NATIONAL QUALITY FORUM

TO: Surgery Endorsement Maintenance Steering Committee

FR: Melinda Murphy, RN, MS and Alexis Forman, MPH

SU: Briefing Materials for Conference Call on June 21, 2011

DA: June 15, 2011

The purpose of this memo to prepare you for the upcoming conference call that is scheduled for **Tuesday, June 21, 3-5 pm ET.**

The purpose of the upcoming conference call is to:

- discuss pediatric heart surgery volume measures;
- review the measure developers' responses to the Committee's suggested modifications for phases I and II measures; and
- continue the discussion of phase II related and competing measures

Please use the following information to access the conference call:

Date/Time: Tuesday, June 21, 3-5 pm ET
Title: Surgery Steering Committee Follow-Up Call
Telephone dial in#: 1-888-218-8059
Access ID: 5969625

Webinar: http://www.MyEventPartner.com/NQForumB4
You will be prompted to enter your name, location (optional), and e-mail address. Then click on "Click here to enter presentation."

For technical support, please e-mail nqf@commpartners.com.

Steering Committee Action:

- Review this briefing memo and attachments.
- Be prepared to discuss measure developer responses and make determination if they are sufficient to proceed to voting.
- Be prepared to discuss related, competing and harmonization issues.

Attachments

1. Agenda
2. Memo: Related and Competing Pediatric and Congenital Cardiac Surgery Volume Measures
3. Table of Committee's Suggested Modifications and Responses from Developers
4. Updated Related and Competing Measure Information
5. Updated Phases I and II Measure Submission Forms

Pediatric and Congenital Heart Surgery Volume Measures
The Committee will start its work by reviewing three competing pediatric and congenital heart surgery volume measures for best in class. Two of these measures are from the *National Voluntary Consensus Standards for Pediatric and Congenital Cardiac Surgery* project and the remaining measure is a phase II maintenance measure. The history of the two measures from the pediatric project along with the measure specifications is included as attachment 2. The 2009 Pediatric Cardiac Surgery Steering Committee evaluated the two new volume measures against the NQF measure evaluation criteria and recommended them for endorsement, but was unable to determine the best measure. Project staff has asked this Committee to provide a recommendation to the Consensus Standards Approval Committee (CSAC) on the best measure or identify specific justification for endorsing more than one measure. Please be sure to review just the **volume** (highlighted in yellow) measures. You will recall that the Committee reviewed the mortality measures and provided feedback at the May in-person meeting.

Phases I and II Follow-Up

Phase I
At the May 4-5 in-person meeting, the Committee made final recommendations for NQF endorsement for all phase I measures with the exception of:

- *0134: Use of internal mammary artery (IMA) in coronary artery bypass graft (CABG)*
    - Committee Suggestion: Please harmonization measures 0134 and 0516 by combining into a single measure which can allow reporting at the provider or institution level.
- *0300: Cardiac patients with controlled 6 am postoperative serum glucose*
    - Committee Suggestion: Change the numerator to 'patients having cardiac surgery whose highest blood sugar between 18 and 24 hours after surgery is 180 mg/dl or less.'

The measure developers have provided their responses regarding the two measures above (see attachment 3-the brown highlighted box). The Committee will decide whether the developers' responses were sufficient to vote on final recommendation for endorsement.

Phase II
The Committee also will review the developers' responses for phase II measures (see attachment 3-the brown highlighted box). The Committee should note their initial vote in light of the responses from the measure developers.

The developers were asked to indicate changes made to the measure submission forms in response to the Committee's suggestions. Updated phases I and II measure submissions forms for measures in which changes were made are in attachment 5. Voting on final recommendation for endorsement for all measures for which additional information is not needed will take place via Survey Monkey. Within a week after the conference call, staff will send the Committee a document outlining the discussion of each measure and provide the voting link. Committee members will be given a week to vote.

Related and Competing Measures
At the May in-person meeting, the Committee began evaluating related measures for harmonization and competing measures for "best in class". Determination of the best measure should be based on the evaluation criteria of *Importance to Measure and Report*, *Scientific Acceptability of Measure Properties*, *Usability*, and *Feasibility*. If the Steering Committee is unable to identify the best (superior) measure, it will need to address the additive value of endorsement of more than one measure. Attachment 4 provides detailed explanations for the determination of competing measures, best in class, harmonization and

added value. It also contains the updated list of measures the NQF staff has identified as related and competing in the Surgery project.

Measure developers will be present on the call to respond to questions at the discretion of the Committee.

If you have any questions regarding the June 21 conference call, do not hesitate to contact Melinda Murphy (mlmurphy@qualityforum.org) or Alexis Forman (aforman@qualityforum.org).

We appreciate your continued dedication and participation on this project.

NATIONAL QUALITY FORUM

National Voluntary Consensus Standards for Pediatric & Congenital Cardiac Surgery

TO: Surgery Endorsement Maintenance Steering Committee
FR: Ashlie Wilbon, NQF Project Manager
SU: Competing Pediatric Cardiac Surgery Mortality & Volume Measures
DA: May 2, 2011

Purpose

This memo provides information on three mortality measures and three volume measures for the pediatric and congenital heart surgery population being evaluated to determine the best measure for NQF endorsement. The Consensus Standards Approval Committee (CSAC) has requested the Surgery Committee' recommendation on "best in class" before taking further action on the measures submitted in a prior project.

Mortality Measures

- **PCS-018-09:** Pre-Operative Mortality Stratified by the Five STS-EACTS Mortality Levels (Society for Thoracic Surgeons) [click here to view submission form]
- **PCS-021-09:** Standardized Mortality Ratio for Congenital Heart Surgery, Risk Adjustment for Congenital Heart Surgery (RACHS-1) Adjusted (Children's Hospital, Boston) [click here to view submission form]
- **0339:** Pediatric Heart Surgery Mortality (PDI 6) (risk adjusted) (AHRQ)

Volume Measures

- **PCS-007-09:** Surgical Volume for Pediatric and Congenital Heart Surgery (Society for Thoracic Surgeons) [click here to view submission form]
- **PCS-008-09:** Surgical Volume for Pediatric and Congenital Heart Surgery, Stratified by the Five STS-EACTS Mortality Levels (Society for Thoracic Surgeons) [click here to view submission form]
- **0340:** Pediatric Heart Surgery Volume (PDI 7) (AHRQ)

Surgery Steering Committee Action:

Using the measure evaluation criteria and draft guidance on reviewing competing measures, provide guidance to the Consensus Standards Approval Committee (CSAC) on the best measure or identify specific justification for endorsing more than one measure.

Background on Competing Pediatric Cardiac Surgery Measures

In 2008 NQF endorsed a pediatric cardiac surgery risk-adjusted mortality measure (0339-PDI 6 by AHRQ) and pediatric heart surgery volume measure (0340-PDI 7 by AHRQ); both of these measures are currently under maintenance review by this Surgery Committee. In 2009, two similar mortality measures and two similar volume measures were submitted to the Pediatric Cardiac Surgery project. The similar mortality measures included a measure of operative mortality stratified by the STS-EACTS complexity stratification tool (PCS-018-09 by STS), and the other a standardized mortality ratio (SMR) [PCS-021-09 by Children's Hospital, Boston (CHB)] using the RACHS-1 method in a statistical risk-adjustment model. The similar volume measures included a surgical volume measure (PCS-007-09 by STS) and a volume

measure stratifying by mortality levels using the STS-EACTS tool (PCS-008-09 by STS). At the time of the pediatric project, the AHRQ measures were not up for endorsement maintenance.

The 2009 Pediatric Cardiac Surgery Steering Committee evaluated the two new mortality measures and the two new volume measures against the 2009 NQF measure evaluation criteria and recommended them for endorsement, but was unable to determine the best measures. The NQF Board has recently re-emphasized NQF's policy to endorse one measure on a particular topic whenever possible and the CSAC has developed guidance to assist steering committees in their review of competing measures (see attached competing measures guidance). Because the AHRQ measures are now undergoing review for endorsement maintenance, the CSAC has requested that the Surgery Steering Committee review all six measures and make recommendations regarding identification of the best measure before it takes action on the two new measures held over from the Pediatric Cardiac Surgery Project. Based on recent discussions with the Board, a clear rationale and justification would be required if more than one measure in the same topical area for the same patient population is recommended for endorsement.

Comparing the Pediatric Heart Surgery Mortality and Volume Measures

Although these measures focus on the same outcome of mortality in the same target population of patients, there are some differences in data source, exclusions, and risk adjustment methodology. The STS measure (PCS-09-018) is based on clinical data submitted according to the STS registry specifications; it produces a rate for each EACTS risk category. The CHB measure (PCS-09-021) is based on either claims data or clinical record data; it is risk adjusted and produces a standardized mortality ratio. The endorsed AHRQ measure (0339) is based on claims data and produces a risk adjusted rate per 1000 patients.

NQF aims to endorse the measure that provides the best representation of quality of care. For all three measures, evidence of risk model validation was presented. The reported C-statistics indicate adequate discrimination: AHRQ measure 0339: 0.875; STS measure PCS-09-018: 0.778-0.812; CHB measure PCS-09-021: 0.809 – 0.854.

The differences in the volume measures lie in the data sources and the methodologies used. Endorsed measure #0340 is a measure of raw volume using administrative claims data. Most similar to this measure is submitted measure PCS-09-007 which also measures raw volume, but using registry data. The third volume measure, PCS-09-008, stratifies volume for the five most complex risk categories also using registry data.

The tables below provide a side-by-side comparison of the specifications for the competing mortality and volume measures.

A summary of the Pediatric Cardiac Surgery Steering Committee's evaluation of the measures follows the specs tables.

Competing Mortality Measures

	Measure# PCS-018-09	Measure# PCS-021-09	Measure #0339
Title	Pre-Operative Mortality Stratified by the Five STS-EACTS Mortality Levels	Standardized Mortality Ratio for Congenital Heart Surgery, Risk Adjustment for Congenital Heart Surgery (RACHS-1) Adjusted.	Pediatric Heart Surgery Mortality (PDI 6) (risk adjusted)
Status	Recommended for Endorsement	Recommended for Endorsement	Under Endorsement-Maintenance Review
Steward	Society of Thoracic Surgeons	Program for Patient Safety and Quality, Children's Hospital Boston	Agency for Healthcare Research & Quality
Description	Operative mortality stratified by the five STS-EACTS Mortality Levels, a multi-institutional validated complexity stratification tool.	Ratio of observed to expected rate of in-hospital mortality following surgical repair of congenital heart defect among patients <18 years of age, risk-adjusted using the Risk Adjustment for Congenital Heart Surgery (RACHS-1) method.	Percentage of cases undergoing surgery for congenital heart disease with an in-hospital death.
Numerator	Number of patients who undergo pediatric and congenital open heart surgery and die during either of the following two time intervals: 1. Prior to hospital discharge 2. Within 30 days of the date of surgery	Cases of congenital heart surgery among patients <18 years of age resulting in in-hospital death.	Number of deaths (DISP=20) among cases meeting the inclusion and exclusion rules for the denominator with a code of pediatric heart surgery with ICD-9-CM diagnosis of congenital heart disease in any field.
Numerator Details		Number of cases of congenital heart surgery among patients <18 years of age able to be placed into a RACHS-1 risk category (see item 8 below) where patient disposition is death prior to hospital discharge.	Number of deaths (DISP=20) among cases meeting the inclusion and exclusion rules for the denominator with a code of pediatric heart surgery with ICD-9-CM diagnosis of congenital heart disease in any field.
Denominator	Number of index cardiac operations in each level of complexity stratification using the five STS-EACTS Mortality Levels, a multi-	Total cases of congenital heart surgery among patients <18 years of age.	Discharges under age 18 with ICD-9-CM procedure codes for congenital heart disease (1P) in any field or non-specific heart surgery (2P) in any field with ICD-9-CM

	Measure# PCS-018-09	Measure# PCS-021-09	Measure #0339
	institutional validated complexity stratification tool		diagnosis of congenital heart disease (2D) in any field.
Denominator Details	As demonstrated in the following publication (STS Attachment 1 (of 2) - O'Brien et al, JTCVS, Nov 2009), the five STS-EACTS Mortality Levels constitute an objective and empirically based tool for complexity stratification. In addition, it represents an improvement over existing consensus-based tools. Definition: The number of patients who undergo pediatric and congenital Cardiac Operation - Cardiac operations are defined as operations that are of operation types of "CPB" or "No CPB Cardiovascular". (CPB is cardiopulmonary bypass.) [1]. Definition: The number of index cardiac operations in each level of complexity stratification using the five STS-EACTS Mortality Levels, a multi-institutional validated complexity stratification tool. The following are STS procedure codes for pediatric and congenital cardiac operations per the STS Congenital Heart Surgery Database Version 3.0 Data Specifications. Analysis should include any index operation performed with any of the	Pediatric cases <18 years of age undergoing surgical repair of a congenital heart defect and able to be placed into a RACHS-1 risk category (see item 8 below).	Discharges under age 18 with ICD-9-CM procedure codes for congenital heart disease (1P) or non-specific heart surgery (2P) with ICD-9-CM diagnosis of congenital heart disease (2D) in any field. Congenital heart disease procedures (1P): 3500 CLOSED VALVOTOMY NOS 3501 CLOSED AORTIC VALVOTOMY 3502 CLOSED MITRAL VALVOTOMY 3503 CLOSED PULMON VALVOTOMY 3504 CLOSED TRICUSP VALVOTOMY 3510 OPEN VALVULOPLASTY NOS 3511 OPN AORTIC VALVULOPLASTY 3512 OPN MITRAL VALVULOPLASTY 3513 OPN PULMON VALVULOPLASTY 3514 OPN TRICUS VALVULOPLASTY 3520 REPLACE HEART VALVE NOS 3521 REPLACE AORT VALV-TISSUE

	Measure# PCS-018-09	Measure# PCS-021-09	Measure #0339
	following component procedures on a patient with pediatric and/or congenital cardiac disease: STS Denominator Codes: 10, 20, 30, 40, 2110, 50, 60, 70, 80, 85, 100, 110, 120, 130, 140, 150, 170, 180, 190, 2300, 2250, 2230, 210, 220, 230, 240, 2290, 250, 2220, 260, 270, 2120, 280, 2200, 290, 300, 310, 330, 340, 350, 360, 370, 380, 390, 400, 420, 430, 440, 450, 460, 2280, 465, 470, 480, 490, 500, 510, 520, 530, 540, 550, 570, 590, 2270, 600, 630, 640, 650, 610, 620, 1774, 1772, 580, 660, 2240, 2310, 2320, 670, 680, 690, 700, 715, 720, 730, 735, 740, 750, 760, 770, 780, 2100, 790, 800, 810, 820, 830, 2260, 840, 850, 860, 870, 880, 2160, 2170, 2180, 2140, 2150, 890, 900, 910, 920, 930, 940, 950, 960, 970, 980, 1000, 1010, 1025, 1030, 2340, 1035, 1050, 1060, 1070, 1080, 1090, 1110, 1120, 1123, 1125, 1130, 1140, 1145, 1150, 1160, 2190, 2210, 1180, 1200, 1210, 1220, 1230, 1240, 1250, 1260, 1275, 1280, 1285, 1290, 1291, 1300, 1310, 1320, 1330, 1340, 1360, 1365, 1370, 1380, 1390, 1410, 1450, 1460, 2350, 1470, 1480, 1490, 1500, 1590, 1600, 1610, 1630, 2095, 1640, 1650, 1660, 1670, 1680, 1690, 1700, 2330,		3522 REPLACE AORTIC VALVE NEC 3523 REPLACE MITR VALV-TISSUE 3524 REPLACE MITRAL VALVE NEC 3525 REPLACE PULM VALV-TISSUE 3526 REPLACE PULMON VALVE NEC 3527 REPLACE TRIC VALV-TISSUE 3528 REPLACE TRICUSP VALV NEC 3531 PAPILLARY MUSCLE OPS 3532 CHORDAE TENDINEAE OPS 3533 ANNULOPLASTY 3534 INFUNDIBULECTOMY 3535 TRABECUL CARNEAE CORD OP 3539 TISS ADJ TO VALV OPS NEC 3541 ENLARGE EXISTING SEP DEF 3542 CREATE SEPTAL DEFECT 3550 PROSTH REP HRT SEPTA NOS 3551

	Measure# PCS-018-09	Measure# PCS-021-09	Measure #0339
	2130, 1720, 1730, 1740, 1760, 1780, 1790, 1802, 1804, 1830, 1860 **Please find data definitions in STS Attachment 2 (of 2) - STS Procedure Code Definitions. Pediatric heart surgery is heart surgery on patients <18 years of age to treat congenital or acquired cardiac disease. Congenital heart surgery is heart surgery on patients of any age to treat congenital cardiac disease. Our measures apply to both pediatric heart surgery and congenital heart surgery, thus applying to the following operations: 1. heart surgery on patients less than 18 years of age to treat congenital or acquired cardiac disease 2. heart surgery on patients of any age to treat congenital cardiac disease		PROS REP ATRIAL DEF-OPN 3552 PROS REPAIR ATRIA DEF-CL 3553 PROST REPAIR VENTRIC DEF 3554 PROS REP ENDOCAR CUSHION 3560 GRFT REPAIR HRT SEPT NOS 3561 GRAFT REPAIR ATRIAL DEF 3562 GRAFT REPAIR VENTRIC DEF 3563 GRFT REP ENDOCAR CUSHION 3570 HEART SEPTA REPAIR NOS 3571 ATRIA SEPTA DEF REP NEC 3572 VENTR SEPTA DEF REP NEC 3573 ENDOCAR CUSHION REP NEC 3581 TOT REPAIR TETRAL FALLOT 3582 TOTAL REPAIR OF TAPVC 3583 TOT REP TRUNCUS ARTERIOS 3584 TOT COR TRANSPOS GRT VES 3591 INTERAT VEN RETRN TRANSP

	Measure# PCS-018-09	Measure# PCS-021-09	Measure #0339
			3592 CONDUIT RT VENT-PUL ART 3593 CONDUIT LEFT VENTR-AORTA 3594 CONDUIT ARTIUM-PULM ART 3595 HEART REPAIR REVISION 3598 OTHER HEART SEPTA OPS 3599 OTHER OP ON HRT VALVES 3699 OTHER OPERATIONS ON VESSEL OF HEART 3733 EXCISION OR DESTRUCTION OF OTHER LESION OR TISSUE OF HEART 3736 EXCISION OR DESTRUCTION OF LEFT ATRIAL APPENDAGE (LAA) OCT08- 375 HEART TRANSPLANTATION (invalid as of OCT03) 3751 HEART TRANSPLANTATION OCT03- 3752 IMPLANT TOT REP HRT SYS OCT03- 390 SYSTEMIC-PULM ART SHUNT 3921 CAVAL-PULMON ART ANASTOM

	Measure# PCS-018-09	Measure# PCS-021-09	Measure #0339
			Non-specific cardiac procedures (2P): 3834 RESECTION OF ABDOMINAL AORTA WITH ANASTOMOSIS 3835 THOR VESSEL RESECT/ANAST 3844 RESECTION OF ABDOMINAL AORTA WITH REPLACEMENT 3845 RESECT THORAC VES W REPL 3864 OTHER EXCISION OF ABDOMINAL AORTA 3865 OTHER EXCISION OF THORACIC VESSEL 3884 OTHER SURGICAL OCCLUSION OF ABDOMINAL AORTA 3885 OCCLUDE THORACIC VES NEC 3949 OTHER REVISION OF VASCULAR PROCEDURE 3956 REPAIR OF BLOOD VESSEL WITH TISSUE PATCH GRAFT 3957 REPAIR OF BLOOD VESSEL WITH SYNTHETIC PATCH GRAFT 3958 REPAIR OF BLOOD VESSEL WITH

	Measure# PCS-018-09	Measure# PCS-021-09	Measure #0339
			UNSPECIFIED TYPE OF PATCH GRAFT 3959 REPAIR OF VESSEL NEC Congenital heart disease diagnoses (2D): 7450 COMMON TRUNCUS 74510 COMPL TRANSPOS GREAT VES 74511 DOUBLE OUTLET RT VENTRIC 74512 CORRECT TRANSPOS GRT VES 74519 TRANSPOS GREAT VESS NEC 7452 TETRALOGY OF FALLOT 7453 COMMON VENTRICLE 7454 VENTRICULAR SEPT DEFECT 7455 SECUNDUM ATRIAL SEPT DEF 74560 ENDOCARD CUSHION DEF NOS 74561 OSTIUM PRIMUM DEFECT 74569 ENDOCARD CUSHION DEF NEC 7457 COR BILOCULARE 7458 SEPTAL CLOSURE ANOM NEC

	Measure# PCS-018-09	Measure# PCS-021-09	Measure #0339
			7459 SEPTAL CLOSURE ANOM NOS 74600 PULMONARY VALVE ANOM NOS 74601 CONG PULMON VALV ATRESIA 74602 CONG PULMON VALVE STENOS 74609 PULMONARY VALVE ANOM NEC 7461 CONG TRICUSP ATRES/STEN 7462 EBSTEIN'S ANOMALY 7463 CONG AORTA VALV STENOSIS 7464 CONG AORTA VALV INSUFFIC 7465 CONGEN MITRAL STENOSIS 7466 CONG MITRAL INSUFFICIENC 7467 HYPOPLAS LEFT HEART SYND 74681 CONG SUBAORTIC STENOSIS 74682 COR TRIATRIATUM 74683 INFUNDIB PULMON STENOSIS 74684 OBSTRUCT HEART ANOM NEC 74685

	Measure# PCS-018-09	Measure# PCS-021-09	Measure #0339
			CORONARY ARTERY ANOMALY 74687 MALPOSITION OF HEART 74689 CONG HEART ANOMALY NEC 7469 CONG HEART ANOMALY NOS 7470 PATENT DUCTUS ARTERIOSUS 74710 COARCTATION OF AORTA 74711 INTERRUPT OF AORTIC ARCH 74720 CONG ANOM OF AORTA NOS 74721 ANOMALIES OF AORTIC ARCH 74722 AORTIC ATRESIA/STENOSIS 74729 CONG ANOM OF AORTA NEC 7473 PULMONARY ARTERY ANOM 74740 GREAT VEIN ANOMALY NOS 74741 TOT ANOM PULM VEN CONNEC 74742 PART ANOM PULM VEN CONN 74749 GREAT VEIN ANOMALY NEC
Exclusions	Any operation that is not a pediatric or congenital Cardiac Operation.	Patients >=18 years of age, those undergoing heart transplantation,	Exclude cases: • MDC 14 (pregnancy, childbirth and

	Measure# PCS-018-09	Measure# PCS-021-09	Measure #0339
	Cardiac operations are defined as operations that are of operation types of "CPB" or "No CPB Cardiovascular" (CPB is cardiopulmonary bypass.) [1]. Any operation that is a pediatric or congenital open heart surgery (operation types of "CPB" or "No CPB Cardiovascular") that cannot be classified into a level of complexity by the five STS-EACTS Mortality Levels.	neonates or premature infants with patent ductus arteriosus repair as the only cardiac surgical procedure, transcatheter interventions, surgical cases unable to be assigned to a RACHS-1 risk category.	pueperium) • with transcatheter interventions (either 3AP, 3BP, 3CP, 3DP, 3EP with 3D, or 3FP) as single cardiac procedures, performed without bypass (5P) but with catheterization (6P) • with septal defects (4P) as single cardiac procedures without bypass (5P) • with diagnosis of ASD or VSD (5D) with PDA as the only cardiac procedure • heart transplant (7P) • premature infants (4D) with PDA closure (3D and 3EP) as only cardiac procedure; • age less than or equal to 30 days with PDA closure as only cardiac procedure • missing discharge disposition (DISP=missing), gender (SEX=missing), age (AGE=missing), quarter (DQTR=missing), year (YEAR=missing) or principal diagnosis (DX1 =missing) • transferring to another short-term hospital (DISP=2) • neonates with birth weight less than 500 grams (Birth Weight Category 1)
Exclusion Details		Neonates are defined as patients <=30 days of age at surgery; premature infants are defined as <37 weeks gestation. See item 8 for RACHS-1 risk categories.	Exclude cases: • MDC 14 (pregnancy, childbirth and pueperium) • with transcatheter interventions (either 3AP, 3BP, 3CP, 3DP, 3EP with 3D, or 3FP) as single cardiac procedures, performed without bypass (5P) but with catheterization (6P) • with septal defects (4P) as single cardiac

	Measure# PCS-018-09	Measure# PCS-021-09	Measure #0339
			procedures without bypass (5P) • with diagnosis of ASD or VSD (5D) with PDA as the only cardiac procedure • heart transplant (7P) • premature infants (4D) with PDA closure (3D and 3EP) as only cardiac procedure; • age less than or equal to 30 days with PDA closure as only cardiac procedure • missing discharge disposition (DISP=missing), gender (SEX=missing), age (AGE=missing), quarter (DQTR=missing), year (YEAR=missing) or principal diagnosis (DX1 =missing) • transferring to another short-term hospital (DISP=2) • neonates with birth weight less than 500 grams (Birth Weight Category 1)
Methods & Risk Adjustment	Stratified by the five STS-EACTS Mortality Levels, a multi-institutional validated complexity stratification tool.	Uses a statistical risk modelRACHS-1 risk categories, age at surgery, prematurity, presence of major non-cardiac structural anomaly, combinations of cardiac procedures performed.	PQI: The predicted value for each case is computed using a logistic regression model and covariates for gender and age in years (in 5-year age groups). The reference population used in the model is the universe of discharges for states that participate in the HCUP State Inpatient Databases (SID) for the year 2007 (updated annually), a database consisting of 43 states and approximately 30 million adult discharges. The expected rate is computed as the sum of the predicted value for each case divided by the number of cases for the unit of analysis of interest (i.e., county, state, and region). The risk adjusted rate is computed using indirect standardization as the observed rate

	Measure# PCS-018-09	Measure# PCS-021-09	Measure #0339
			divided by the expected rate, multiplied by the reference population rate The model includes additional covariates for RACHS-1 risk categories. Required data elements: CMS Diagnosis Related Group (DRG); CMS Major Diagnostic Category (MDC); age in days up to 364, then age years at admission; International Classification of Diseases, Ninth Revision, Clinical Modification (ICD-9-CM) principal and secondary diagnosis codes.
Risk Model Performance Statistics	C-statistics: STS-EACTS Congenital Heart Surgery Mortality Categories (2009) Model without patient covariates: C = 0.778 Model with patient covariates: C = 0.812	I -- Validation of Risk Adjustment Model Original derivation of RACHS-1: (1) Pediatric Cardiac Care Consortium (PCCC) database 1996; 4370 cases from 32 institutions. (2) Hospital discharge data from three states (Illinois 1994, Massachusetts 1995, California 1995); 3646 total cases. Subsequent validation: (3) 1996 hospital discharge data from six states (California, Illinois, Massachusetts, New York, Pennsylvania, Washington); 4318 total cases. (4) Retrospectively collected primary data from a newly created pediatric cardiac care program in Guatemala, 1997-2004; 1215 total cases. (5) Kids' Inpatient Database (KID) 2000; 12717 total cases. Other uses:	We performed a cross-sectional analysis of California hospital discharges from 2005–2007 for patients aged <18 years. [1] Agency for Healthcare Research and Quality pediatric-specific quality indicators were used to identify adverse events in 431524 discharges from 38 freestanding, academic, not-for-profit, tertiary care pediatric hospitals in the United States participating in the Pediatric Health Information System database in 2006. [2] References [1] Bardach NS, Chien AT, Dudley RA. Small numbers limit the use of the inpatient pediatric quality indicators for hospital comparison. Acad Pediatr. 2010 Jul-Aug;10(4):266-73. PMID: 20599180; doi:10.1016/j.acap.2010.04.025.

	Measure# PCS-018-09	Measure# PCS-021-09	Measure #0339
		(6) Kids' Inpatient Database (KID) 2003; 11395 total cases. (7) Pediatric Health Information System (PHIS) 2002-2006; 45621 total cases. Risk Model C-Statistics: (1) Area under the ROC curve for the full RACHS-1 model 0.811; p value for Hosmer-Lemeshow test 0.34. (2) Area under the ROC curve 0.814; p value for Hosmer-Lemeshow test 0.21. (3) Area under the ROC curve 0.818; p value for Hosmer-Lemeshow test 0.83. (4) Area under the ROC curve 0.854. (5) Area under the ROC curve 0.828; p value for Hosmer-Lemeshow test 0.66. (6) Area under the ROC curve 0.809; p value for Hosmer-Lemeshow test 0.18. (7) Area under the ROC curve 0.822; p value for Hosmer-Lemeshow test 0.08.	[2] Kronman MP, Hall M, Slonim AD, Shah SS. Charges and lengths of stay attributable to adverse patient-care events using pediatric-specific quality indicators: a multicenter study of freestanding children´s hospitals. Pediatrics. 2008 Jun;121(6):e1653-9. PMID: 18519468; DOI: http://dx.doi.org/10.1542/peds.2007-2831.
Data Source	Paper Medical Record, Electronic Clinical Registry, Electronic Clinical Database, Electronic Health/Medical Record	Paper Medical Record, Electronic Clinical Database, Electronic Health/Medical Record, Other	Electronic administrative data/claims
Level	Community/Population, Health Plan, Group of clinicians (facility, dept/unit, group), Facility (e.g., hospital, nursing home)	Facility (e.g., hospital, nursing home)	Facility/Agency
Setting	Hospital	Hospital	Hospital

Competing Volume Measures

	Measure# PCS-007-09	Measure# PCS-008-09	Measure # 0340
Title	Surgical Volume for Pediatric and Congenital Heart Surgery	Surgical Volume for Pediatric and Congenital Heart Surgery, Stratified by the Five STS-EACTS Mortality Levels	Pediatric Heart Surgery Volume (PDI 7)
Status	Recommended for Time-Limited Endorsement	Recommended for Time-Limited Endorsement	Under Endorsement-Maintenance Review
Steward	Society of Thoracic Surgeons	Society of Thoracic Surgeons	Agency for Healthcare Research and Quality
Description	Surgical Volume for Pediatric and Congenital Heart Surgery	Surgical volume for pediatric and congenital heart surgery stratified by the five STS-EACTS Mortality Levels, a multi-institutional validated complexity stratification tool	Number of discharges with procedure for pediatric heart surgery
Numerator	Number of pediatric and congenital heart surgery operations	Number of pediatric and congenital cardiac surgery operations (types "CPB" and "No-CPB Cardiovascular") in each of the strata of complexity specified by the five STS-EACTS Mortality Levels, a multi-institutional validated complexity stratification tool.	Discharges under age 18 with ICD-9-CM procedure codes for either congenital heart disease (1P) in any field or non-specific heart surgery (2P) with ICD-9-CM diagnosis of congenital heart disease (2D) in any field.
Denominator	N/A	N/A	This measure does not have a denominator due to the fact it is a volume measure.
Exclusions	Measure Exclusions: Any operation that is not a pediatric or congenital Cardiac Operation. Cardiac operations are defined as operations that are of operation types of "CPB" or "No CPB Cardiovascular". (CPB is cardiopulmonary bypass.) [1].	Any operation that is not a pediatric or congenital Cardiac Operation. Cardiac operations are defined as operations that are of operation types of "CPB" or "No CPB Cardiovascular" (CPB is cardiopulmonary bypass.) [1]. Any operation that is a pediatric or congenital open heart surgery (operation types of "CPB" or "No CPB	N/A

	Measure# PCS-007-09	Measure# PCS-008-09	Measure # 0340
		Cardiovascular") that cannot be classified into a level of complexity by the five STS-EACTS Mortality Levels.	
Methods & Risk Adjustment	N/A	N/A	N/A
Numerator Details	Cardiac operations are defined as operations that are of operation types "CPB" or "No CPB Cardiovascular" (CPB is cardiopulmonary bypass.) [1]. The following are STS procedure codes for pediatric and congenital cardiac operations per the STS Congenital Heart Surgery Database Version 3.0 Data Specifications. Analysis should include any index operation performed with any of the following component procedures on a patient with pediatric and/or congenital cardiac disease: 10, 20, 30, 40, 2110, 50, 60, 70, 80, 85, 100, 110, 120, 130, 140, 150, 170, 180, 190, 2300, 2250, 2230, 210, 220, 230, 240, 2290, 250, 2220, 260, 270, 2120, 280, 2200, 290, 300, 310, 330, 340, 350, 360, 370, 380, 390, 400, 420, 430, 440, 450, 460, 2280, 465, 470, 480, 490, 500, 510, 520, 530, 540, 550, 570, 590, 2270, 600, 630, 640, 650, 610, 620, 1774, 1772, 580, 660, 2240, 2310, 2320,	There are currently three validated systems of Complexity Stratification in use to categorize operations for pediatric and congenital heart disease on the basis of complexity. Each of these is used in some registry databases, and data is currently stratified using each of the three systems in the most recent outcome reports of the Society of Thoracic Surgery Congenital Heart Surgery database. The three systems are: 1. the RACHS-1 (Risk Adjustment in Congenital Heart Surgery) System with 5 functional levels; 2. The Aristotle Basic Complexity Score with 4 levels; and 3. STS-EACTS Mortality Levels (5 levels). As demonstrated in the following publication (STS Attachment 1 (of 2) - O'Brien et al, JTCVS, Nov 2009), the five STS-EACTS Mortality Levels constitute an objective and empirically based tool for complexity stratification. In addition, it represents an improvement over existing consensus-based tools. Numerator definition: The number of patients who undergo pediatric and	Discharges under age 18 with ICD-9-CM procedure codes for either congenital heart disease (1P) or non-specific heart surgery (2P) with ICD-9-CM diagnosis of congenital heart disease (2D) in any field. Congenital heart disease procedures (1P): 3500 CLOSED VALVOTOMY NOS 3501 CLOSED AORTIC VALVOTOMY 3502 CLOSED MITRAL VALVOTOMY 3503 CLOSED PULMON VALVOTOMY 3504 CLOSED TRICUSP VALVOTOMY 3510 OPEN VALVULOPLASTY NOS 3511 OPN AORTIC VALVULOPLASTY 3512 OPN MITRAL VALVULOPLASTY 3513 OPN PULMON VALVULOPLASTY 3514 OPN TRICUS VALVULOPLASTY 3520

	Measure# PCS-007-09	Measure# PCS-008-09	Measure # 0340
	670, 680, 690, 700, 715, 720, 730, 735, 740, 750, 760, 770, 780, 2100, 790, 800, 810, 820, 830, 2260, 840, 850, 860, 870, 880, 2160, 2170, 2180, 2140, 2150, 890, 900, 910, 920, 930, 940, 950, 960, 970, 980, 1000, 1010, 1025, 1030, 2340, 1035, 1050, 1060, 1070, 1080, 1090, 1110, 1120, 1123, 1125, 1130, 1140, 1145, 1150, 1160, 2190, 2210, 1180, 1200, 1210, 1220, 1230, 1240, 1250, 1260, 1275, 1280, 1285, 1290, 1291, 1300, 1310, 1320, 1330, 1340, 1360, 1365, 1370, 1380, 1390, 1410, 1450, 1460, 2350, 1470, 1480, 1490, 1500, 1590, 1600, 1610, 1630, 2095, 1640, 1650, 1660, 1670, 1680, 1690, 1700, 2330, 2130, 1720, 1730, 1740, 1760, 1780, 1790, 1802, 1804, 1830, 1860 **Please find data definitions in STS Attachment 2 (of 2) - STS Procedure Code Definitions. Pediatric heart surgery is heart surgery on patients <18 years of age to treat congenital or acquired cardiac disease. Congenital heart surgery is heart surgery on patients of any age to treat congenital cardiac disease. Our measures apply to both pediatric heart surgery and congenital heart	congenital Cardiac Operation - Cardiac operations are defined as operations that are of operation types of "CPB" or "No CPB Cardiovascular". (CPB is cardiopulmonary bypass.) [1].Numerator definition: The number of index cardiac operations in each level of complexity stratification using the five STS-EACTS Mortality Levels, a multi-institutional validated complexity stratification tool. The following are STS procedure codes for pediatric and congenital cardiac operations per the STS Congenital Heart Surgery Database Version 3.0 Data Specifications. Analysis should include any index operation performed with any of the following component procedures on a patient with pediatric and/or congenital cardiac disease: 10, 20, 30, 40, 2110, 50, 60, 70, 80, 85, 100, 110, 120, 130, 140, 150, 170, 180, 190, 2300, 2250, 2230, 210, 220, 230, 240, 2290, 250, 2220, 260, 270, 2120, 280, 2200, 290, 300, 310, 330, 340, 350, 360, 370, 380, 390, 400, 420, 430, 440, 450, 460, 2280, 465, 470, 480, 490, 500, 510, 520, 530, 540, 550, 570, 590, 2270, 600, 630, 640, 650, 610, 620, 1774, 1772, 580, 660, 2240, 2310, 2320, 670, 680, 690, 700, 715, 720, 730, 735, 740, 750, 760, 770, 780, 2100, 790, 800, 810, 820, 830, 2260, 840, 850, 860, 870, 880, 2160, 2170, 2180, 2140, 2150, 890, 900, 910, 920,	REPLACE HEART VALVE NOS 3521 REPLACE AORT VALV-TISSUE 3522 REPLACE AORTIC VALVE NEC 3523 REPLACE MITR VALV-TISSUE 3524 REPLACE MITRAL VALVE NEC 3525 REPLACE PULM VALV-TISSUE 3526 REPLACE PULMON VALVE NEC 3527 REPLACE TRIC VALV-TISSUE 3528 REPLACE TRICUSP VALV NEC 3531 PAPILLARY MUSCLE OPS 3532 CHORDAE TENDINEAE OPS 3533 ANNULOPLASTY 3534 INFUNDIBULECTOMY 3535 TRABECUL CARNEAE CORD OP 3539 TISS ADJ TO VALV OPS NEC 3541 ENLARGE EXISTING SEP DEF 3542 CREATE SEPTAL DEFECT

	Measure# PCS-007-09	Measure# PCS-008-09	Measure # 0340
	surgery, thus applying to the following operations: 1. heart surgery on patients less than 18 years of age to treat congenital or acquired cardiac disease 2. heart surgery on patients of any age to treat congenital cardiac disease	930, 940, 950, 960, 970, 980, 1000, 1010, 1025, 1030, 2340, 1035, 1050, 1060, 1070, 1080, 1090, 1110, 1120, 1123, 1125, 1130, 1140, 1145, 1150, 1160, 2190, 2210, 1180, 1200, 1210, 1220, 1230, 1240, 1250, 1260, 1275, 1280, 1285, 1290, 1291, 1300, 1310, 1320, 1330, 1340, 1360, 1365, 1370, 1380, 1390, 1410, 1450, 1460, 2350, 1470, 1480, 1490, 1500, 1590, 1600, 1610, 1630, 2095, 1640, 1650, 1660, 1670, 1680, 1690, 1700, 2330, 2130, 1720, 1730, 1740, 1760, 1780, 1790, 1802, 1804, 1830, 1860 **Please find data definitions in STS Attachment 2 (of 2) - STS Procedure Code Definitions. Pediatric heart surgery is heart surgery on patients <18 years of age to treat congenital or acquired cardiac disease. Congenital heart surgery is heart surgery on patients of any age to treat congenital cardiac disease. Our measures apply to both pediatric heart surgery and congenital heart surgery, thus applying to the following operations: 1. heart surgery on patients less than 18 years of age to treat congenital or acquired cardiac disease 2. heart surgery on patients of any age to treat congenital cardiac disease	3550 PROSTH REP HRT SEPTA NOS 3551 PROS REP ATRIAL DEF-OPN 3552 PROS REPAIR ATRIA DEF-CL 3553 PROST REPAIR VENTRIC DEF 3554 PROS REP ENDOCAR CUSHION 3560 GRFT REPAIR HRT SEPT NOS 3561 GRAFT REPAIR ATRIAL DEF 3562 GRAFT REPAIR VENTRIC DEF 3563 GRFT REP ENDOCAR CUSHION 3570 HEART SEPTA REPAIR NOS 3571 ATRIA SEPTA DEF REP NEC 3572 VENTR SEPTA DEF REP NEC 3573 ENDOCAR CUSHION REP NEC 3581 TOT REPAIR TETRAL FALLOT 3582 TOTAL REPAIR OF TAPVC 3583 TOT REP TRUNCUS ARTERIOS 3584

	Measure# PCS-007-09	Measure# PCS-008-09	Measure # 0340
			TOT COR TRANSPOS GRT VES 3591 INTERAT VEN RETRN TRANSP 3592 CONDUIT RT VENT-PUL ART 3593 CONDUIT LEFT VENTR-AORTA 3594 CONDUIT ARTIUM-PULM ART 3595 HEART REPAIR REVISION 3598 OTHER HEART SEPTA OPS 3599 OTHER OP ON HRT VALVES 3699 OTHER OPERATIONS ON VESSEL OF HEART 3733 EXCISION OR DESTRUCTION OF OTHER LESION OR TISSUE OF HEART 3736 EXCISION OR DESTRUCTION OF LEFT ATRIAL APPENDAGE (LAA) OCT08- 375 HEART TRANSPLANTATION (invalid as of OCT03) 3751 HEART TRANSPLANTATION OCT03- 3752 IMPLANT TOT REP HRT SYS OCT03- 390 SYSTEMIC-PULM ART SHUNT

	Measure# PCS-007-09	Measure# PCS-008-09	Measure # 0340
			3921 CAVAL-PULMON ART ANASTOM Non-specific cardiac procedures (2P): 3834 RESECTION OF ABDOMINAL AORTA WITH ANASTOMOSIS 3835 THOR VESSEL RESECT/ANAST 3844 RESECTION OF ABDOMINAL AORTA WITH REPLACEMENT 3845 RESECT THORAC VES W REPL 3864 OTHER EXCISION OF ABDOMINAL AORTA 3865 OTHER EXCISION OF THORACIC VESSEL 3884 OTHER SURGICAL OCCLUSION OF ABDOMINAL AORTA 3885 OCCLUDE THORACIC VES NEC 3949 OTHER REVISION OF VASCULAR PROCEDURE 3956 REPAIR OF BLOOD VESSEL WITH TISSUE PATCH GRAFT 3957 REPAIR OF BLOOD VESSEL WITH

	Measure# PCS-007-09	Measure# PCS-008-09	Measure # 0340
			SYNTHETIC PATCH GRAFT 3958 REPAIR OF BLOOD VESSEL WITH UNSPECIFIED TYPE OF PATCH GRAFT 3959 REPAIR OF VESSEL NEC Congenital heart disease diagnoses (2D): 7450 COMMON TRUNCUS 74510 COMPL TRANSPOS GREAT VES 74511 DOUBLE OUTLET RT VENTRIC 74512 CORRECT TRANSPOS GRT VES 74519 TRANSPOS GREAT VESS NEC 7452 TETRALOGY OF FALLOT 7453 COMMON VENTRICLE 7454 VENTRICULAR SEPT DEFECT 7455 SECUNDUM ATRIAL SEPT DEF 74560 ENDOCARD CUSHION DEF NOS 74561 OSTIUM PRIMUM DEFECT 74569 ENDOCARD CUSHION DEF NEC 7457

	Measure# PCS-007-09	Measure# PCS-008-09	Measure # 0340
			COR BILOCULARE 7458 SEPTAL CLOSURE ANOM NEC 7459 SEPTAL CLOSURE ANOM NOS 74600 PULMONARY VALVE ANOM NOS 74601 CONG PULMON VALV ATRESIA 74602 CONG PULMON VALVE STENOS 74609 PULMONARY VALVE ANOM NEC 7461 CONG TRICUSP ATRES/STEN 7462 EBSTEIN'S ANOMALY 7463 CONG AORTA VALV STENOSIS 7464 CONG AORTA VALV INSUFFIC 7465 CONGEN MITRAL STENOSIS 7466 CONG MITRAL INSUFFICIENC 7467 HYPOPLAS LEFT HEART SYND 74681 CONG SUBAORTIC STENOSIS 74682 COR TRIATRIATUM 74683 INFUNDIB PULMON STENOSIS

	Measure# PCS-007-09	Measure# PCS-008-09	Measure # 0340
			74684 OBSTRUCT HEART ANOM NEC 74685 CORONARY ARTERY ANOMALY 74687 MALPOSITION OF HEART 74689 CONG HEART ANOMALY NEC 7469 CONG HEART ANOMALY NOS 7470 PATENT DUCTUS ARTERIOSUS 74710 COARCTATION OF AORTA 74711 INTERRUPT OF AORTIC ARCH 74720 CONG ANOM OF AORTA NOS 74721 ANOMALIES OF AORTIC ARCH 74722 AORTIC ATRESIA/STENOSIS 74729 CONG ANOM OF AORTA NEC 7473 PULMONARY ARTERY ANOM 74740 GREAT VEIN ANOMALY NOS 74741 TOT ANOM PULM VEN CONNEC 74742 PART ANOM PULM VEN CONN 74749

	Measure# PCS-007-09	Measure# PCS-008-09	Measure # 0340
			GREAT VEIN ANOMALY NEC Exclude cases: • MDC 14 (pregnancy, childbirth and pueperium) • with transcatheter interventions (either 3AP, 3BP, 3CP, 3DP, 3EP with 3D, or 3FP) as single cardiac procedures, performed without bypass (5P) but with catheterization (6P); • with septal defects (4P) as single cardiac procedures without bypass (5P) Transcatheter interventions procedure codes: Closed heart valvotomy (3AP): 3500 CLOSED HEART VALVOTOMY, UNSPECIFIED VALUE 3501 CLOSED HEART VALVOTOMY, AORTIC VALUE 3502 CLOSED HEART VALVOTOMY, MITRAL VALUE 3503 CLOSED HEART VALVOTOMY, PULMONARY VALUE 3504 CLOSED HEART VALVOTOMY, TRICUSPID VALUE Atrial septal enlargement (3BP): 3541

	Measure# PCS-007-09	Measure# PCS-008-09	Measure # 0340
			ENLARGEMENT OF EXISTING ATRIAL SEPTAL DEFECT 3542 CREATION OF SEPTAL DEFECT IN HEART Atrial septal defect repair (3CP): 3551 REPAIR OF ATIAL SEPTAL DEFECT WITH PROSTHESIS, OPEN TECHNIQUE 3571 OTHER AND UNSPECIFIED REPAIR OF ATRIAL SEPTAL DEFECT Ventricular septal defect repair (3DP): 3553 REPAIR OF VENTRICULAR SEPTAL DEFECT WITH PROSTHESIS 3572 OTHER AND UNSPECIFIED REPAIR OF VENTRICULAR SEPTAL DEFECT Occlusion of thoracic vessel (3EP): 3885 OCCLUDE THORACIC VES NEC PDA closure diagnosis code (3D): 7470 PATENT DUCTUS ARTERIOSUS Other surgical occlusion (3FP): 3884 OTHER SURGICAL OCCLUSION OF

	Measure# PCS-007-09	Measure# PCS-008-09	Measure # 0340
			AORTA, ABDOMINAL 3885 OTHER SURGICAL OCCLUSION OF THORACIC VESSEL 3959 OTHER REPAIR OF VESSEL Extracorporeal circulation (5P): 3961 EXTRACORPOREAL CIRCULAT Catheterization (6P): 3721 RT HEART CARDIAC CATH 3722 LEFT HEART CARDIAC CATH 3723 RT/LEFT HEART CARD CATH 8842 CONTRAST AORTOGRAM 8843 CONTR PULMON ARTERIOGRAM 8844 ARTERIOGRAPHY OF OTHER INTRATHORACIC VESSELS 8850 ANGIOCARDIOGRAPHY, NOT OTHERWISE SPECIFIED 8851 ANGIOCARDIOGRAPHY OF VENAE CAVAE 8852 ANGIOCARDIOGRAPHY OF RIGHT

	Measure# PCS-007-09	Measure# PCS-008-09	Measure # 0340
			HEART STRUCTURES 8853 ANGIOCARDIOGRAPHY OF LEFT HEART STRUCTURES 8854 COMBINED RIGHT AND LEFT HEART ANGIOCARDIOGRAPHY 8855 CORONARY ARTERIOGRAPHY USING A SINGLE CATHETER 8856 CORONARY ARTERIOGRAPHY USING TWO CATHETERS 8857 OTHER AND UNSPECIFIED CORONARY ARTERIOGRAPHY 8858 NEGATIVE-CONTRAST CARDIAC ROENTGENOGRAPHY Atrial septal defect repair and enlargement (4P): 3541 ENLARGE EXISTING SEP DEF 3552 PROS REPAIR ATRIA DEF-CL
Denominator Details	N/A	N/A	N/A
Exclusion Details	N/A	N/A	N/A
Data Source	Paper Medical Record, Electronic Claims, Electronic Clinical Registry, Electronic Clinical Database, Electronic Health/Medical Record	Paper Medical Record, Electronic Claims, Electronic Clinical Registry, Electronic Clinical Database, Electronic Health/Medical Record	Electronic administrative data/claims

	Measure# PCS-007-09	Measure# PCS-008-09	Measure # 0340
Level	Community/Population, Health Plan, Group of clinicians (facility, dept/unit, group), Facility (e.g., hospital, nursing home), Integrated delivery system	Health Plan, Group of clinicians (facility, dept/unit, group), Facility (e.g., hospital, nursing home), Integrated delivery system	Facility/agency
Setting	Hospital	Hospital	Hospital

Summary of Pediatric Cardiac Surgery Steering Committee Evaluation

PCS-018-09 Operative mortality stratified by the five STS-EACTS Mortality Levels
Operative mortality stratified by the five STS-EACTS Mortality Levels, a multi-institutional validated complexity stratification tool

Measure Evaluation Ratings: I: Y-9; N-0 **S:** H-8; M-1; L-0 **U:** H-6; M-2; L-0 **F:** H-8; M-1; L-0

This is measure of operative mortality within 30 days after surgery or prior to discharge for patients who undergo pediatric and congenital open heart surgery, stratifying for complexity using the STS-EACTS mortality levels.

- *Scientific acceptability:* In an effort to standardize this measure, NQF asked the measure developer to select one method of risk-stratification. The capture of post-discharge mortality, especially for distant referrals, needs to be assured for this measure to work. This measure requires use of the same set of STS codes as do the process measures discussed above; therefore the same concerns regarding the selection of STS codes apply. The STS-EACTS mortality score is based mostly on actual data that have been assessed by the STS and EACTS databases.

- *Feasibility:* There is the need to use the STS-EACTS database to generate the measure and to determine complexity levels.

PCS-021-09 Standardized mortality ratio for congenital heart surgery, Risk Adjustment for Congenital Heart Surgery (RACHS-1) method *Operative mortality stratified by the five STS-EACTS Mortality Levels, a multi-institutional validated complexity stratification tool*

Measure Evaluation Ratings: I: Y-9; N-0 **S:** H-7; M-1; L-1 **U:** H-5; M-2; L-1 **F:** H-6; M-2; L-1

This measure uses the RACHS-1 system of risk analysis to compute an observed-to-expected (O/E) standardized mortality ratio (SMR). A score of >1.0 indicates that the observed mortality is greater than the expected mortality. The risk analysis method (RACHS-1) incorporates five clinical characteristics: six predefined risk categories, age at surgery, prematurity, presence of a major non cardiac structural anomaly, and combinations of cardiac procedures performed. The data required for this measure can be collected through manual chart abstraction or administrative data (ICD-9-CM codes) to determine the RACHS-1 score.

- *Scientific acceptability:* The Steering Committee agreed that this measure demonstrates scientific acceptability. This measure uses the RACHS-1 system of risk analysis based on observed mortality (numerator) as related to expected mortality (denominator). The risk analysis takes into account all risk levels and condenses the program's performance on the basis of O/E. A score of 1.0 or higher indicates that the observed mortality is greater than the expected mortality, and, therefore, the program is underachieving. Concerns have been expressed in the literature about the use of administrative datasets, particularly in areas in which the coding choices are limited. Some Committee members expressed concerns about the conversion of the ICD-9-CM codes to ICD-10-CM; however, the measure developer confirmed that it has already begun the mapping process for this measure.

- *Feasibility:* The data required for this measure can be easily collected through manual chart

abstraction to determine the RACHS-1 score and from administrative data. Particularly with administrative data, the burden of gathering data to calculate the measure is low.

PCS-007-09 Surgical volume for pediatric and congenital heart surgery *Surgical volume for pediatric and congenital heart surgery* (STS)

Measure Evaluation Ratings: I: Y-9; N-0 **S:** H-5; M-3; L-1 **U:** H-6; M-3; L-0 **F:** H-8; M-1; L-0

- *Usability:* It is not harmonized with NQF-endorsed measure #0340. Some thought that data derived from a clinical dataset is a more valid representation of number of procedures than the administrative data used in the existing NQF-endorsed measure. In response to a question of why both this measure and PCS-008 were needed, the developer responded that the totals by mortality level as counted in PCS-008-09 cannot be rolled up and would not equal the total volume calculated for this measure.

- *Feasibility:* This measure requires use of STS codes or a crosswalk from ICD-9-CM for those who do not use the STS database.

PCS-008-09 Surgical volume for pediatric and congenital heart surgery, stratified by the five STS-EACTS Mortality Levels *Surgical volume for pediatric and congenital heart surgery stratified by the five STS-EACTS Mortality Levels, a multi-institutional validated complexity stratification tool* (STS)

Measure Evaluation Ratings: I: Y-9; N-0 **S:** H-6; M-3; L-0 **U:** H-9; M-0; L-0 **F:** H-9; M-0; L-0

- *Usability:* The mortality Score is a stratified schema based on true data. This score was implemented by several authors based on actual data from the STS database. This measure is used in conjunction with the STS mortality measure stratified by risk level (PCS-018) This is not harmonized to previously NQF-endorsed measure #0339, as this uses a more robust identification of procedures.

- *Feasibility:* As with PCS-007-09, this measure requires the use of STS codes or a crosswalk from STS codes to ICD-9 codes.

Competing Measure Discussion

The Pediatric Cardiac Surgery Steering Committee was reluctant to determine a best-in-class mortality measures among the two methods (RACHS-1, and STS-EACTS) given that the field has yet to determine which method is best. The Committee noted above mentioned concerns regarding the use of administrative data to calculate the CHB measure noting references that have demonstrated the shortcomings of the use of administrative data in congenital heart disease. The CHB measure has been extensively tested and in active use. The analysis of the AHRQ measure on pediatric heart surgery mortality in the Surgery Project will allow a full comparison of the mortality and volume measures across the various data sources.

Table of Committee's Suggested Modifications and Responses from Developers

Table of Committee's Suggested Modifications and Responses from Developers

Phase I

0134 Use of internal mammary artery (IMA) in coronary artery bypass graft (CABG)

Originally Submitted Specifications

Description: Percentage of patients aged 18 years and older undergoing isolated coronary artery bypass graft (CABG) who received an internal mammary artery (IMA) graft.
Numerator Statement: Number of patients undergoing isolated coronary artery bypass graft (CABG) who received an internal mammary artery (IMA) graft.
Denominator Statement: All patients undergoing isolated CABG.
Exclusions: Cases are removed from the denominator if the patient had a previous CABG prior to the current admission or if IMA was not used and one of the following reasons was provided:
- Subclavian stenosis
- Previous cardiac or thoracic surgery
- Previous mediastinal radiation
- Emergent or salvage procedure
- No LAD disease

Adjustment/Stratification: no risk adjustment necessary/No stratification is required for this measure.
Level of Analysis: Clinicians: Group; Facility/Agency; Population: National, regional/network, states, counties or cities
Type of Measure: Process
Data Source: Registry data-STS Adult Cardiac Surgery Database, Version 2.73

Updated Specifications

Level of Analysis: Clinicians: Individual, Group, Team; Facility/Agency; Population: National, regional/network, states, counties or cities
Measure Steward: Society of Thoracic Surgeons | 633 North Saint Clair Street, Suite 2320 | Chicago | Illinois | 60611

Steering Committee Recommendation for Endorsement: Pending harmonization of 0134 and 0516
Rationale: This measure is tied to improved outcomes due to high patency rates of the IMA. The current compliance is 95 percent; however variation among programs exists; i.e., compliance rates as low as 80 percent. Final recommendation will be included in the phase II report.

If applicable, Conditions/Questions for Developer:
1. 1b.4 Summary of Data on Disparities by Population Group: Please provide data on disparities.
2. 2a.9 Denominator Exclusions: Please remove "the IMA is not a suitable conduit due to size or flow" from the exclusions.

Developer Response:
1. Data on disparities are provided in the form.
2. STS staff agreed to remove the exclusion related to IMA suitability during Steering Committee meeting. The form was modified to reflect this.

If applicable, Conditions/Questions for Developer:
1. Harmonization: As agreed, please harmonize measures 0134 and 0516 by combining into a single measure which can allow reporting at the provider or institution level.

Developer Response:
1. Measures have been harmonized according to the instructions above. As requested by NQF, any modifications made have been provided in the measure submission form for #0134. Please note: the only change is in section "2a.32. Level of Measurement/Analysis." The denominator and exclusion sections will remain as they originally were submitted for #0134, as these specifications reflect the most recent (i.e., 2010-2011) STS Adult Cardiac Surgery Database specification upgrade.

1. Importance to Measure and Report: Y-20; N-1
(1a. Impact; 1b. Performance gap; 1c. Outcome or Evidence)
Rationale: The literature points to disparities amongst women, with IMA used less often in women. The developer did not provide information or data on disparities related to performance on the measure.

2. Scientific Acceptability of Measure Properties: C-14; P-7; M-0; N-0
(2a. Precise specifications; 2b. Reliability testing; 2c. Validity testing; 2d. Exclusions justified; 2e. Risk adjustment/stratification; 2f. Meaningful differences; 2g. Comparability; 2h. Disparities)
Rationale: The exclusion 'IMA not suitable,' can lead to the issue of gaming. This causes apprehension as to who determines if the IMA is not suitable. Currently, there is no criteria that classifies the IMA as suitable. The Committee requested this exclusion be removed.

3. Usability: C-20; P-1; M-0; N-0
(3a. Meaningful/useful for public reporting and quality improvement; 3b. Harmonized; 3c. Distinctive or additive value to existing measures)
Rationale: The information obtained is meaningful and useful.

4. Feasibility: C-20; P-1; M-0; N-0

0134 Use of internal mammary artery (IMA) in coronary artery bypass graft (CABG)

(4a. Clinical data generated during care process; 4b. Electronic sources; 4c. Exclusions – no additional data source; 4d. Susceptibility to inaccuracies/ unintended consequences identified 4e. Data collection strategy can be implemented)

Rationale: The information can be derived from electronic sources.

0300 Cardiac patients with controlled 6 am postoperative serum glucose

Originally Submitted Specifications

Description: Percentage of cardiac surgery patients with controlled 6 am serum glucose (≤200 mg/dl) on postoperative day (POD) 1 and POD 2.

Numerator Statement: Surgery patients with controlled 6 am serum glucose (≤200 mg/dl) on postoperative day (POD) 1 and POD 2.

Denominator Statement: Cardiac surgery patients with no evidence of prior infection. Include patients with an ICD-9-CM Principle Procedure code or ICD-9-CM Other Procedure codes of selected surgeries AND an ICD-9-CM for ICD-9-CM codes Principle Procedure code or ICD-9-CM Other Procedure codes of selected surgeries.

Exclusions: Excluded Populations:

- Patients less than 18 years of age
- Patients who have a length of Stay greater than 120 days
- Patients who had a principal diagnosis suggestive of preoperative infectious diseases (as defined in Appendix A, Table 5.09 for ICD-9-CM codes)
- Burn and transplant patients (as defined in Appendix A, Tables 5.14 and 5.15 for ICD-9-CM codes)
- Patients whose ICD-9-CM principal procedure was performed entirely by Laparoscope
- Patients enrolled in clinical trials
- Patients whose ICD-9-CM principal procedure occurred prior to the date of admission
- Patients with physician/advanced practice nurse/physician assistant (physician/APN/PA) documented infection prior to surgical procedure of interest
- Patients who expired perioperatively

Adjustment/Stratification: no risk adjustment necessary/No stratification is required for this measure.

Level of Analysis: Facility/Agency; Population: national; Program: QIO; can be measured at all levels

Type of Measure: Process

Data Source: Electronic administrative data/claims; paper medical record/flow-sheet. Vendor tools or CART.
Vendor tools or CART (both electronic). CART is available for download free at
http://www.qualitynet.org/dcs/ContentServer?c=Page&pagename=QnetPublic%2FPage%2FQnetTier2&cid=1138900279093

Updated Specifications

Numerator Details:

Required data elements: Glucose

Allowable values:

1 All values collected between 18 and 24 hours after Anesthesia End Time were = 180 mg/dL. (passes)

2 A single value collected between 18 and 24 hours after Anesthesia End Time was > 180 mg/dL but all other values after the higher value were = 180 mg/dL prior to the end point of 24 hours after Anesthesia End Time. (passes)

3 A single value collected between 18 and 24 hours after Anesthesia End Time was > 180 mg/dL and NO other values after the higher value were = 180 mg/dL prior to the end point of 24 hours after Anesthesia End Time. (fails)

4 No values collected between 18 and 24 hours after Anesthesia End Time were = 180 mg/dL or unable to determine from medical record documentation. (fails)

5 The patient discharged prior to 24 hours after Anesthesia End Time.

Measure Steward: Centers for Medicare & Medicaid Services | 7500 Security Boulevard | Baltimore | Maryland | 21244

Steering Committee Recommendation for Endorsement: Conditional on updated measure submission reflecting change in numerator to patients having cardiac surgery whose highest blood sugar between 18 and 24 hours after surgery is 180mg/dl or less and any other modifications necessitated by that change as well as response to additional question and condition. Final recommendation will be included in the phase II report.

Rationale: Subsequent to developer changing the timeframe from 6 am due to variation in time of surgery, Committee indicated that a more comprehensive measure would involve monitoring a patient's blood glucose over the 18-24 hour period after surgery and allowing a 4 hour window to reduce high glucose levels to ≤ 180mg/dl.

If applicable, Conditions/Questions for Developer:

1. 2a.1 Numerator Statement: The timeframe should be within 24 hours after surgery instead of 6 am.
2. 2a.10 Denominator Exclusion Details: Provide a more detailed definition of perioperative death.

Developer Response:

Table of Committee's Suggested Modifications and Responses from Developers

0300 Cardiac patients with controlled 6 am postoperative serum glucose

1. This recommendation was presented to the SCIP Infection TEP on April 6, 2011. The panel accepted changing the measure numerator to patients having cardiac surgery whose highest blood sugar, between 18 and 24 hours after surgery is 180mg/dl or less.
2. Patients that expire during the perioperative period are excluded from this measure, as they should not be held accountable for glucose values on POD 1 or 2. The data element has this definition: The patient expired during the timeframe from surgical incision through discharge from the post anesthesia care/recovery area. Additional abstraction instructions include:
   For patients discharged from surgery and admitted to the PACU: The end of the perioperative period occurs when the patient is discharged from the PACU.
   For patients discharged from surgery and admitted to locations other than the PACU (e.g., ICU): The perioperative period would end a maximum of six hours after arrival to the recovery area.

If applicable, Conditions/Questions for Developer:

1. 2a.1 Numerator Statement: Suggested modification-If serum glucose is above 180 mg/dl, was it decreased within a specific amount of time.
2. 2b Reliability Testing and 2c Validity Testing: Advise what additional testing will need to be completed in light of the suggested modification.

Steering Committee Follow-up:

The Steering Committee agreed that the response from the developer regarding POD was adequate.

Developer Response:

1. The numerator statement remains: Cardiac surgery patients with controlled postoperative blood glucose (less than or equal to 180 mg/dL) in the timeframe of 18 to 24 hours after *Anesthesia End Time.*

- However, the data element "Glucose" will still instruct the hospital to look at the recorded blood sugars between 18-24 hours after Anesthesia End Time and has been modified as follows:
- If all blood sugars are </= 180 mg/dL in this time frame, the case would pass the measure;
- If any blood sugar was > 180 mg/dL during this timeframe, the hospital would look to see if there was a subsequent blood sugar drawn in this time frame. If all subsequent blood sugars were </= 180 mg/dL, the case will pass the measure. If subsequent blood sugars were > 180 mg/dL, the case will fail.
- A single elevated blood sugar **without** any follow-up actions or levels drawn would cause the case to fail.
- If no blood sugars were recorded between 18-24 hours, the hospital would be instructed to look at the 12-18 hour time frame and use the same instructions.

2. These measure specifications changes have been thoroughly reviewed by the SCIP TEP. They have already provided valuable input and will continue to review the revised specifications after implementation. The specifications are also reviewed by the SCIP subject matter experts at the Joint Commission and at IFMC, the Hospital Inpatient Quality Reporting Program Support Contractor for CMS. This is standard procedure for all measure specification revision for the performance measures. The measure specifications will also be vetted via the Learning Laboratory. With the lengthy timelines for implementation of modifications to existing specifications and the short timeframe for preparing the changes, a joint venture called the Learning Laboratory has been developed and implemented for aligned measures. Both CMS and the Joint Commission are involved in this process and it has been used successfully in the recent past. A small group of relevant organizations (facilities and/or vendors) review and provide input on proposed measure modifications yielding a better product at relatively minimal costs, since participation is voluntary.

1. Importance to Measure and Report: Y-16; N-5

(1a. Impact; 1b. Performance gap; 1c. Outcome or Evidence)

Rationale: The goal of the measure, to improve patient's blood sugar, is important. Performance at the aggregate is 93.4%; disparity information requested to understand if there are subpopulation disparities.

2. Scientific Acceptability of Measure Properties: C-2; P-12; M-7; N-0

(2a. Precise specifications; 2b. Reliability testing; 2c. Validity testing; 2d. Exclusions justified; 2e. Risk adjustment/stratification; 2f. Meaningful differences; 2g. Comparability; 2h. Disparities)

Rationale: There is a need for more flexibility in the timeframe to allow comparability since variation in patient times of departure from the operating room. Both the committee and developer have heard anecdotal reports that clinical staff is leaving patients on insulin drips to meet the criteria of the measure. Assuming this to be accurate, the timeframe change will address such an unintended consequence of the measure.

3. Usability: C-5; P-6; M-10; N-0

(3a. Meaningful/useful for public reporting and quality improvement; 3b. Harmonized; 3c. Distinctive or additive value to existing measures)

Rationale: The Committee was unsure if this measure would provide additive value if the timeframe remains at 6 am.

4. Feasibility: C-5; P-9; M-7; N-0

0300 Cardiac patients with controlled 6 am postoperative serum glucose

(4a. Clinical data generated during care process; 4b. Electronic sources; 4c. Exclusions – no additional data source; 4d. Susceptibility to inaccuracies/ unintended consequences identified 4e. Data collection strategy can be implemented)

Rationale: The measure cannot be easily implemented using the current timeframe.

Phase II

0284 Surgery patients on beta blocker therapy prior to admission who received a beta blocker during the perioperative period

Originally Submitted Specifications

Description: Percentage of patients on beta blocker therapy prior to admission who received a beta blocker during the perioperative period

Numerator Statement: Surgery patients on beta blocker therapy prior to admission who receive a beta blocker during the perioperative period

Denominator Statement: All surgery patients on beta blocker therapy prior to arrival

Exclusions:

- Patients less than 18 years of age
- Patients who have a Length of Stay greater than 120 days
- Patients enrolled in clinical trials
- Patients whose ICD-9-CM principal procedure occurred prior to the date of admission
- Patients who expired during the perioperative period
- Pregnant patients taking a beta-blocker prior to arrival
- Patients with a documented Reason for Not Administering Beta-Blocker-Perioperative
- Patients with Ventriular Assist Devices or Heart Transplantation Data Elements:

Admission Date
Anesthesia Start Date
Birthdate
Clinical Trial
Discharge Date
ICD-9-CM Principal Procedure Code
Laparoscope

Include patients with an ICD-9-CM Principal Procedure code or ICD-9-CM Other Procedure Codes of selected surgeries.

Adjustment/Stratification: no risk adjustment necessary/No stratification is required for this measure.

Level of Analysis: Facility/ Agency, Population : National, Program : QIO

Type of Measure: Process

Data Source: Electronic administrative data/ claims, Paper medical record/ flow-sheet

Vendor tools (electronic) or CART. CART is available for download free at http://www.qualitynet.org/dcs/ContentServer?c=Page&pagename=QnetPublic%2FPage%2FQnetTier2&cid=1138900279093

Updated Specifications

Denominator Statement:

All surgery patients on beta blocker therapy prior to arrival

NOTE: To be in the denominator, the patient must be on a beta-blocker prior to arrival. The case is excluded if the patient is not on a beta-blocker prior to arrival.

Data Element Data Collection Question: Is there documentation that the patient was on a daily beta-blocker therapy prior to arrival? Yes/No

Notes for Abstraction:

- If there is documentation that the beta-blocker was taken daily at "home" or is a "current" medication, select "Yes".
- If a beta-blocker is listed as a home medication without designation of how often or when it is taken, select "Yes".
- If there is documentation that the beta-blocker is a home/current medication and additional documentation indicates the beta-blocker was not taken daily, e.g., the medication reconciliation form lists a beta-blocker as a home/current medication, but documentation in the nurses notes state "patient denies taking beta-blocker every day", select "No".
- If there is documentation that the beta-blocker is on a schedule other than daily, select "No".
- If there is documentation that the beta-blocker was given on a "prn" basis for cardiac or non-cardiac reasons, select "No".

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Steering Committee Recommendation for Endorsement: Conditional; Criteria for Endorsement met: Y- 19; N -2; A-0

Rationale: The measure is meaningful for public reporting and quality improvement.

Table of Committee's Suggested Modifications and Responses from Developers

0284 Surgery patients on beta blocker therapy prior to admission who received a beta blocker during the perioperative period

If applicable, Conditions/Questions for Developer:

1. 2a.4 Denominator Statement: Include definition of 'prior to arrival' and clarify the expected beta blocker dosing during the perioperative period (e.g., beyond homeopathic dose) – should be done to a specific parameter; i.e., hear rate or blood pressure.
2. 2a.9 Denominator Exclusions: Exclusion for laparoscopy verbally reported as removed effective January 1, 2012. Please confirm.
3. 2a.9 Denominator Exclusions: Consider exclusions for patients on beta blockers for non-cardiac reasons.

Developer Response:

1. To be in the measure denominator, the patient must be on a beta-blocker prior to arrival. The data collection question and relevant notes for abstraction for the data element Beta-Blocker Current Medication are listed below. The case is excluded if the answer to this data element is "no." We do NOT use specific parameters for dosing because this measure was designed to ensure that patients on beta-blocker therapy at home have continued therapy. It is not evaluating whether the dose is therapeutic. There is simply no way to define a "homeopathic dose" for the purposes of data collection.
   Suggested Data Collection Question: Is there documentation that the patient was on a daily beta-blocker therapy prior to arrival? Yes/No
   Notes for Abstraction:
   • If there is documentation that the beta-blocker was taken daily at "home" or is a "current" medication, select "Yes".
   • If a beta-blocker is listed as a home medication without designation of how often or when it is taken, select "Yes".
   • If there is documentation that the beta-blocker is a home/current medication and additional documentation indicates the beta-blocker was not taken daily, e.g., the medication reconciliation form lists a beta-blocker as a home/current medication, but documentation in the nurses notes state "patient denies taking beta-blocker every day", select "No".
   • If there is documentation that the beta-blocker is on a schedule other than daily, select "No".
   • If there is documentation that the beta-blocker was given on a "prn" basis for cardiac or non-cardiac reasons, select "No".
2. The data element Laparoscope has been removed from all SCIP measures for January 1, 2012 discharges. Major surgeries performed laparoscopically may be included if their ICD-9 Principal Procedure Code is included in the denominator (Table 5.10).
   Those exclusions are accounted for in the Notes for Abstraction for the data element Beta-Blocker Current Medication. See above. The abstractor is instructed to answer "no" to this data element which excludes them from the measure.

If applicable, Questions to the Steering Committee:

1. Importance to Measure and Report: Y-21; N-0
(1a. Impact; 1b. Performance gap; 1c. Outcome or Evidence)
Rationale: Performance is above 90 percent; however, concern about discontinuation of beta blockers in the post-op period remains a concern which has the potential to affect large numbers. It was noted that beta blockers had to be titrated to a certain heart rate from them to provide a beneficial result to the patient.

2. Scientific Acceptability of Measure Properties: C-10; P-10; M-1; N-0
(2a. Precise specifications; 2b. Reliability testing; 2c. Validity testing; 2d. Exclusions justified; 2e. Risk adjustment/stratification; 2f. Meaningful differences; 2g. Comparability; 2h. Disparities)
Rationale: The evidence, construction and testing of the measure meets requirements. The Committee questioned the period of time that was considered as part of the perioperative period and why laparoscopic procedures were included in the exclusions and set conditions related to these concerns.

3. Usability: C-12; P-9; M-0; N-0
(3a. Meaningful/useful for public reporting and quality improvement; 3b. Harmonized; 3c. Distinctive or additive value to existing measures)
Rationale: The measure is meaningful for public reporting and quality improvement.

4. Feasibility: C-12; P-9; M-0; N-0
(4a. Clinical data generated during care process; 4b. Electronic sources; 4c. Exclusions – no additional data source; 4d. Susceptibility to inaccuracies/ unintended consequences identified 4e. Data collection strategy can be implemented)
Rationale: The required data is readily available; the Committee questioned whether the measure would continue to rely on paper records. It is not included in the list for electronic health records (EHR) at present; however, the developer was encouraged to consider capturing titration to heart rate when it does move to EHR. . They were also encouraged to better convey the bradycardia exclusion.

0365 Pancreatic Resection Mortality Rate (IQI 9)

Originally Submitted Specifications
Description: Percentage of discharges with procedure code of pancreatic resection with an in-hospital death.

0365 Pancreatic Resection Mortality Rate (IQI 9)

Numerator Statement: Number of deaths (DISP=20) among cases meeting the inclusion and exclusion rules for the denominator.
Denominator Statement: Discharges, age 18 years and older, with ICD-9-CM pancreatic resection code procedure and a diagnosis code of pancreatic cancer in any field.
Exclusions: Exclude cases:
• missing discharge disposition (DISP=missing), gender (SEX=missing), age (AGE=missing), quarter (DQTR=missing), year (YEAR=missing) or principal diagnosis (DX1 =missing)
• transferring to another short-term hospital (DISP=2)
• MDC 14 (pregnancy, childbirth, and puerperium)
Adjustment/Stratification: risk adjustment method widely or commercially available The predicted value for each case is computed using a hierarchical model (logistic regression with hospital random effect) and covariates for gender, age in years (in 5-year age groups), All Patient Refined-Diagnosis Related Group (APR-DRG) and APR-DRG risk-of-mortality subclass. The reference population used in the model is the universe of discharges for states that participate in the HCUP State Inpatient Databases (SID) for the year 2007 (updated annually), a database consisting of 43 states and approximately 30 million adult discharges. The expected rate is computed as the sum of the predicted value for each case divided by the number of cases for the unit of analysis of interest (i.e., hospital, state, and region). The risk adjusted rate is computed using indirect standardization as the observed rate divided by the expected rate, multiplied by the reference population rate/User has the optin to stratify by gender, age (5-year age groups), race / ethnicity, primary payer, and custom stratifiers.
Level of Analysis: Facility/ Agency
Type of Measure: Outcome
Data Source: Electronic administrative data/ claims
Updated Specifications
Brief description of measure:
Percentage of discharges with procedure code of pancreatic resection with an in-hospital death.
Denominator Details:
Discharges, age 18 years and older, with ICD-9-CM pancreatic resection code procedure and a diagnosis code of pancreatic cancer in any field.
ICD-9-CM pancreatic resection procedure codes:
526
TOTAL PANCREATECTOMY
527
RAD PANCREATICODUODENECT
Denominator Exclusions:
Exclude cases:
• missing discharge disposition (DISP=missing), gender (SEX=missing), age (AGE=missing), quarter (DQTR=missing), year (YEAR=missing) or principal diagnosis (DX1 =missing)
• transferring to another short-term hospital (DISP=2)
• MDC 14 (pregnancy, childbirth, and puerperium)
Denominator Exclusion Details*:* Exclude cases:
• missing discharge disposition (DISP=missing), gender (SEX=missing), age (AGE=missing), quarter (DQTR=missing), year (YEAR=missing) or principal diagnosis (DX1 =missing)
• transferring to another short-term hospital (DISP=2)
• MDC 14 (pregnancy, childbirth, and puerperium)
ICD-9-CM codes:
577.0
Acute pancreatitis
577.1
Chronic pancreatitis
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Steering Committee Recommendation for Endorsement: The Steering Committee will vote on this measure after receiving feedback from the developer on the denominator details and exclusions.
Rationale: The measure was considered important and cited strong evidence.

If applicable, Conditions/Questions for Developer:
Overarching comment: Please provide feasibility of reporting mortality stratified by institutional volume (e.g., high, medium, low volume with parameters for each) rather than having rate and mortality separated.

1. De.2 Brief Description of Measure: Ensure measure description accurately captures measure focus.

Table of Committee's Suggested Modifications and Responses from Developers

0365 Pancreatic Resection Mortality Rate (IQI 9)

2. 2a.8 Denominator Details: Do not limit to pancreatic resection for cancer - could stratify by malignant and benign. Also, consider providing volume as well as rate.
3. 2a.9 Denominator Exclusions: Please remove 'transferring to another short-term hospital (DISP=2)' from the exclusions.
4. 2a.9 Denominator Exclusions: Add exclusion for pancreatitis.

Measures 0365 and 0366 should be fully harmonized in order to properly report as a pair. This will involve including all pancreatic disease in both the numerator and denominator of both measures. They can then be stratified by malignant and benign disease.

Note: Discussion of Related and Competing measures may result in additional requests to developers specific to harmonization.

Developer Response:

1. AHRQ agrees to revise the measure description to more accurately capture the measure focus
2. AHRQ agrees to harmonize the mortality and volume indicator denominators to include benign disease in the mortality measure. Note that the mortality and volume indicator (0366) are designated as paired measures
3. This request is problematic for a few reasons. First, the outcome of interest (in-hospital mortality) is not observed for these cases. Second, it is possible that a single case may be counted twice (once for the transferring hospital, once for the receiving hospital). Third, removing this exclusion would require using data that linked patients across hospitalizations (in order to avoid the issues #1 and #2), which is not readily available for individual hospitals across institutions. Therefore, we respectively defer a definitive response to this request pending the routine availability of linked hospitalization data, or at a minimum additional analysis using such data of the potential impact of removing the exclusion.
4. AHRQ agrees to add an exclusion for pancreatitis

If applicable, Questions to the Steering Committee:

1. Importance to Measure and Report:
(1a. Impact; 1b. Performance gap; 1c. Outcome or Evidence)
Rationale: The evidence supports the measure's focus on pancreatic resections for cancer.

2. Scientific Acceptability of Measure Properties:
(2a. Precise specifications; 2b. Reliability testing; 2c. Validity testing; 2d. Exclusions justified; 2e. Risk adjustment/stratification; 2f. Meaningful differences; 2g. Comparability; 2h. Disparities)
Rationale: The measure was considered scientifically acceptable. The Committee debated the importance of separate measures focusing on a pancreatic resection for cancer and a pancreatic resection for benign disease and determined that both could be captured in a single measure to be stratified to report each.

3. Usability:
(3a. Meaningful/useful for public reporting and quality improvement; 3b. Harmonized; 3c. Distinctive or additive value to existing measures)
Rationale: This measure is in use in multiple states and healthcare systems and is reported on HCUPnet as well as used in the MONAHRQ system that is provided for public reporting and QI.

4. Feasibility:
(4a. Clinical data generated during care process; 4b. Electronic sources; 4c. Exclusions – no additional data source; 4d. Susceptibility to inaccuracies/ unintended consequences identified 4e. Data collection strategy can be implemented)
Rationale: This measure was considered feasible; data is obtained from electronic claims and chart abstraction. This is a very low volume procedure.

0366 Pancreatic Resection Volume (IQI 2)

Originally Submitted Specifications
Description: Number of discharges with procedure for pancreatic resection.
Numerator Statement: Discharges, age 18 years and older, with ICD-9-CM codes for pancreatic resection procedure.
Denominator Statement: not applicable
Exclusions: Not applicable
Adjustment/Stratification: no risk adjustment necessary/No stratification is required for this measure.
Level of Analysis: Facility/ Agency
Type of Measure: Structure/management
Data Source: Electronic administrative data/ claims
Updated Specifications
Brief description of measure*:* Number of discharges with procedure for pancreatic resection.
Numerator Details*:* Discharges, age 18 years and older, with ICD-9-CM codes for pancreatic resection procedure.

Table of Committee's Suggested Modifications and Responses from Developers

0366 Pancreatic Resection Volume (IQI 2)

ICD-9-CM pancreatic resection procedure codes:
526
TOTAL PANCREATECTOMY
527
RAD PANCREATICODUODENECT
52.5
Partial pancreatectomy
52.51
Proximal pancreatectomy
52.52
Distal pancreatectomy
52.53
Radical subtotal pancreatectomy
52.59
Other partial pancreatectomy
Exclude cases:
• MDC 14 (pregnancy, childbirth, and puerperium)
Testing Results*:* Pancreatic Resection is measured accurately with discharge data. Most facilities perform 10 or fewer esophagectomies for cancer during a 5 year period
Testing Results*:* Pancreatic resection volume was found to be modestly negatively correlated with resection mortality, although these findings may be limited by inadequate risk adjustment of the outcome measure. Only one study used clinical data to estimate the association between hospital volume and mortality following esophageal cancer surgery. Begg et al. analyzed retrospective data from the Surveillance, Epidemiology, and End Results (SEER)-Medicare linked database from 1984 through 1993.22 The crude 30-day mortality rate was 17.3% at hospitals that performed 1-5 esophagectomies on Medicare patients during the study period, versus 3.9% and 3.4% at hospitals that performed 6-10 and 11 or more esophagectomies, respectively. The association between volume and mortality remained highly significant ($p<.001$) in a multivariate model, adjusting for the number of comorbidities, cancer stage and volume, and age. Studies based on California and Maryland data found that the risk-adjusted mortality rates at low-volume hospitals were around 3.0 times those at high-volume hospitals.23 24 Empirical evidence shows that esophageal resection volume—after adjusting for age, sex, and APR-DRG—is moderately and negatively correlated with mortality for esophageal resection ($r=-.29$, $p<.05$), as well as mortality after other cancer resection procedures.25
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Steering Committee Recommendation for Endorsement: The Steering Committee will vote on this measure after receiving feedback from the developer on the denominator details and exclusions.
Rationale: The measure was considered important and cited strong evidence.

If applicable, Conditions/Questions for Developer:

1. De.2 Brief Description of Measure: Ensure measure description accurately captures measure focus.
2. 2a.3 Numerator Details: Partial resections and partial operations should be included in 0366,
3. 2a.8 Denominator Details: Do not limit to pancreatic resection for cancer.
4. 2a.9 Denominator Exclusions: Please remove 'transferring to another short-term hospital (DISP=2)' from the exclusions.
5. 2a.9 Denominator Exclusions: Add exclusion for pancreatitis.
6. 2b.3 and 2.c.3 Testing Results: Text speaks to esophageal resection. Please provide correct information and advise if there are other such errors within the submission that have required correction.

Measures 0365 and 0366 should be fully harmonized in order to properly report as a pair. This will involve including all pancreatic disease in both the numerator and denominator of both measures. They can then be stratified by malignant and benign disease.
Note: Discussion of Related and Competing measures may result in additional requests to developers specific to harmonization.

Developer Response:

1. AHRQ agrees to revise the measure description to more accurately capture the measure focus
2. AHRQ agrees to include partial resections and partial operations
3. The volume measure contains no such exclusion. However, in general AHRQ agrees to harmonize the mortality and volume indicator denominators to include benign disease in the mortality measure. Note that the mortality (0365) and volume indicator are designated as paired measures.
4. The volume measure contains no such exclusion; however, see note above regarding harmonization
5. The volume measure contains no such exclusion; however, see note above regarding harmonization
6. Such erroneous references shall be corrected

If applicable, Questions to the Steering Committee:

Table of Committee's Suggested Modifications and Responses from Developers

0366 Pancreatic Resection Volume (IQI 2)
1. Importance to Measure and Report: *(1a. Impact; 1b. Performance gap; 1c. Outcome or Evidence)* **Rationale:** The evidence supports the measure's focus on pancreatic resections for cancer.
2. Scientific Acceptability of Measure Properties: *(2a. Precise specifications; 2b. Reliability testing; 2c. Validity testing; 2d. Exclusions justified; 2e. Risk adjustment/stratification; 2f. Meaningful differences; 2g. Comparability; 2h. Disparities)* **Rationale:** The measure was considered scientifically acceptable. The Committee debated the importance of separate measures focusing on a pancreatic resection for cancer and a pancreatic resection for benign disease and determined that both could be captured in a single measure to be stratified to report each.
3. Usability: *(3a. Meaningful/useful for public reporting and quality improvement; 3b. Harmonized; 3c. Distinctive or additive value to existing measures)* **Rationale:** This measure is in use in multiple states and healthcare systems and is reported on HCUPnet as well as used in the MONAHRQ system that is provided for public reporting and quality improvement.
4. Feasibility: *(4a. Clinical data generated during care process; 4b. Electronic sources; 4c. Exclusions – no additional data source; 4d. Susceptibility to inaccuracies/ unintended consequences identified 4e. Data collection strategy can be implemented)* **Rationale:** This measure was considered feasible; data is obtained from electronic claims and chart abstraction. This is a very low volume procedure.

0265 Hospital Transfer/Admission
Originally Submitted Specifications **Description:** Rate of ASC admissions requiring a hospital transfer or hospital admission upon discharge from the ASC **Numerator Statement:** Ambulatory surgical center (ASC) admissions requiring a hospital transfer or hospital admission upon discharge from the ASC. **Denominator Statement:** All ASC admissions **Exclusions:** None **Adjustment/Stratification:** no risk adjustment necessary/No stratification is required for this measure. **Level of Analysis:** Facility/ Agency **Type of Measure:** Outcome **Data Source:** Paper medical record/ flow-sheet **Updated Specifications** **Summary of Measure Results Demonstrating Performance Gap:** Although data for 1,185 ASCs are included in the ASC QC database for this measure, many report at the corporate level and do not report data for individual ASCs. The ASC QC database includes center-level rates for this measure for 526 ASCs throughout the US. The rates for this measure are based on the 526 individually-reporting ambulatory surgery centers throughout the US for services provided during April to June 2010. The rate for unscheduled transfer or admission to a hospital ranged from a minimum of 0.0% to a maximum of 2.3%. The mean rate was 0.1% (SD: 0.2%), while the median rate was 0.1%. The maximum transfer rate of 2.3% and a third quartile value of 0.2% demonstrate that there is an opportunity for improvement in this measure. **Data/Sample:** Although data for 1,185 ASCs are included in the ASC QC database for this measure, many report at the corporate level and do not report data for individual ASCs. The ASC QC database includes center-level rates for this measure for 526 ASCs throughout the US. The 526 individually-reporting ambulatory surgery centers represent a convenience sample of the ASC population were used to assess the opportunity for improvement for this measure. The centers were located throughout the US. Services from the second calendar quarter of 2010 were included in this portion of the study. **Reliability Testing: Data/Sample:** Although data for 1,185 ASCs are included in the ASC QC database, many report at the corporate level and do not report data for individual ASCs. The ASC QC database includes center-level rates for this measure for 526 ASCs throughout the US. The rates for this measure were collected for the 526 individually-reporting ambulatory surgery centers throughout the US for services provided during April to June 2010. **Methods to Identify Statistically Significant and Practical or Meaningful Differences in Performance:** An individual ASC's transfer rate may be compared to the standard rate from the ASC Quality website (http://www.ascquality.org/qualityreport.cfm#Transfer). A statistically significant difference in performance may be detected by using a standard test of proportions as outlined in most standard statistical texts. Since each transfer may represent increased risk exposure for the patient, a rate higher than the standard of 1 per 1000 is also of practical significance. The null hypothesis for this test is that the sample proportion from the ASC is not different from the industry standard taken from the ASC Quality website. The alternative is that there is a statistically significant difference. We recommend

0265 Hospital Transfer/Admission

that this test be performed in its two-sided form so that the ASC may determine if they are either statistically higher or lower than the standard. The recommended p-value for this test is the 0.05 level, but ASCs may have justification for different value. Using this statistical method for detecting significant variances from the industry standard will allow users to determine if differences may be due to sampling error or may indicate a true difference in performance.

If disparities have been reported/identified but measure is not specified to detect disparities, provide follow-up plans:

At the present time, a federal quality reporting system has not yet been proposed or implemented for ambulatory surgical centers. We anticipate that CMS will issue its proposals for an ASC quality reporting system in the near future. The data the ASC Quality Collaboration currently receives for this measure is collected at the ASC-level or at the level of the corporate parent of the ASC. Corporate parent data submissions combine data from multiple ASCs. Disparity measures by population group require the collection of patient-level data or collection of the data for individual populations of patients. At this time, the ASC Quality Collaboration does not have access to any patient-level or individual population level data that would allow for analysis of subpopulation disparities based on race, sex and age. However, we understand the importance of subpopulation data and are taking steps that would allow us to collect the necessary data. We are actively pursuing the development of a registry that would allow us to develop subpopulation performance data for this measure and others. Potential registry development vendors have been identified and initial communications regarding the project have already taken place. We plan to select a vendor by third quarter of 2011, initiate the development of the registry database immediately upon contract acceptance, and have a functioning registry three months thereafter.

Measure Steward: ASC Quality Collaboration | 5686 Escondida Blvd S | St. Petersburg | Florida | 33715

Steering Committee Recommendation for Endorsement: Conditional Criteria for Endorsement met: Y-13; N-7; A-0

Rationale: This measure focus is important and will encourage reporting and provide the ability to analyze transfer rates among ASCs.

If applicable, Conditions/Questions for Developer:

1. 1b.2 Summary of Measure Results Demonstrating Performance Gap: Rates and percentages presented in the measure are confusing. Please review and revise as appropriate
2. 1b.3 Data/Sample: There is a discrepancy between the data that was collected and publicly reported. In the usability section, it states that 1,185 ASCs submitted data for 2nd quarter 2010 on this particular measure; however, in section 1b.3, it states that only 526 ASCs submitted data on this measure. Please reconcile.
3. 2a.2 Numerator Time Window: Revise numerator statement from "…discharge from the ASC" to a more appropriate interval this will also reduce potential perverse incentives. Time window should be at least 24 hours, which would also reduce potential for the unintended incentive to discharge home when admission needed.
4. 2f.2. Methods to Identify Statistically Significant and Practical or Meaningful Differences in Performance: The statistical analysis does not specify a method; validity is questioned. Please reevaluate and in doing so, be specific about what is known about what transfer rates should be expected to be.
5. 2h. Disparities in Care: Please submit any subpopulation performance data that is available for the measures. The committee understands that ASCs do not have a quality reporting system requirement; however, assessment of subpopulation data is important and should be collected and reported for this and other measures.

Developer Response:

1. Although data for 1,185 ASCs are included in the ASC QC database for this measure, many report at the corporate level and do not report data for individual ASCs. The ASC QC database includes center-level rates for this measure for 526 ASCs throughout the US. The rates for this measure are based on the 526 individually-reporting ambulatory surgery centers throughout the US for services provided during April to June 2010. The rate for unscheduled transfer or admission to a hospital ranged from a minimum of 0.0% to a maximum of 2.3%. The mean rate was 0.1% (SD: 0.2%), while the median rate was 0.1%. The maximum transfer rate of 2.3% and a third quartile value of 0.2% demonstrate that there is an opportunity for improvement in this measure.
2. Although data for 1,185 ASCs are included in the ASC QC database for this measure, many report at the corporate level and do not report data for individual ASCs. The ASC QC database includes center-level rates for this measure for 526 ASCs throughout the US. The 526 individually-reporting ambulatory surgery centers represent a convenience sample of the ASC population were used to assess the opportunity for improvement for this measure. The centers were located throughout the US. Services from the second calendar quarter of 2010 were included in this portion of the study.
3. Based on our experience to date, we have no reason to believe that patients requiring admission or transfer to the hospital are being discharged home in order to improve the ASC's performance on this measure. The malpractice risk from substandard care carries much graver consequences than any potential outcome from slightly higher rates of transfer/admission related to this measure. After discussion with NQF staff and if the Committee wishes to see a measure of the hospital admission rate for a more extended timeframe, we will create a separate measure using a sampling protocol. We propose to develop this measure using the following draft numerator and denominator statements, which may be modified during the development phase:
   Numerator statement: Ambulatory surgery center (ASC) admissions experiencing a hospital admission in the 24 hour period

0265 Hospital Transfer/Admission

following discharge from the ASC.
Denominator statement: All selected ASC patients (sampling protocol to be developed and tested)

4. An individual ASC's transfer rate may be compared to the standard rate from the ASC Quality website (http://www.ascquality.org/qualityreport.cfm#Transfer). A statistically significant difference in performance may be detected by using a standard test of proportions as outlined in most standard statistical texts. Since each transfer may represent increased risk exposure for the patient, a rate higher than the standard of 1 per 1000 is also of practical significance. The null hypothesis for this test is that the sample proportion from the ASC is not different from the industry standard taken from the ASC Quality website. The alternative is that there is a statistically significant difference. We recommend that this test be performed in its two-sided form so that the ASC may determine if they are either statistically higher or lower than the standard. The recommended p-value for this test is the 0.05 level, but ASCs may have justification for different value. Using this statistical method for detecting significant variances from the industry standard will allow users to determine if differences may be due to sampling error or may indicate a true difference in performance.
5. The data the ASC Quality Collaboration currently receives for this measure is collected at the ASC-level or at the level of the corporate parent of the ASC. Corporate parent data submissions combine data from multiple ASCs. Disparity measures by population group require the collection of patient-level data or collection of the data for individual populations of patients. At this time, the ASC Quality Collaboration does not have access to any patient-level or individual population level data that would allow for analysis of subpopulation disparities based on race, sex and age. However, we understand the importance of subpopulation data and are taking steps that would allow us to collect the necessary data. We are actively pursuing the development of a registry that would allow us to develop subpopulation performance data for this measure and others. Potential registry development vendors have been identified and initial communications regarding the project have already taken place. We plan to select a vendor by third quarter of 2011, initiate the development of the registry database immediately upon contract acceptance, and have a functioning registry three months thereafter.
6. **ADDITIONAL INFORMATION and Response from Measure Developer:**
We have also revised 2f1 for this measure #0265 Hospital Transfer to provide additional clarity:
2f.1. Data/Sample (Description of the data or sample including number of measured entities; number of patients; dates of data; if a sample, characteristics of the entities included)
Although data for 1,185 ASCs are included in the ASC QC database, many report at the corporate level and do not report data for individual ASCs. The ASC QC database includes center-level rates for this measure for 526 ASCs throughout the US. The rates for this measure were collected for the 526 individually-reporting ambulatory surgery centers throughout the US for services provided during April to June 2010.

If applicable, Questions to the Steering Committee:

1. Importance to Measure and Report: Y-15; N-5
(1a. Impact; 1b. Performance gap; 1c. Outcome or Evidence)
Rationale: The Committee deems the focus of the measure important but has concerns about a) the potential for the unintended consequence of discharging a patient to home when potential need for admission is relatively high which argues for modification of the measure to include a time window for admission and b) the low admission rate reflected in the data provided does not demonstrate a meaningful performance gap. Modification of the measure with a time window could resolve the concerns.

2. Scientific Acceptability of Measure Properties: C-2; P-10; M-6; N-2
(2a. Precise specifications; 2b. Reliability testing; 2c. Validity testing; 2d. Exclusions justified; 2e. Risk adjustment/stratification; 2f. Meaningful differences; 2g. Comparability; 2h. Disparities)
Rationale: The measure does not provide concise parameters for measurement benchmarking, since it does not establish an appropriate target rate of transfer. Developer has been asked to address this.

3. Usability: C-6; P-9; M-3; N-2
(3a. Meaningful/useful for public reporting and quality improvement; 3b. Harmonized; 3c. Distinctive or additive value to existing measures)
Rationale: The statistical analysis did not seem valid, since the outliers would vary by ambulatory surgical center. This measure may not be ready for public reporting since it does not have a specific target transfer rate. Developer has been asked to address this.

4. Feasibility: C-13; P-7; M-0; N-0
(4a. Clinical data generated during care process; 4b. Electronic sources; 4c. Exclusions – no additional data source; 4d. Susceptibility to inaccuracies/ unintended consequences identified 4e. Data collection strategy can be implemented)
Rationale: Data is derived from the patient health record. The measure could have the unintended consequence of promoting a discharge to home rather than a transfer, since an admission would be viewed as "failing to meet the measure".

1519 Statin Therapy at Discharge after Lower Extremity Bypass (LEB)

Table of Committee's Suggested Modifications and Responses from Developers

1519 Statin Therapy at Discharge after Lower Extremity Bypass (LEB)

Originally Submitted Specifications

Description: Percentage of patients aged 18 years and older undergoing infrainguinal lower extremity bypass who are prescribed a statin medication at discharge. This measure is proposed for both hospitals and individual providers.
Numerator Statement: Patients undergoing infrainguinal lower extremity bypass who are prescribed a statin medication at discharge.
Denominator Statement: All patients aged 18 years and older undergoing lower extremity bypass as defined above who are discharged alive, excluding those patients who are intolerant to statins.
Exclusions: Chart documentation that patient was not an eligible candidate for statin therapy due to known drug intolerance, or patient died before discharge.
Adjustment/Stratification: no risk adjustment necessary/No stratification is required for this measure.
Level of Analysis: Can be measured at all levels, Clinicians : Group, Clinicians : Individual, Facility/ Agency
Type of Measure: Process
Data Source: Registry data

Updated Specifications

Numerator Time Window: Since hospitals have sufficient annual volume to generate accurate reporting levels, these are proposed for reporting every 12 months for hospital. Since surgeons have lower individual volume, we recommend annual reporting of the last 50 consecutive procedures, which may span more than one year, with suppression if < 10 procedures (ie, reported as too low volume to report).
Denominator Time Window: Since hospitals have sufficient annual volume to generate accurate reporting levels, these are proposed for reporting every 12 months for hospital. Since surgeons have lower individual volume, we recommend annual reporting of the last 50 consecutive procedures, which may span more than one year, with suppression if < 10 procedures (ie, reported as too low volume to report).
Measure Steward: Society for Vascular Surgery | 633 N. Saint Clair St., 22nd Floor | Chicago | Illinois | 60611

Steering Committee Recommendation for Endorsement: Conditional Criteria for Endorsement met: Y-19; N-0 ; A-1
Rationale: The focus of the measure is important and while the evidence cited speaks to statin use for LDL control, use of statins without reference to LDL is the current trend and, per the developer, it is expected that it will be supported in future guidelines.

If applicable, Conditions/Questions for Developer:

1. 2a.2 Numerator Time Window: Timeframe lacks precision. Please address.
2. 2a.7 Denominator Time Window: Timeframe lacks precision. Please address.
   Note: Discussion of Related and Competing measures may result in additional requests to developers specific to harmonization

Developer Response: We have modified the form time window for all SVS measures as follows:
Since hospitals have sufficient annual volume to generate accurate reporting levels, these are proposed for reporting every 12 months for hospital. Since surgeons have lower individual volume, we recommend annual reporting of the last 50 consecutive procedures, which may span more than one year, with suppression if < 10 procedures (ie, reported as too low volume to report).

If applicable, Questions to the Steering Committee:

1. Importance to Measure and Report: Y-19; N-1 ; A-0
(1a. Impact; 1b. Performance gap; 1c. Outcome or Evidence)
Rationale: The measure is based on a guideline which focuses on statin use for LDL control while the measure focuses on statin use regardless of the LDL control; however the current trend in practice to use of statin without reference to LDL.

2. Scientific Acceptability of Measure Properties: C-8; P-11; M-1; N-0
(2a. Precise specifications; 2b. Reliability testing; 2c. Validity testing; 2d. Exclusions justified; 2e. Risk adjustment/stratification; 2f. Meaningful differences; 2g. Comparability; 2h. Disparities)
Rationale: The numerator and denominator timeframes lack precision.

3. Usability: C-14; P-5; M-1; N-0
(3a. Meaningful/useful for public reporting and quality improvement; 3b. Harmonized; 3c. Distinctive or additive value to existing measures)
Rationale: The measure was considered usable but relies on registry data.

4. Feasibility: C-13; P-7; M-0; N-0
(4a. Clinical data generated during care process; 4b. Electronic sources; 4c. Exclusions – no additional data source; 4d. Susceptibility to inaccuracies/ unintended consequences identified 4e. Data collection strategy can be implemented)
Rationale: The feasibility of implementation was questioned since the data comes from a registry. For registry participants the measure is quite feasible; a non-participant would have to collect manually or develop an electronic system.

Table of Committee's Suggested Modifications and Responses from Developers

0357 Abdominal Aortic Aneurysm (AAA) Repair Volume (IQI 4)

Originally Submitted Specifications

Description: Count of discharges with a procedure code of provider-level AAA repair.
Numerator Statement: Discharges, age 18 years and older, with an abdominal aortic aneurysm repair procedure and a primary or secondary diagnosis of AAA.
Denominator Statement: This volume measure does not have a denominator.
Exclusions: Numerator exclusions
• MDC 14 (pregnancy, childbirth, and puerperium)
Adjustment/Stratification: no risk adjustment necessary/No stratification is required for this measure.
Level of Analysis: Facility/ Agency
Type of Measure: Structure/management
Data Source: Electronic administrative data/ claims

Updated Specifications

Stratification Details/Variables: Stratified by endovascular and open repairs (additional methodological development will be required to ensure the measures have adequate reliability).
Measure Steward: Agency for Healthcare Research and Quality | 540 Gaither Road | Rockville | Maryland | 20850

Steering Committee Recommendation for Endorsement: Conditional *No did not pass Importance to Measure and Report: Y-10; N-11*

Rationale: The Committee had extensive discussion about the volume and related mortality measures before asking for additional information. Did not pass Importance to Measure and Report

If applicable, Conditions/Questions for Developer:

Overarching Comment: The Steering Committee vote regarding the NQF evaluation criterion of "Importance" was split with 10 voting yes and 11 voting no and a number of members noted the measure should only be reported with the related mortality measure. The developer will want to review the measure in its entirety in this light and provide whatever additional information/specification including value as a paired measure with mortality, that it believes appropriate. Should specifications change, it is important to provide information regarding testing with the changes. Additionally,

1. 2a. 11 Stratification Details/Variables: Measure should stratify the measure by endovascular and open repairs.
   Note: Discussion of Related and Competing measures may result in additional requests to developers specific to harmonization. As discussed the developer should meet with SVS to harmonize or blend measures concerning AAA

Developer Response:

1. AHRQ agrees to stratify the measure by endovascular and open repairs, but notes that additional methodological development will be required to ensure the measures have adequate reliability.

If applicable, Questions to the Steering Committee:

1. Importance to Measure and Report: Y-10; N-11 *(1a. Impact; 1b. Performance gap; 1c. Outcome or Evidence)*
Rationale: The measure would provide key information to the public about AAA mortality, but does not provide separate information on EVARs and open repairs. The vote is reflective of the debate related to the value and implications of separately reporting open and endovascular repairs. AHRQ representatives indicated that the stratification is a component of the current software; however the Committee would like to see this specifically reflected in the specifications of the measure. AHRQ representatives indicated that a separate risk adjustment model could be developed for open and endovascular procedures with both ruptured and unruptured aneurysms. The majority of AAA repairs are done endovascularly and open repairs have become more complicated.

2. Scientific Acceptability of Measure Properties:
(2a. Precise specifications; 2b. Reliability testing; 2c. Validity testing; 2d. Exclusions justified; 2e. Risk adjustment/stratification; 2f. Meaningful differences; 2g. Comparability; 2h. Disparities)
Rationale:

3. Usability:
(3a. Meaningful/useful for public reporting and quality improvement; 3b. Harmonized; 3c. Distinctive or additive value to existing measures)
Rationale:

4. Feasibility:
(4a. Clinical data generated during care process; 4b. Electronic sources; 4c. Exclusions – no additional data source; 4d. Susceptibility to inaccuracies/ unintended consequences identified 4e. Data collection strategy can be implemented)
Rationale:

0359 Abdominal Aortic Artery (AAA) Repair Mortality Rate (IQI 11)

Originally Submitted Specifications

0359 Abdominal Aortic Artery (AAA) Repair Mortality Rate (IQI 11)

Description: Percent of discharges with procedure code of AAA repair with an in-hospital death.
Numerator Statement: Number of deaths (DISP=20) among cases meeting the inclusion and exclusion rules for the denominator.
Denominator Statement: Discharges, age 18 years and older, with ICD-9-CM AAA repair code procedure and a diagnosis of AAA in any field.
Exclusions: Exclude cases:
• missing discharge disposition (DISP=missing), gender (SEX=missing), age (AGE=missing), quarter (DQTR=missing), year (YEAR=missing) or principal diagnosis (DX1 =missing)
• transferring to another short-term hospital (DISP=2)
• MDC 14 (pregnancy, childbirth, and puerperium)
Adjustment/Stratification: risk adjustment method widely or commercially available The predicted value for each case is computed using a hierarchical model (logistic regression with hospital random effect) and covariates for gender, age in years (in 5-year age groups), All Patient Refined-Diagnosis Related Group (APR-DRG) and APR-DRG risk-of-mortality subclass. The reference population used in the model is the universe of discharges for states that participate in the HCUP State Inpatient Databases (SID) for the year 2007 (updated annually), a database consisting of 43 states and approximately 30 million adult discharges. The expected rate is computed as the sum of the predicted value for each case divided by the number of cases for the unit of analysis of interest (i.e., hospital, state, and region). The risk adjusted rate is computed using indirect standardization as the observed rate divided by the expected rate, multiplied by the reference population rate.Risk adjustment factors: sex
age 18-24; age 25-29; age 30-34; age 35-39; age 40-44; age 45-49; age 50-54; age 55-59; age 60-64; age 65-69; age 70-74; age 75-79; age 80-84; age 85+
each age category*female
ADRG 1731 (other vascular procedures-minor)
ADRG 1732 (other vascular procedures-moderate)
ADRG 1733 (other vascular procedures-major)
ADRG 1734 (other vascular procedures-extreme)
ADRG 1691 (major thoracic and abdominal vascular procedures-minor)
ADRG 1692 (major thoracic and abdominal vascular procedures-moderate)
ADRG 1693 (major thoracic and abdominal vascular procedures-major)
ADRG 1694 (major thoracic and abdominal vascular procedures-extreme
ADRG 9999 (other)/Gender, age (5-year age groups), race / ethnicity, primary payer, custom
Level of Analysis: Facility/ Agency
Type of Measure: Outcome
Data Source: Electronic administrative data/ claims
Updated Specifications
Stratification Details/Variables*:* Gender, age (5-year age groups), race / ethnicity, primary payer, custom
Stratify the measure by endovascular and open repairs and stratify by ruptured vs. un-ruptured aneurysm; however, additional methodological development will be required to ensure the measures have adequate reliability; b) the risk stratification model is specified below; c) the model has been validated on the State Inpatient Databases (SID), which consists of hospital discharge data from 40 states (constituting about 90% of hospital discharges in the U.S) for the years 2001-2008
Testing Results*:* The relatively small number of AAA resections performed by each hospital suggests that mortality rates at the hospital level are likely to be unreliable. Empirical evidence shows that his indicator is precise, with a raw provider level mean of 21.5% and a substantial standard deviation of 26.8%.87
Relative to other indicators, a higher percentage of the variation occurs at the provider level, rather than the discharge level. The signal ratio (i.e., the proportion of the total variation across providers that is truly related to systematic differences in provider performance rather than random variation) is low, at 30.7%, indicating that some of the observed differences in provider performance.
2. The signal to noise ratio is the ratio of the between hospital variance (signal) to the within hospital variance (noise). The formula is signal / (signal + noise). The ratio itself is only a diagnostic for the degree of variance in the risk-adjusted rate systematically associated with the provider. Therefore, what matters is the magnitude of the variance in the "smoothed" rate (that is, the variance in the risk-adjusted rate after the application of the univariate shrinkage estimator based on the signal ratio). What the data demonstrate is systematic variation in the provider level rate of 2.6 to 7.6 per 100 from the 5th to 95th percentile after a signal ratio of 0.307 is applied as the shrinkage estimator (that is, after accounting for variation due to random factors).
Table 3. Risk Adjustment Coefficients for IQI #11— AAA Repair Mortality
Parameter Label DF Estimate Standard Error Wald Chi-Square Pr > Chi-Square
Intercept 1 -6.6044 0.1713 1486.04 0.0000
Sex Female 1 0.4539 0.0747 36.95 0.0000
Age 65 to 74 1 0.4879 0.1072 20.72 0.0000

0359 Abdominal Aortic Artery (AAA) Repair Mortality Rate (IQI 11)

Age 75 to 79 1 0.8737 0.1201 52.97 0.0000
Age 80 to 84 1 1.1092 0.1200 85.50 0.0000
Age 85+ 1 1.4440 0.1359 112.97 0.0000
APR-DRG '1691' to '1692' 1 1.6789 0.1623 107.05 0.0000
APR-DRG '1693' to '1694' 1 3.9127 0.1523 659.72 0.0000
APR-DRG '1733' to '1734' 1 3.1568 0.1676 354.55 0.0000
MDC 5 1 2.6400 0.1483 316.85 0.0000
MDC Other 1 2.9536 0.2252 172.05 0.0000
RUPTURED 1 2.0565 0.0808 647.42 0.0000
c-statistic 0.937

Measure Steward: Agency for Healthcare Research and Quality | 540 Gaither Road | Rockville | Maryland | 20850

Steering Committee Recommendation for Endorsement: The Steering Committee engaged in extensive discussion of the volume and mortality measures, as noted in review of 0357 above, and will vote on this measure after receiving feedback from the developer on separating or stratifying the measure into open and EVAR mortality rates since the procedures and complications vary significantly.
Rationale:

If applicable, Conditions/Questions for Developer:

1. 2a.11 Stratification Details/Variables: a) Stratify the measure by endovascular and open repairs as well as emergency vs elective repair; b) specify the risk stratification model used; 3) identify settings where the model has been validated in addition to the training data set in which it was developed or provide other supporting data as to its validity.
2. 2b.3 Testing Results: Please provide information about signal to noise ratio.
   Note: Discussion of Related and Competing measures may result in additional requests to developers specific to harmonization. As discussed, the developer should meet with SVS to harmonize or blend measures concerning AAA

Developer Response:

1. a) As noted above, AHRQ agrees to stratify the measure by endovascular and open repairs; in addition, AHRQ agrees to stratify by ruptured vs. un-ruptured aneurysm (which is what we assume you mean by emergency vs. elective repair); but AHRQ again notes that additional methodological development will be required to ensure the measures have adequate reliability; b) the risk stratification model is specified below; c) the model has been validated on the State Inpatient Databases (SID), which consists of hospital discharge data from 40 states (constituting about 90% of hospital discharges in the U.S) for the years 2001-2008
2. The signal to noise ratio is the ratio of the between hospital variance (signal) to the within hospital variance (noise). The formula is signal / (signal + noise). The ratio itself is only a diagnostic for the degree of variance in the risk-adjusted rate systematically associated with the provider. Therefore, what matters is the magnitude of the variance in the "smoothed" rate (that is, the variance in the risk-adjusted rate after the application of the univariate shrinkage estimator based on the signal ratio). What the data demonstrate is systematic variation in the provider level rate of 2.6 to 7.6 per 100 from the 5th to 95th percentile after a signal ratio of 0.307 is applied as the shrinkage estimator (that is, after accounting for variation due to random factors).

Table 3. Risk Adjustment Coefficients for IQI #11— AAA Repair Mortality

Parameter	Label	DF	Estimate	Standard Error	Wald Chi-Square	Pr > Chi-Square
Intercept		1	-6.6044	0.1713	1486.04	0.0000
Sex	Female	1	0.4539	0.0747	36.95	0.0000
Age	65 to 74	1	0.4879	0.1072	20.72	0.0000
Age	75 to 79	1	0.8737	0.1201	52.97	0.0000
Age	80 to 84	1	1.1092	0.1200	85.50	0.0000
Age	85+	1	1.4440	0.1359	112.97	0.0000
APR-DRG	'1691' to '1692'	1	1.6789	0.1623	107.05	0.0000
APR-DRG	'1693' to '1694'	1	3.9127	0.1523	659.72	0.0000
APR-DRG	'1733' to '1734'	1	3.1568	0.1676	354.55	0.0000
MDC	5	1	2.6400	0.1483	316.85	0.0000
MDC	Other	1	2.9536	0.2252	172.05	0.0000

0359 Abdominal Aortic Artery (AAA) Repair Mortality Rate (IQI 11)

RUPTURED	1	2.0565	0.0808	647.42	0.0000

c-statistic 0.937

Note: The APR-DRG consists of the DRG and the risk-of-mortality subclass (minor (1), moderate (2), major (3) and extreme (4)).

If applicable, Questions to the Steering Committee:

1. Importance to Measure and Report: Y-10; N-11; A-1

(1a. Impact; 1b. Performance gap; 1c. Outcome or Evidence)

Rationale: The measure would provide key information to the public about AAA volume, but does not provide separate information on EVARs and open repairs. The majority of AAA repairs are done endovascularly and open repairs have become more complicated.

2. Scientific Acceptability of Measure Properties:

(2a. Precise specifications; 2b. Reliability testing; 2c. Validity testing; 2d. Exclusions justified; 2e. Risk adjustment/stratification; 2f. Meaningful differences; 2g. Comparability; 2h. Disparities)

Rationale:

3. Usability:

(3a. Meaningful/useful for public reporting and quality improvement; 3b. Harmonized; 3c. Distinctive or additive value to existing measures)

Rationale:

4. Feasibility:

(4a. Clinical data generated during care process; 4b. Electronic sources; 4c. Exclusions – no additional data source; 4d. Susceptibility to inaccuracies/ unintended consequences identified 4e. Data collection strategy can be implemented)

Rationale:

1523 In-hospital mortality following elective open repair of small AAAs

Originally Submitted Specifications

Description: Percentage of aymptomatic patients undergoing open repair of small abdominal aortic aneurysms (AAA)who die while in hospital. This measure is proposed for both hospitals and individual providers.

Numerator Statement: Mortality following elective open repair of asymptomatic AAAs in men with < 6 cm dia and women with < 5.5 cm dia AAAs

Denominator Statement: All elective open repairs of asymptomatic AAAs in men with < 6 cm dia and women with < 5.5 cm dia AAAs

Exclusions: > 6 cm minor diameter - men

> 5.5 cm minor diameter - women

Symptomatic AAAs that required urgent/emergent (non-elective) repair

Adjustment/Stratification: no risk adjustment necessary/No stratification is required for this measure.

Level of Analysis: Can be measured at all levels, Clinicians : Group, Clinicians : Individual, Facility/ Agency

Type of Measure: Outcome

Data Source: Registry data

Updated Specifications

Numerator Details: ANY registry that includes hospitalization details, AAA diameter and discharge status is required to identify patients for numerator inclusion. The Society for Vascular Surgery Vascular Quality Initiative (SVS VQI) and the Vascular Study Group of New England (VSGNE) are examples of registries that record such information, but the measure is not limited to these registries. Patients who died in hospital following elective open infrarenal AAA repair if their aneurysm was asymptomatic and small (< 6cm dia in men, <5.5 cm dia in women, judged by preoperative imaging (CT, MR or ultrasound)).

Denominator Details: ANY registry that includes hospitalization details, AAA diameter and discharge status is required to identify patients for denominator inclusion. The Society for Vascular Surgery Vascular Quality Initiative (SVS VQI) and the Vascular Study Group of New England (VSGNE) are examples of registries that record such information, but the measure is not limited to these registries. Patients who underwent elective open AAA repair are included if their aneurysm was asymptomatic and small (< 6cm dia in men, <5.5 cm dia in women, judged by preoperative imaging(CT, MR or ultrasound)).

Summary of Evidence Supporting Exclusion(s):

Large clinical trials have demonstrated the relative safety of observation AAAs with a minimum diameter of less than 5.5 cm.(1) Most of these data were from men, and the same studies show that for women, AAAs rupture risk is higher, such that a minimum 5 cm threshold for women is generally recommended (1). In this measure, we are proposing that elective open AAA repair in men with AAAs < 6 cm dia and women with AAAs < 5.5 cm dia should only be recommended when the operative risk is low, because the AAA rupture risk is low (at a size less than 0.5 greater than the minimum rupture risk). This means that risk adjustment is considered as part of the surgical decision making, and does not need to be otherwise controlled for, as discussed further in 2.e.1.

Analytic Method: rate calculation based on AAA dia size. AAAs were analyzed with 6 cm dia cutpoint in men and a 5.5 cm dia cutpoint

1523 In-hospital mortality following elective open repair of small AAAs

in women, as described below.

Measure Steward: Society for Vascular Surgery | 633 N. St. Clair, 24th floor | Chicago | Illinois | 60611

Steering Committee Recommendation for Endorsement: ***Conditional*** *Y-9; N-11; A-1*

Rationale: The evidence supports the measure's focus on small AAAs repairs and it provides important outcome data; however the Committee had a number of questions for which it requested developer response before further consideration of the measure.

If applicable, Conditions/Questions for Developer:

Overall comment: Based on the narrow margin of the Steering Committee vote related to having met criteria for endorsement the measure will be reconsidered with the response to the questions and conditions below.

1. De2. Brief Description and 2a.1 Numerator Statement: Suggested addition of 30-day mortality with in-hospital mortality. Also, please clarify whether aneurysm size can be collected using administrative (i.e., is widely available outside the Northern New England registry), or available clinical data and the added burden of such collection.
2. 2a. Measure Specifications: Provide a timeframe for availability of newly created CPT2 codes to make this a universally applicable measure.
3. 2a.3 Numerator Details: Reword the numerator details here and throughout where registry is specified to be clear that a specific registry (i.e., SVS, VSGNE) is not required to collect the data.
4. 2b Reliability Testing and 2c Validity Testing: Advise what testing will be needed and completed for the suggested modification to 30 day mortality?
5. 2d. Exclusions: Provide reconcile sample size and data for what is being measured. Also reconcile aneurysm size in the population of interest and the sizes specified throughout.
6. 2h. Disparities in Care: Provide information about disparities or plans to be able to provide data.
7. 3a.2 Use in a Public Reporting Initiative: Please provide plans for public reporting (within 3 years).

Note: Discussion of Related and Competing measures may result in additional requests to developers specific to harmonization

Developer Response:

1. We suggest in-hospital instead of 30-day mortality for several reasons. We have previously studied mortality within the first year after open AAA repair. In-hospital mortality was 2.1% and 30-day mortality was 2.3% in VSGNE, since almost every patient who died within 30 days was never discharged. [Predicting 1-year mortality after elective abdominal aortic aneurysm repair. Beck et al, J Vasc Surg. 2009.49:838-44]. Further, in-hospital mortality is more easily obtained and audited, and is immediately available at the time of discharge. Finally, there is lower cost for obtaining in-hospital results, since subsequent patient contact after discharge is not necessary. We believe that these advantages make in-hospital mortality a more appropriate measure and have not changed this portion of the application. AAA size is readily available in the medical record, and is tracked not only in VSGNE, but the SVS VQI registry, which now comprises more than 80 centers in 30 states across the U. S., and is expected to comprise all states by 2012. The SVS VQI is the de facto national registry for vascular surgery. While AAA size cannot currently be collected using administrative data, we expect that the great majority of vascular surgeons in the U.S. will be participating in SVS VQI by 2012.
2. It is our plan to request CPT2 codes to allow coding of AAA diameter by claims data. These codes will be reviewed by the CPT Performance Measures Advisory Group's next meeting, which is scheduled for July 18-19, 2011. The CPT Editorial Panel will then have to approve the codes before they can appear in any CPT publication. The Editorial Panel will meet October 13-15, 2011.
3. Numerator and denominator have been edited to clearly state than ANY registry tracking the appropriate variables can be used for reporting all of the current measures being proposed by SVS.
4. As stated above, we have already compared in-hospital and 30-day mortality in 748 patients undergoing open elective AAA repair in VSGNE and found no advantage to using 30-day mortality, which is more difficult and more expensive to collect.
5. This section has been expanded. Data are provided for large and small AAAs, showing difference in operative mortality, emphasizing the reason for including only SMALL dia AAAs in this measure. Patients with larger diameter AAAs cannot be included without complex risk adjusting that is not available. However, data indicate that MANY small AAAs are being electively repaired, and it is in this population that a quality measure is needed. Most patients with much larger AAAs always warrant treatment, since the AAA rupture risk is so high if not treated.
6. Disparities have not been reported. As additional data are acquired from the SVS registry across a much larger and varied population, future disparities may be discovered.
7. SVS intends to request that all of these measures be included in PQRS, and expects CMS to begin publishing PQRS data in the near future. Independent of this, SVS plans to request permission from participating providers and hospitals to publish these measures on the SVS public website.

If applicable, Questions to the Steering Committee:

1. Importance to Measure and Report: Y-18; N-3; A-0

Table of Committee's Suggested Modifications and Responses from Developers

1523 In-hospital mortality following elective open repair of small AAAs

(1a. Impact; 1b. Performance gap; 1c. Outcome or Evidence)
Rationale: The measure provides important outcome data. More AAA repairs are being conducted; although, they may not be medically necessary. However, the data provided in the measure included both small and large aneurysms, despite the stated measure's focus on only small AAAs. High mortality levels may encourage a process review.

2. Scientific Acceptability of Measure Properties: C-2; P-16; M-2; A-1
(2a. Precise specifications; 2b. Reliability testing; 2c. Validity testing; 2d. Exclusions justified; 2e. Risk adjustment/stratification; 2f. Meaningful differences; 2g. Comparability; 2h. Disparities)
Rationale: The Committee described the importance of extending the measure to 30 day mortality to identify adverse outcomes. The Committee stated the numerator time window, while verbally explained as satisfaction, could be confusing to users. Testing was questioned; while the measure focused on small aneurysms, testing was conducted on large aneurysms.

3. Usability: C-4; P-11; M-4; A-2
(3a. Meaningful/useful for public reporting and quality improvement; 3b. Harmonized; 3c. Distinctive or additive value to existing measures)
Rationale: The data used for the measure is drawn from registry data that includes both claims and chart abstracted data thus is usable for registry participants but would prove challenging to collect for non-registry participants

4. Feasibility: C-4; P-10; M-3; A-4
(4a. Clinical data generated during care process; 4b. Electronic sources; 4c. Exclusions – no additional data source; 4d. Susceptibility to inaccuracies/ unintended consequences identified 4e. Data collection strategy can be implemented)
Rationale: The registry group from which data for this measure is drawn is about 10 hospitals thus information about feasibility is limited and not tested for non-registry data. At present there is no mechanism for identifying small aneurysms with administrative data. The developer is working to develop CPT II codes that would allow aneurysm size to be captured and reported with administrative data. This would require new/additional specifications for the measure. It was noted that the measure could be revised and limited to mortality unrelated to aneurysm size which could be collected using administrative data and would require revision of the measure.

1534 In-hospital mortality following elective EVAR of small AAAs

Originally Submitted Specifications
Description: Percentage of patients undergoing elective endovascular repair of small asymptomatic abdominal aortic aneurysms (AAA) who die while in hospital. This measure is proposed for both hospitals and individual providers.
Numerator Statement: Mortality following elective endovascular AAA repair of asymptomatic AAAs in men with < 6 cm dia and women with < 5.5 cm dia AAAs
Denominator Statement: All elective endovascular repairs of asymptomatic AAAs in men with < 6 cm dia and women with < 5.5 cm dia AAAs
Exclusions: A registry that includes hospitalization details, AAA diameter and discharge status is required to identify patients for denominator inclusion. The Society for Vascular Surgery Vascular Quality Initiative (SVS VQI) and the Vascular Study Group of New England (VSGNE) registries records such information. Patients who underwent endovascular AAA repair are included if their aneurysm was asymptomatic and small (< 6cm dia in men, <5.5 cm dia in women, judged by preoperative imaging).
Adjustment/Stratification: no risk adjustment necessary/No stratification is required for this measure.
Level of Analysis: Can be measured at all levels, Clinicians : Group, Clinicians : Individual, Facility/ Agency
Type of Measure: Outcome
Data Source: Registry data
Updated Specifications
Numerator Time Window*:* Since hospitals have sufficient annual volume to generate accurate reporting levels, these are proposed for reporting every 12 months for hospital. Since surgeons have lower individual volume, we recommend annual reporting of the last 50 consecutive procedures, which may span more than one year, with suppression if < 10 procedures (ie, reported as too low volume to report).
Denominator Time Window*:* Since hospitals have sufficient annual volume to generate accurate reporting levels, these are proposed for reporting every 12 months for hospital. Since surgeons have lower individual volume, we recommend annual reporting of the last 50 consecutive procedures, which may span more than one year, with suppression if < 10 procedures (ie, reported as too low volume to report).
Summary of Evidence Supporting Exclusion(s): Large clinical trials have demonstrated the relative safety of observation AAAs with a minimum diameter of less than 5.5 cm. (1) Most of these data were from men, and the same studies show that for women, AAAs rupture risk is higher, such that a minimum 5 cm threshold for women is generally recommended (1). In this measure, we are proposing that elective open AAA repair in men with AAAs < 6 cm dia and women with AAAs < 5.5 cm dia should only be recommended when the operative risk is low, because the AAA rupture risk is low (at a size less than 0.5 greater than the minimum rupture risk). This means that

1534 In-hospital mortality following elective EVAR of small AAAs

risk adjustment is considered as part of the surgical decision making, and does not need to be otherwise controlled for, as discussed further in 2.e.1.

Analytic Method: rate calculation based on AAA dia size. AAAs were analyzed with 6 cm dia cutpoint in men and a 5.5 cm dia cutpoint in women, as described below.

Measure Steward: Society for Vascular Surgery | 633 N. St. Clair, 22nd Floor | Chicago | Illinois, 60611

Steering Committee Recommendation for Endorsement: ***Conditional*** *Y-9; N-12; A-0*

Rationale: The evidence supports the measure's focus on small AAAs repairs and it provides important outcome data; however, the Committee has a number of questions for which it requested developer response before further consideration of the measure.

If applicable, Conditions/Questions for Developer:

Based on the narrow margin of the Steering Committee vote related to having met criteria for endorsement, the committee will reconsider the measure with the response to the questions and conditions below.

1. De2. Brief Description and 2a.1 Numerator Statement: Suggested modification- addition of 30-day mortality with in-hospital mortality. Also, please clarify whether aneurysm size can be collected using administrative (i.e., is widely available outside the Northern New England registry), or available clinical data and the added burden of such collection.
2. 2a Measure Specifications: Scope of the measure as specified will have limited impact. Please reevaluate.
3. 2b Reliability Testing and 2c Validity Testing: Identify the testing that will need to be completed for the suggested modifications?
4. 2d. Exclusions: Provide reconcile sample size and data for what is being measured. Also reconcile aneurysm size in the population of interest and the sizes specified throughout.
5. 2h. Disparities in Care: Providing information about disparities or plans to be able to provide same.
6. 3a.2 Use in a public reporting initiative: Please provide plans for public reporting (within 3 years).

Developer Response:

1. We suggest in-hospital instead of 30-day mortality for several reasons. We have previously studied mortality within the first year after elective endovascular AAA repair. In-hospital mortality was 0.48% and 30-day mortality was 0.50% in VSGNE, since almost every patient who died within 30 days was never discharged. [Predicting 1-year mortality after elective abdominal aortic aneurysm repair. Beck et al, J Vasc Surg. 2009.49:838-44]. Further, in-hospital mortality is more easily obtained and audited, and is immediately available at the time of discharge. Finally, there is lower cost for obtaining in-hospital results, since subsequent patient contact after discharge is not necessary. We believe that these advantages make in-hospital mortality a more appropriate measure and have not changed this portion of the application. AAA size is readily available in the medical record, and is tracked not only in VSGNE, but the SVS VQI registry, which now comprises more than 80 centers in 30 states across the U. S., and is expected to comprise all states by 2012. The SVS VQI is the de facto national registry for vascular surgery. While AAA size cannot currently be collected using administrative data, we expect that the great majority of vascular surgeons in the U.S. will be participating in SVS VQI by 2012.
2. We are not certain as to the exact specification within 2a to which this comment is applied. However, we disagree that this measure will have limited impact. Most AAAs are small when detected, and there is a general suspicion that too many small AAAs are being repaired unnecessarily, with a resulting unnecessary operative mortality. This measure will focus attention on the elective mortality rate of endovascular AAA repair in these patients. Although the median mortality rate is low in VSGNE, there is significant variation among hospitals, and large clinical trials have documented this mortality to be 2-3%, even for small AAAs. If 10,000 patients per year in the US undergo unnecessary endovascular repair of such small AAAs, a 3% mortality results in 300 avoidable deaths. This is an important quality measure, and needs to be established in parallel with our open AAA repair measure, so that surgeons performing AAA repair can/must report their outcomes independent of which technique they use. We have not changed the measure form, because it was not clear where to insert this information.
3. As stated above, we have already compared in-hospital and 30-day mortality in 639 patients undergoing elective endovascular AAA repair in VSGNE and found no advantage to using 30-day mortality, which is more difficult and more expensive to collect.
4. This section has been expanded. Data are provided for large and small AAAs, showing difference in operative mortality, emphasizing the reason for including only SMALL dia AAAs in this measure. Patients with larger diameter AAAs cannot be included without complex risk adjusting that is not available. However, data indicate that MANY small AAAs are being electively repaired, and it is in this population that a quality measure is needed. Most patients with much larger AAAs always warrant treatment, since the AAA rupture risk is so high if not treated.
5. Disparities have not been reported. As additional data are acquired from the SVS registry across a much larger and varied population, future disparities may be discovered.
6. SVS intends to request that all of these measures be included in PQRS, and expects CMS to begin publishing PQRS data in the near future. Independent of this, SVS plans to request permission from participating providers and hospitals to publish these measures on the SVS public website.

If applicable, Questions to the Steering Committee:

Table of Committee's Suggested Modifications and Responses from Developers

1534 In-hospital mortality following elective EVAR of small AAAs

1. Importance to Measure and Report: Y-21; N-0 ; A-0
(1a. Impact; 1b. Performance gap; 1c. Outcome or Evidence)
Rationale: The measure provides important outcome data. More AAA repairs are being conducted; although, they may not be medically necessary. However, the data provided in the measure included both small and large aneurysms, despite the measure's focus on only small AAAs. High mortality levels may encourage a process review.

2. Scientific Acceptability of Measure Properties: C-5; P-13; M-3; N-0
(2a. Precise specifications; 2b. Reliability testing; 2c. Validity testing; 2d. Exclusions justified; 2e. Risk adjustment/stratification; 2f. Meaningful differences; 2g. Comparability; 2h. Disparities)
Rationale: The Committee described the importance of extending the measure to 30 day mortality to identify adverse outcomes. The Committee stated that the time window may be confusing.

3. Usability: C-3; P-15; M-2; N-1
(3a. Meaningful/useful for public reporting and quality improvement; 3b. Harmonized; 3c. Distinctive or additive value to existing measures)
Rationale: In the future the measure could be adjusted to be applicable for other procedures.

4. Feasibility: C-5; P-10; M-5; N-1
(4a. Clinical data generated during care process; 4b. Electronic sources; 4c. Exclusions – no additional data source; 4d. Susceptibility to inaccuracies/ unintended consequences identified 4e. Data collection strategy can be implemented)
Rationale: The measure did not provide wide spread testing data and may not be feasible to gather information on without a registry. The developer is attempting to create CPT II codes.

1540 Postoperative Stroke or Death in Asymptomatic Patients undergoing Carotid Endarterectomy

Originally Submitted Specifications
Description: Percentage of patients age 18 or older without carotid territory neurologic or retinal symptoms within the one year immediately preceding carotid endarterectomy (CEA) who experience stroke or death following surgery while in the hospital. This measure is proposed for both hospitals and individual surgeons.
Numerator Statement: Patients age 18 or older without preoperative carotid territory neurologic or retinal sympotoms within the one year immediately preceding CEA who experience stroke or death during their hospitalization following carotid endarterectomy
Denominator Statement: Asymptomatic patients (based on NASCET criteria) on the within one year of CEA
Exclusions: A registry that includes hospitalization details and symptom status within 120 days is required to identify patients for denominator inclusion. The Society for Vascular Surgery Vascular Quality Initiative (SVS VQI) and the Vascular Study Group of New England (VSGNE) registries records such information. Patients who were asymptomatic within one year of the CAS (CPT code 37215)are included.
Adjustment/Stratification: no risk adjustment necessary/No stratification is required for this measure.
Level of Analysis: Facility/ Agency; Can be measured at all levels; Clinicians: Individual; Clinicians: Group
Type of Measure: Outcome
Data Source: Registry data
Measure Steward: Society for Vascular Surgery | 633 N. St. Clair, 22nd St. | Chicago | Illinois, 60611

Steering Committee Recommendation for Endorsement: ***Conditional*** *Y-13; N-8; A-0*
Rationale: The measure will establish whether the asymptomatic patient benefits from the carotid endarterectomy.

If applicable, Conditions/Questions for Developer:

1. 2a Measure Specifications: Provide information about type and accuracy of codes from registry data? Provide the codes. Diagnostic codes must be used and will need to ensure testing with these codes is complete.
2. 2h. Disparities in Care: Provide information about disparities or plans to be able to provide data.
3. 3a.2 Use in a Public Reporting Initiative: Please provide plans for public reporting (within 3 years).

Developer Response:

1. As indicated in the list of previously provided registry variables that was attached to the last submission, post-operative stroke (major or minor) and death are recorded in the SVS registry. These are not derived from ICD-9 codes, but rather are directly obtained by review of the medical record, usually during the time of admission by clinical personnel. Definitions for these variables were also reported. We are not certain which "codes" are being referred to, since this is a registry measure defined by clinical definitions within the registry, or any other available registry that records postoperative stroke (major or minor) and death in asymptomatic patients undergoing carotid endarterectomy.
2. Disparities have not been reported. As additional data are acquired from the SVS registry across a much larger and varied population, future disparities may be discovered.
3. SVS intends to request that all of these measures be included in PQRS, and expects CMS to begin publishing PQRS data in

1540 Postoperative Stroke or Death in Asymptomatic Patients undergoing Carotid Endarterectomy

the near future. Independent of this, SVS plans to request permission from participating providers and hospitals to publish these measures on the SVS public website.

If applicable, Questions to the Steering Committee:

1. Importance to Measure and Report: Y-20; N-1
(1a. Impact; 1b. Performance gap; 1c. Outcome or Evidence)
Rationale: The Committee considered the asymptomatic patient undergoing carotid endarterectomy reasonable to measure.

2. Scientific Acceptability of Measure Properties: C-6; P-14; M-1; N-0
(2a. Precise specifications; 2b. Reliability testing; 2c. Validity testing; 2d. Exclusions justified; 2e. Risk adjustment/stratification; 2f. Meaningful differences; 2g. Comparability; 2h. Disparities)
Rationale: The Committee noted the need to define and specify methods to document (e.g., ICD-9 coding, potential development and use of CPT-II codes) asymptomatic and then to standardize the definition. There was concern about whether the measure is, in fact, measuring what is intended. This relates to adequacy of testing.

3. Usability: C-5; P-14; M-1; N-1
(3a. Meaningful/useful for public reporting and quality improvement; 3b. Harmonized; 3c. Distinctive or additive value to existing measures)
Rationale: The Committee was unclear about the details of the measure steward's plan for publicly reporting the measure.

4. Feasibility: C-4; P-13; M-3; N-1
(4a. Clinical data generated during care process; 4b. Electronic sources; 4c. Exclusions – no additional data source; 4d. Susceptibility to inaccuracies/ unintended consequences identified 4e. Data collection strategy can be implemented)
Rationale: The Committee would like to see information and testing related to how the pending CPT-II codes correlate to the patient record documentation related to 'asymptomatic'.

1543 Postoperative Stroke or Death in Asymptomatic Patients undergoing Carotid Artery Stenting (CAS)

Originally Submitted Specifications

Description: Percentage of patients 18 years of age or older without carotid territory neurologic or retinal symptoms within 120 days immediately proceeding carotid angioplasty and stent (CAS) placement who experience stroke or death during their hospitalization for this procedure. This measure is proposed for both hospitals and individual interventionalists.
Numerator Statement: Patients over age 18 without preoperative carotid territory neurologic or retinal sympotoms within one year of their procedure who experience stroke or death during their hospitalization following elective carotid artery angioplasty and stent placement
Denominator Statement: Patients over age 18 without preoperative carotid territory neurologic or retinal symptoms within one year immediately preceding carotid artery stenting
Exclusions: A registry that includes hospitalization details and symptom status within one year is required to identify patients for numerator inclusion. The Society for Vascular Surgery Vascular Quality Initiative (SVS VQI) and the Vascular Study Group of New England (VSGNE) registries records such information. Patients who were asymptomatic within one year of the CAS (CPT code 37215) are included.
Adjustment/Stratification: no risk adjustment necessary/No stratification is required for this measure.
Level of Analysis: Facility/ Agency
Type of Measure: Outcome
Data Source: Registry data

Updated Specifications

Numerator Time Window*:* Since hospitals have sufficient annual volume to generate accurate reporting levels, these are proposed for reporting every 12 months for hospital. Since surgeons have lower individual volume, we recommend annual reporting of the last 50 consecutive procedures, which may span more than one year, with suppression if < 10 procedures (ie, reported as too low volume to report).
Numerator Time Window*:* Since hospitals have sufficient annual volume to generate accurate reporting levels, these are proposed for reporting every 12 months for hospital. Since surgeons have lower individual volume, we recommend annual reporting of the last 50 consecutive procedures, which may span more than one year, with suppression if < 10 procedures (ie, reported as too low volume to report).
Numerator Details*:* ANY registry that includes hospitalization details and symptom status within 120 days is required to identify patients for numerator inclusion. The Society for Vascular Surgery Vascular Quality Initiative (SVS VQI) and the Vascular Study Group of New England (VSGNE) are examples of registries that record such information, but the measure is not limited to these registries. Patients who were asymptomatic within one year of the CAS (CPT code 37215) who died or had a stroke recorded in the registry during that admission.

Table of Committee's Suggested Modifications and Responses from Developers

1543 Postoperative Stroke or Death in Asymptomatic Patients undergoing Carotid Artery Stenting (CAS)

Denominator Time Window*:* Since hospitals have sufficient annual volume to generate accurate reporting levels, these are proposed for reporting every 12 months for hospital. Since surgeons have lower individual volume, we recommend annual reporting of the last 50 consecutive procedures, which may span more than one year, with suppression if < 10 procedures (ie, reported as too low volume to report).

Denominator Details: ANY registry that includes hospitalization details and symptom status within one year is required to identify patients for numerator inclusion. The Society for Vascular Surgery Vascular Quality Initiative (SVS VQI) and the Vascular Study Group of New England (VSGNE) are examples of registries that record such information, but the measure is not limited to these registries. Patients who were asymptomatic within one year of the CAS (CPT code 37215) are included.

Measure Steward: Society for Vascular Surgery | 633 N. St. Clair, 22nd floor | Chicago | Illinois, 60611

Steering Committee Recommendation for Endorsement: Recommended Y-15; N-6; A-0

Rationale: The measure will establish whether the asymptomatic patient benefits from the carotid artery stenting.

If applicable, Conditions/Questions for Developer:

The Committee suggested that measures related to carotid artery stenting be developed in conjunction with other specialties that perform the procedures; i.e., radiologists and cardiologists.

Developer Response:

1. The measure proposed for carotid artery stenting is identical to the measure proposed for carotid endarterectomy, two competing procedures used to treat the same disease. By limiting the measure to asymptomatic patients, we are eliminating the need for risk adjustment, since this is embodied in the decision to perform these prophylactic procedures to prevent future stroke, i.e., the operative risk of stroke and death must be certain to be low in order to justify these procedures. Stroke and death is the combined endpoint used in all randomized trials of these procedures, and we believe it is critically important that surgeons who perform carotid endarterectomy and stenting should report their outcomes for BOTH of these procedures. Since this is such a clean outcome measure, without need for risk adjustment, we do not believe that its approval should be withheld because it has not yet been proposed by other specialties. In fact, SVS VQI has surgeons and radiologists who participate and support an outcome measure for both carotid endarterectomy and stenting. We respectfully ask the committee to approve both of these important measures in parallel. The form has been updated to reflect relevant comments provided for other SVS measures.

If applicable, Questions to the Steering Committee:

1. Importance to Measure and Report: Y-21; N-0

(1a. Impact; 1b. Performance gap; 1c. Outcome or Evidence)

Rationale: The Committee considered the asymptomatic patient undergoing carotid artery stenting reasonable to measure.

2. Scientific Acceptability of Measure Properties: C-6; P-14; M-1; N-0

(2a. Precise specifications; 2b. Reliability testing; 2c. Validity testing; 2d. Exclusions justified; 2e. Risk adjustment/stratification; 2f. Meaningful differences; 2g. Comparability; 2h. Disparities)

Rationale: The Committee noted the need to define and specify methods to document (e.g., ICD-9 coding, potential development and use of CPT-II codes) asymptomatic and then to standardize the definition.

3. Usability: C-6; P-13; M-1; N-1

(3a. Meaningful/useful for public reporting and quality improvement; 3b. Harmonized; 3c. Distinctive or additive value to existing measures)

Rationale: The Committee was unclear about the public reporting plan.

4. Feasibility: C-6; P-11; M-3; N-1

(4a. Clinical data generated during care process; 4b. Electronic sources; 4c. Exclusions – no additional data source; 4d. Susceptibility to inaccuracies/ unintended consequences identified 4e. Data collection strategy can be implemented)

Rationale: The Committee would like to see information and testing related to how the pending CPT-II codes correlate to the patient record documentation related to 'asymptomatic'

1531 Follow-up assessment of stroke or death after carotid revascularization

Originally Submitted Specifications

Description: Proportion of patients with carotid revascularization procedures who had follow-up performed for evaluation of death and neurologic assessment with an NIH Stroke Scale (by an examiner who is certified by the American Stroke Association) after the procedure.

Numerator Statement: Patients with documentation of a follow-up assessment between 21 and 60 days after the date of carotid revascularization for both:

1. Neurologic status with an assessment using the NIH Stroke Scale (by an examiner who is certified by the American Stroke Association), AND

1531 Follow-up assessment of stroke or death after carotid revascularization

2. Vital Status (alive or expired)
Denominator Statement: Patients with carotid revascularization (surgery or stent) procedures
Exclusions: Patients with pre-procedure conditions of:
1.Acute evolving stroke, or
2.Carotid artery dissection
Adjustment/Stratification: no risk adjustment necessary/No stratification is required for this measure.
Level of Analysis: Facility/ Agency
Type of Measure: Process
Data Source: Registry data
Updated Specifications
Numerator Statement: Patients with documentation of a follow-up assessment between 21 and 60 days after the date of carotid revascularization for both:
1. Neurologic status with an assessment using the NIH Stroke Scale (by an examiner who is certified by the American Stroke Association), AND
2. Vital Status (alive or expired)
Data/Sample*:* Data were compared for 33 hospitals with 30 or more procedures for a 12 month period from January 2009 to December 2009 and from January 2010 and January 2010.
Analytic Methods: Results were compared for two proximate time periods: January 2009 to December 2009 and from January 2010 to December 2010. Hospitals were excluded if they did not have data for both time periods, or if they did not perform 30 or more procedures during this time period. A simple scatter plot to assess correlation of follow-up rates for these hospitals for the 2 time periods was developed, as well as a Bland-Altman plot to show the range of hospital change in performance for these two time periods.
Testing Results: See supplemental documents. The Pearson correlation coefficient observed was 0.78. The average change in performance was -0.018, with a 95% confidence interval of 0.347 to 0.311, showing very good reliability of data over time.
Measure Steward: American College of Cardiology Foundation (ACCF) | 2400 N Street NW | Washington | District Of Columbia, 20037

Steering Committee Recommendation for Endorsement: No
Rationale: Two issues were key: 1) feasibility with little evidence that this process measure is strongly linked to improvement in outcome, and 2) was likelihood of being able to retrieve the information and that of requirement that assessment be done by an American Stroke Association certified examiner. With respect to the latter, there was question about comparability of baseline and post procedure testing comparability. Did not pass Importance to Measure and Report

If applicable, Conditions/Questions for Developer:

1. 2a.1 Numerator Statement: Reconsider the window of time within which assessment must be completed, including consideration of assessment prior to 21 days.
2. 2b Reliability Testing: Please provide reliability testing information addressing, with specifics, each required item.
3. 2c.3 Validity Testing Results: Please provide information regarding how the testing compares with the relevant evidence and guidelines.

Developer Response:

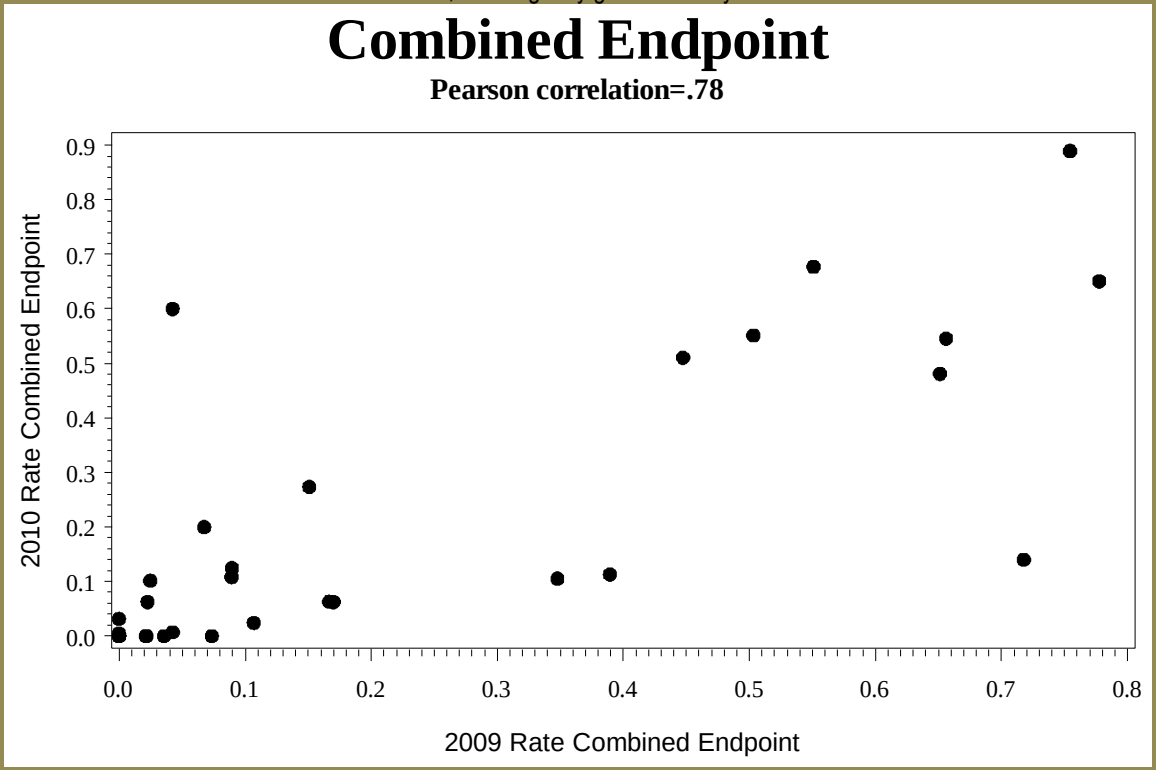
1. Numerator statement – assessment prior to 21 days:
   The measure developers reconsidered the window of time for assessment and decided to maintain the current period for assessment between 21 and 60 days for several reasons. First, major contemporary trials used 30 day events as primary endpoints for outcomes, which included neurologic assessment to identify stroke. Based on these trial endpoints, the developers felt a follow-up timeframe <21 days would miss the identification of new neurological events that trigger the need for further evaluation from a neurologist. Second, a structured timeframe, consistent with contemporary trials, provides a more accurate comparison of rates of assessment and outcomes between facilities providing carotid revascularization procedures. Finally, testing of the measure indicated only 2% of patients submitted with follow-up records had an assessment timeframe of <21 days.
2. Reliability Testing:
   2b. Reliability testing:
   2b.1 Data/sample *(description of data/sample and size)***:**
   Data were compared for 33 hospitals with 30 or more procedures for a 12 month period from January 2009 to December 2009 and from January 2010 and January 2010.
   2b.2 Analytic Method *(type of reliability & rationale, method for testing)***:**
   Results were compared for two proximate time periods: January 2009 to December 2009 and from January 2010 to December 2010. Hospitals were excluded if they did not have data for both time periods, or if they did not perform 30 or more procedures during this time period. A simple scatter plot to assess correlation of follow-up rates for these hospitals for the 2 time periods was developed, as well as a Bland-Altman plot to show the range of hospital change in performance for these two time

1531 Follow-up assessment of stroke or death after carotid revascularization

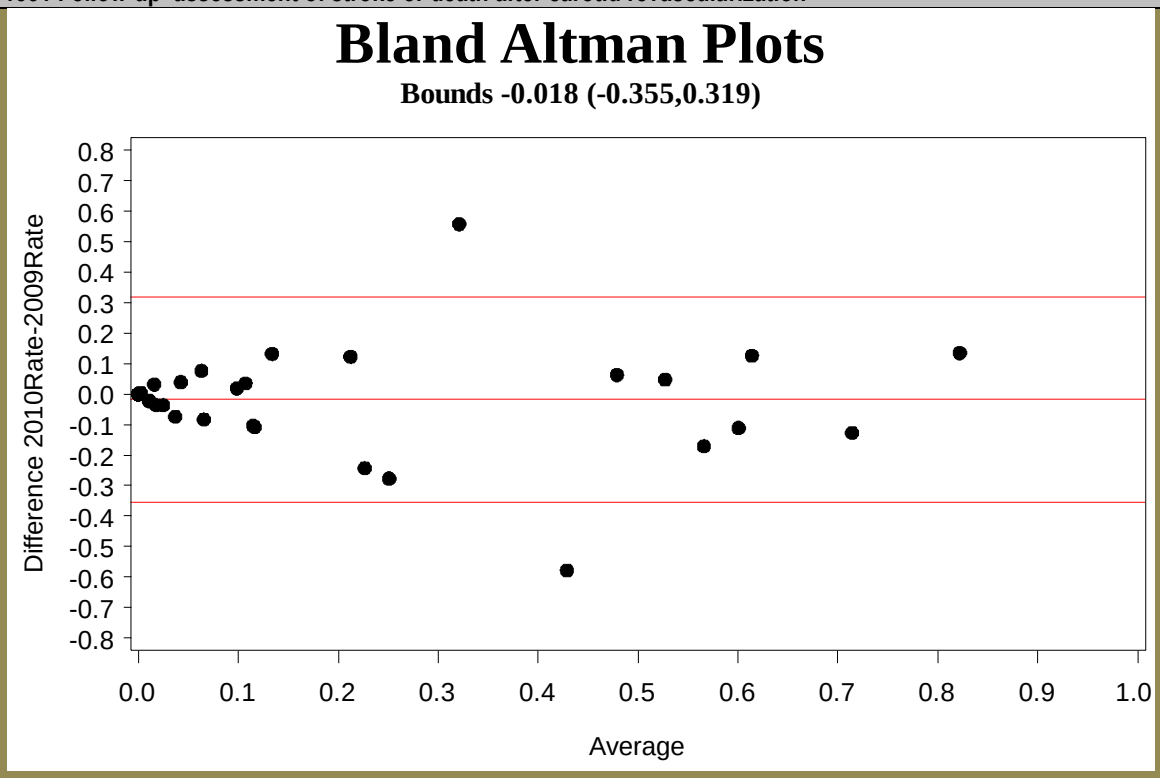
periods.

2b.3 Testing Results *(reliability statistics, assessment of adequacy in the context of norms for the test conducted)*:

See below. The correlation coefficient observed was 0.78. The average change in performance was -0.018, with a 95% confidence interval of 0.347 to 0.311, showing very good reliability of data over time.

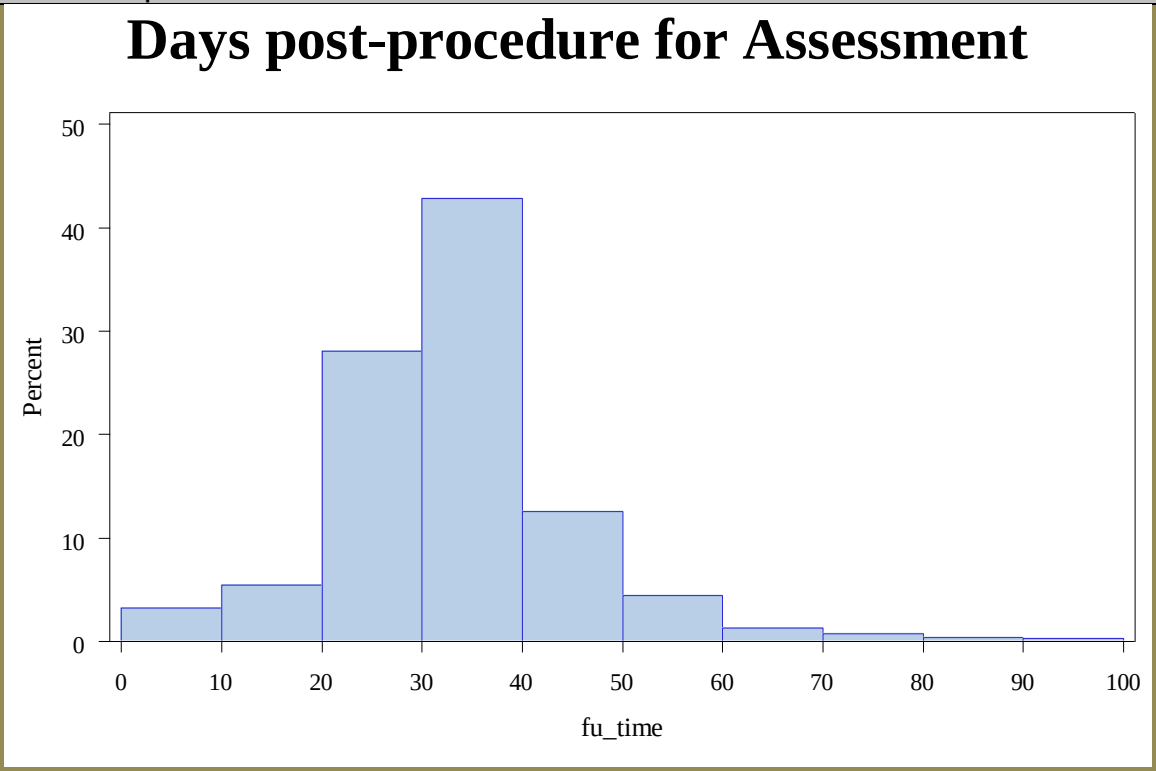


1531 Follow-up assessment of stroke or death after carotid revascularization



3. Validity Testing Results: Major contemporary trials used 30 day assessment of primary endpoints for outcomes, which included neurologic assessment to identify stroke. Measure testing demonstrated three things: 1) the CARE Registry dataset has the data elements to accurately measure and report this process of care; 2) a gap in care exists with regard to assessment and reporting around the 30 day outcome endpoint consistent with published literature; and 3) among the patients who had follow-up, nearly all of them had follow-up during the timeframe of 21-60 days (see below diagram - 2.2% had follow-up performed <21 days and 0.76% had follow-up >60 days).

1531 Follow-up assessment of stroke or death after carotid revascularization



If applicable, Questions to the Steering Committee:

1. Importance to Measure and Report: Y-7; N-13
(1a. Impact; 1b. Performance gap; 1c. Outcome or Evidence)
Rationale: The Committee stated that the measure should involve multi-stakeholder agreement and that it would not adequately measure the follow-up for or outcome of stroke or death.

2. Scientific Acceptability of Measure Properties:
(2a. Precise specifications; 2b. Reliability testing; 2c. Validity testing; 2d. Exclusions justified; 2e. Risk adjustment/stratification; 2f. Meaningful differences; 2g. Comparability; 2h. Disparities)
Rationale:

3. Usability:
(3a. Meaningful/useful for public reporting and quality improvement; 3b. Harmonized; 3c. Distinctive or additive value to existing measures)
Rationale:

4. Feasibility:
(4a. Clinical data generated during care process; 4b. Electronic sources; 4c. Exclusions – no additional data source; 4d. Susceptibility to inaccuracies/ unintended consequences identified 4e. Data collection strategy can be implemented)
Rationale:

0339 Pediatric Heart Surgery Mortality (PDI 6)

Originally Submitted Specifications
Description: Percentage of cases undergoing surgery for congenital heart disease with an in-hospital death.
Numerator Statement: Number of deaths (DISP=20) among cases meeting the inclusion and exclusion rules for the denominator with a code of pediatric heart surgery with ICD-9-CM diagnosis of congenital heart disease in any field.
Denominator Statement: Discharges under age 18 with ICD-9-CM procedure codes for congenital heart disease (1P) in any field or non-specific heart surgery (2P) in any field with ICD-9-CM diagnosis of congenital heart disease (2D) in any field.
Exclusions: Exclude cases:
• MDC 14 (pregnancy, childbirth and pueperium)
• with transcatheter interventions (either 3AP, 3BP, 3CP, 3DP, 3EP with 3D, or 3FP) as single cardiac procedures, performed without bypass (5P) but with catheterization (6P)

0339 Pediatric Heart Surgery Mortality (PDI 6)

• with septal defects (4P) as single cardiac procedures without bypass (5P)
• with diagnosis of ASD or VSD (5D) with PDA as the only cardiac procedure
• heart transplant (7P)
• premature infants (4D) with PDA closure (3D and 3EP) as only cardiac procedure;
• age less than or equal to 30 days with PDA closure as only cardiac procedure
• missing discharge disposition (DISP=missing), gender (SEX=missing), age (AGE=missing), quarter (DQTR=missing), year (YEAR=missing) or principal diagnosis (DX1 =missing)
• transferring to another short-term hospital (DISP=2)
• neonates with birth weight less than 500 grams (Birth Weight Category 1)

Adjustment/Stratification: risk adjustment method widely or commercially available PQI: The predicted value for each case is computed using a logistic regression model and covariates for gender and age in years (in 5-year age groups). The reference population used in the model is the universe of discharges for states that participate in the HCUP State Inpatient Databases (SID) for the year 2007 (updated annually), a database consisting of 43 states and approximately 30 million adult discharges. The expected rate is computed as the sum of the predicted value for each case divided by the number of cases for the unit of analysis of interest (i.e., county, state, and region). The risk adjusted rate is computed using indirect standardization as the observed rate divided by the expected rate, multiplied by the reference population rate
The model includes additional covariates for RACHS-1 risk categories.
Required data elements: CMS Diagnosis Related Group (DRG); CMS Major Diagnostic Category (MDC); age in days up to 364, then age years at admission; International Classification of Diseases, Ninth Revision, Clinical Modification (ICD-9-CM) principal and secondary diagnosis codes/The user has the option to stratify by Gender, birthweight, age in days, age in years, race / ethnicity, primary payer, and custom stratifiers.

Level of Analysis: Facility/ Agency
Type of Measure: Outcome
Data Source: Electronic administrative data/ claims
Measure Steward: Agency for Healthcare Research and Quality | 540 Gaither Road | Rockville | Maryland | 20850

Steering Committee Recommendation for Endorsement: Conditional Y-18; N-1; A-0
Rationale: Measuring pediatric heart surgery mortality is important and the measure is valid and meets criteria RACHS is supported in the literature.

If applicable, Conditions/Questions for Developer:

1. This measure and Measure 0340 should continue to be reported as a pair.

Developer Response:

1. AHRQ agrees to continue to note the Pediatric heart surgery mortality and volume (339 and 340 respectively) are to be reported as a paired measure in related AHRQ QI documents.

If applicable, Questions to the Steering Committee:

1. Importance to Measure and Report: Y-18; N-1
(1a. Impact; 1b. Performance gap; 1c. Outcome or Evidence)
Rationale: The measure was considered important and the performance gap suggests room for improvement.
The Committee requested timely updated citations in the future.

2. Scientific Acceptability of Measure Properties: C-13; P-6; M-0; N-0
(2a. Precise specifications; 2b. Reliability testing; 2c. Validity testing; 2d. Exclusions justified; 2e. Risk adjustment/stratification; 2f. Meaningful differences; 2g. Comparability; 2h. Disparities)
Rationale: The measure was considered scientifically acceptable.

3. Usability: C-15; P-4; M-0; N-0
(3a. Meaningful/useful for public reporting and quality improvement; 3b. Harmonized; 3c. Distinctive or additive value to existing measures)
Rationale: This measure has been in wide use over a number of years and is considered usable.

4. Feasibility: C-15; P-3; M-1; N-0
(4a. Clinical data generated during care process; 4b. Electronic sources; 4c. Exclusions – no additional data source; 4d. Susceptibility to inaccuracies/ unintended consequences identified 4e. Data collection strategy can be implemented)
Rationale: This measure uses claims data thus was considered feasible.

0340 Pediatric Heart Surgery Volume (PDI 7)

Originally Submitted Specifications
Description: Number of discharges with procedure for pediatric heart surgery

Table of Committee's Suggested Modifications and Responses from Developers

0340 Pediatric Heart Surgery Volume (PDI 7)

Numerator Statement: Discharges under age 18 with ICD-9-CM procedure codes for either congenital heart disease (1P) in any field or non-specific heart surgery (2P) with ICD-9-CM diagnosis of congenital heart disease (2D) in any field.
Denominator Statement: This measure does not have a denominator due to the fact it is a volume measure.
Exclusions: Not applicable. This measure does not have a denominator due to the fact it is a volume measure.
Adjustment/Stratification: no risk adjustment necessary/No stratification is required for this measure.
Level of Analysis: Facility/ Agency
Type of Measure: Structure/management
Data Source: Electronic administrative data/ claims
Measure Steward: Agency for Healthcare Research and Quality | 540 Gaither Road | Rockville | Maryland | 20850

Steering Committee Recommendation for Endorsement: Conditional Y-15; N-4; A-0
Rationale: The measure was considered important, valid and meets criteria.

If applicable, Conditions/Questions for Developer:

1. This measure and Measure 0339 should continue to be reported as a pair.

Developer Response:

1. AHRQ agrees to continue to note the Pediatric heart surgery mortality and volume (339 and 340 respectively) are to be reported as a paired measure in related AHRQ QI documents.

If applicable, Questions to the Steering Committee:

1. Importance to Measure and Report: Y-14; N-5
(1a. Impact; 1b. Performance gap; 1c. Outcome or Evidence)
Rationale: The Committee noted the performance gap, which showed that the risk-adjusted mortality is higher at hospitals with fewer than 100 cases per year. The Committee requested timely updated citations in the future.

2. Scientific Acceptability of Measure Properties: C-10; P-8; M-1; N-0
(2a. Precise specifications; 2b. Reliability testing; 2c. Validity testing; 2d. Exclusions justified; 2e. Risk adjustment/stratification; 2f. Meaningful differences; 2g. Comparability; 2h. Disparities)
Rationale: This reporting of pediatric heart surgery volume alone may not be valid since it occurs in small numbers. Additionally, pediatric heart surgery has become regionalized and is conducted at relatively few institutions.

3. Usability: C-10; P-8; M-1; N-0
(3a. Meaningful/useful for public reporting and quality improvement; 3b. Harmonized; 3c. Distinctive or additive value to existing measures)
Rationale: This measure has been in wide use over a number of years and is considered usable.

4. Feasibility: C-13; P-6; M-0; N-0
(4a. Clinical data generated during care process; 4b. Electronic sources; 4c. Exclusions – no additional data source; 4d. Susceptibility to inaccuracies/ unintended consequences identified 4e. Data collection strategy can be implemented)
Rationale: This measure uses claims data thus was considered feasible.

0352 Failure to Rescue In-Hospital Mortality (risk adjusted)

Originally Submitted Specifications
Description: Percentage of patients who died with a complications in the hospital.
Numerator Statement: Patients who died with a complication plus patients who died without documented complications. Death is defined as death in the hospital.
All patients in an FTR analysis have developed a complication (by definition).
Complicated patient has at least one of the complications defined in Appendix B(see website http://www.research.chop.edu/programs/cor/outcomes.php). Complications are defined using the secondary ICD9 diagnosis and procedure codes and the DRG code of the current admission.
Comorbidities are defined in Appendix C (see website http://www.research.chop.edu/programs/cor/outcomes.php) using secondary ICD9 diagnosis codes of the current admission and primary or secondary ICD9 diagnosis codes of previous admission within 90 days of the admission date of the current admission.
*When physician part B is available, the definition of complications and comorbidities are augmented to include CPT codes.
Denominator Statement: General Surgery, Orthopedic and Vascular patients in specific DRGs with complications plus patients who died in the hospital without complications.
Inclusions: adult patients admitted for one of the procedures in the General Surgery, Orthopedic or Vascular DRGs (see appendix A http://www.research.chop.edu/programs/cor/outcomes.php)
Exclusions: Patients over age 90, under age 18.
Adjustment/Stratification: risk-adjustment devised specifically for this measure/condition Risk Adjustment: Model was developed

0352 Failure to Rescue In-Hospital Mortality (risk adjusted)

using logistic regression analysis.
Associated data elements: age in years, sex, race, comorbidities, DRGs (combined with and without complications) and procedure codes within DRGs, transfer status.
Failure to rescue is adjusted using a logistic regression model where y is a failure and the total N is composed of patients who develop a complication and patients who died without a complication.
According to developer: The model adjustment variables can vary. We have found that FTR results are fairly stable, even with little adjustment, since all patients in an FTR analysis have developed a complication (by definition), they are a more homogeneous group of patients than the entire population. Hence severity adjustment plays somewhat less of a role than in other outcome measures/Complicated patient has at least one of the complications defined in Appendix B (http://www.research.chop.edu/programs/cor/outcomes.php) Complications are defined using the secondary ICD9 diagnosis and procedure codes and the DRG code of the current admission. When Physician Part B file is available, the definition of complications and comorbidities are augmented to include CPT codes.
Level of Analysis: Facility/ Agency, Health Plan, Integrated Delivery System, Population : Counties or cities, Population : National, Population : Regional/ network, Population : states
Type of Measure: Outcome
Data Source: Electronic administrative data/ claims
Updated Specifications
If measure is stratified, provide stratified results: Disparities in care are shown in Silber et al Arch Surg 2009 where the results show white patients displayed a reduction in failure-to-rescue rates in the teaching intensive hospitals vs non-teaching hospitals (OR, 0.94; 95% CI, 0.92-0.97), black patients displayed an increased failure-to-rescue rate (OR, 1.06; 95% CI, 1.00-1.12)(Results are based on 30 day mortality FTR however in-hospital showed similar results)
If disparities have been reported/identified but measure is not specified to detect disparities, provide follow-up plans:
Failure to Rescue can be used to detect disparities in health outcomes across providers, shown in Silber et al. Arch Surg 2009.
Use in Public Reporting Initiative: FTR information is online for the public to access (http://stokes.chop.edu/programs/cor/outcomes.php). Consumers can access FTR results through the multiple research publications on the measure. In the future FTR could be reported on a wider scale, the same way that mortality rates are reported.
Measure Steward: The Children´s Hospital of Philadelphia | 3535 Market Street, Suite 1029 | Philadelphia | Pennsylvania | 19104

Steering Committee Recommendation for Endorsement: Conditional Y-18; N-3; A-0
Rationale: The measure provides information about how hospitals handle patients who develop complications; i.e., whether hospital systems are in place to prevent a patient complication from progressing to death.

If applicable, Conditions/Questions for Developer:

1. 2a.6 Target Population Age Range: Reevaluate upper age limit in terms of increasing and providing exclusions to capture limited future; e.g., DNR status. In future, consider development of a companion pediatric measure.
2. 2h. Disparities in Care: Provide information about disparities or plans to be able to provide data.
3. 3a.2 Use in Public Reporting Initiative: Provide plans and expected date (within 3 years) for public reporting.

Note: Discussion of Related and Competing measures may result in additional requests to developers specific to harmonization

Developer Response:

1. 2a.6 Target Population Age Range: We use 90 years as a cut-point because of our concern regarding the increased use of do-not-resuscitate at higher ages [Wenger et al. Epidemiology of Do-Not Resuscitate Orders. Disparity by Age, Diagnosis, Gender, Race, and Functional Impairment. Arch Intern Med. 1995; 155(19):2056-62, Hakim et al. Factors Associated with Do-Not-Resuscitate Orders: Patients', Preferences, Prognoses, and Physicians Judgments. Ann Intern Med.1996; 125:284-293.]. While we do adjust for admission severity when reporting FTR, and this includes age, we still thought it prudent to use an upper bound on age, since DNR status prior to the procedure is not well defined at hospitals [Tabak YP, Johannes RS, Silber JH, Kurtz SG, Gibber EM. Should do-not-resuscitate status be included as a mortality risk adjustor? The impact of DNR variations on performance reporting. Med Care 2005; 43:658-666] (See 2d.1 Measure Exclusions Explanation section in submission form). Currently, we are not considering developing a companion pediatric measure because in general the pediatric population has low mortality rates. However we are currently exploring the development of a pediatric FTR specifically for cardiothoracic surgery where mortality rates are higher.
2. 2h. Disparities in Care:
   2h.1. Disparities in care are shown in Silber et al Arch Surg 2009 where the results show white patients displayed a reduction in failure-to-rescue rates in the teaching intensive hospitals vs non-teaching hospitals (OR, 0.94; 95% CI, 0.92-0.97), black patients displayed an increased failure-to-rescue rate (OR, 1.06; 95% CI, 1.00-1.12)(Results are based on 30 day mortality FTR however in-hospital showed similar results)
   2h.2 Failure to Rescue can be used to detect disparities in health outcomes across providers, shown in Silber et al. Arch Surg 2009.

0352 Failure to Rescue In-Hospital Mortality (risk adjusted)

3. 3a.2 Use in Public Reporting Initiative: FTR information is online for the public to access (http://stokes.chop.edu/programs/cor/outcomes.php). Consumers can access FTR results through the multiple research publications on the measure. In the future FTR could be reported on a wider scale, the same way that mortality rates are reported.

If applicable, Questions to the Steering Committee:

1. Importance to Measure and Report: Y-18; N-3
(1a. Impact; 1b. Performance gap; 1c. Outcome or Evidence)
Rationale: The measure complements mortality and complication statistics. It provides additional insight into statistics by looking beyond crude mortality and assesses whether hospital systems are in place to prevent a patient complication from progressing to death. This measure is supported by the evidence.

2. Scientific Acceptability of Measure Properties: C-9; P-11; M-1; N-0
(2a. Precise specifications; 2b. Reliability testing; 2c. Validity testing; 2d. Exclusions justified; 2e. Risk adjustment/stratification; 2f. Meaningful differences; 2g. Comparability; 2h. Disparities)
Rationale: The measure contains updated CPT codes. The measure is risk adjusted and the population captured includes patients with and without documented complications. It assumes that if patients die post-surgery, there was an undocumented complication.

3. Usability: C-7; P-12; M-2; N-0
(3a. Meaningful/useful for public reporting and quality improvement; 3b. Harmonized; 3c. Distinctive or additive value to existing measures)
Rationale: The measure is somewhat complicated and has not yet been used in public reporting.

4. Feasibility: C-8; P-12; M-1; N-0
(4a. Clinical data generated during care process; 4b. Electronic sources; 4c. Exclusions – no additional data source; 4d. Susceptibility to inaccuracies/ unintended consequences identified 4e. Data collection strategy can be implemented)
Rationale: The measure will be relatively easy to collect since it uses administrative data.

0353 Failure to Rescue 30-Day Mortality (risk adjusted)

Originally Submitted Specifications
Description: Percentage of patients who died with a complication within 30 days from admission.
Numerator Statement: Patients who died with a complication plus patients who died without documented complications. Death is defined as death within 30 days from admission.
All patients in an FTR analysis have developed a complication (by definition).
Complicated patient has at least one of the complications defined in Appendix B(see website http://www.research.chop.edu/programs/cor/outcomes.php). Complications are defined using the secondary ICD9 diagnosis and procedure codes and the DRG code of the current admission.
Comorbidities are defined in Appendix C(see website http://www.research.chop.edu/programs/cor/outcomes.php) using secondary ICD9 diagnosis codes of the current admission and primary or secondary ICD9 diagnosis codes of previous admission within 90 days of the admission date of the current admission.
*When physician part B is available, the definition of complications and comorbidities are augmented to include CPT codes.
Denominator Statement: General Surgery, Orthopedic and Vascular patients in specific DRGs with complications plus patients who died in the hospital without complications.
Inclusions: adult patients admitted for one of the procedures in the General Surgery, Orthopedic or Vascular DRGs (see appendix A http://www.research.chop.edu/programs/cor/outcomes.php)
Inclusions: adult patients admitted for one of the procedures in the General Surgery, Orthopedic or Vascular DRGs (see appendix A)
Exclusions: Patients over age 90, under age 18.
Adjustment/Stratification: risk-adjustment devised specifically for this measure/condition Risk Adjustment: Model was developed using logistic regression analysis.
Associated data elements: age in years, sex, race, comorbidities, DRGs (combined with and without complications) and procedure codes within DRGs, transfer status.
Failure to rescue is adjusted using a logistic regression model where y is a failure and the total N is composed of patients who develop a complication and patients who died without a complication.
According to developer: The model adjustment variables can vary. We have found that FTR results are fairly stable, even with little adjustment, since all patients in an FTR analysis have developed a complication (by definition), they are a more homogeneous group of patients than the entire population. Hence severity adjustment plays somewhat less of a role than in other outcome measures/Complicated patient has at least one of the complications defined in Appendix B (http://www.research.chop.edu/programs/cor/outcomes.php) Complications are defined using the secondary ICD9 diagnosis and

0353 Failure to Rescue 30-Day Mortality (risk adjusted)

procedure codes and the DRG code of the current admission. When Physician Part B file is available, the definition of complications and comorbidities are augmented to include CPT codes.
Level of Analysis: Facility/ Agency, Health Plan, Integrated Delivery System, Population : Counties or cities, Population : National, Population : Regional/ network, Population : states
Type of Measure: Outcome
Data Source: Electronic administrative data/ claims
Updated Specifications
If measure is stratified, provide stratified results: Disparities in care are shown in Silber et al Arch Surg 2009 where the results show white patients displayed a reduction in failure-to-rescue rates in the teaching intensive hospitals vs non-teaching hospitals (OR, 0.94; 95% CI, 0.92-0.97), black patients displayed an increased failure-to-rescue rate (OR, 1.06; 95% CI, 1.00-1.12)
If disparities have been reported/identified but measure is not specified to detect disparities, provide follow-up plans
Failure to Rescue can be used to detect disparities in health outcomes across providers, shown in Silber et al. Arch Surg 2009.
Use in Public Reporting Initiative: FTR information is online for the public to access (http://stokes.chop.edu/programs/cor/outcomes.php). Consumers can access FTR results through the multiple research publications on the measure. In the future FTR could be reported on a wider scale, the same way that mortality rates are reported.
Measure Steward: The Children´s Hospital of Philadelphia | 34th St. and Civic Center Blvd. | Philadelphia | Pennsylvania | 19104

Steering Committee Recommendation for Endorsement: Conditional Y-13; N-8; A-0
Rationale: The measure provides information about how hospitals handle patients who develop complications; i.e., prevent patient complications from progressing to death. It will also track difference in length of stay that could bias statistics associated with in-hospital mortality.

If applicable, Conditions/Questions for Developer:

1. 2a.6 Target Population Age Range: Reevaluate upper age limit in terms of increasing and providing exclusions to capture limited future; e.g., DNR status. In future, consider development of a companion pediatric measure.
2. 2h. Disparities in Care: Provide information about disparities or plans to be able to provide data.
3. 3a.2 Use in Public Reporting Initiative: Provide plans and expected date (within 3 years) for public reporting.
4. Please advise how 30 day data is collected and how post-hospital care with potential for affecting outcomes is handled.

Note: Discussion of Related and Competing measures may result in additional requests to developers specific to harmonization

Developer Response:

1. 2a.6 Target Population Age Range: We use 90 years as a cut-point because of our concern regarding the increased use of do-not-resuscitate at higher ages [Wenger et al. Epidemiology of Do-Not Resuscitate Orders. Disparity by Age, Diagnosis, Gender, Race, and Functional Impairment. Arch Intern Med. 1995; 155(19):2056-62, Hakim et al. Factors Associated with Do-Not-Resuscitate Orders: Patients', Preferences, Prognoses, and Physicians Judgments. Ann Intern Med.1996; 125:284-293.]. While we do adjust for admission severity when reporting FTR, and this includes age, we still thought it prudent to use an upper bound on age, since DNR status prior to the procedure is not well defined at hospitals [Tabak YP, Johannes RS, Silber JH, Kurtz SG, Gibber EM. Should do-not-resuscitate status be included as a mortality risk adjustor? The impact of DNR variations on performance reporting. Med Care 2005; 43:658-666] (See 2d.1 Measure Exclusions Explanation section in submission form)
   Currently, we are not considering developing a companion pediatric measure because in general the pediatric population has low mortality rates. However we are currently exploring the development of a pediatric FTR specifically for cardiothoracic surgery where mortality rates are higher.
2. 2h. Disparities in Care:
   2h.1. Disparities in care are shown in Silber et al Arch Surg 2009 where the results show white patients displayed a reduction in failure-to-rescue rates in the teaching intensive hospitals vs non-teaching hospitals (OR, 0.94; 95% CI, 0.92-0.97), black patients displayed an increased failure-to-rescue rate (OR, 1.06; 95% CI, 1.00-1.12)(Results are based on 30 day mortality FTR however in-hospital showed similar results)
   2h.2. Failure to Rescue can be used to detect disparities in health outcomes across providers, shown in Silber et al. Arch Surg 2009.
3. 3a.2 Use in Public Reporting Initiative: FTR information is online for the public to access (http://stokes.chop.edu/programs/cor/outcomes.php). Consumers can access FTR results through the multiple research publications on the measure. In the future FTR could be reported on a wider scale, the same way that mortality rates are reported.
4. If one has administrative claims data that can be linked to post-discharge data, then one can report a 30-day from admission measure. The advantage of a 30-day measure is that it is unbiased with respect to the practice pattern of the hospital. All hospitals are judged with the same 30-day window whether they tend to discharge patients earlier than later. This is generally considered to be the gold standard for using mortality data. The FTR 30-day measure has the same advantages of the 30-day

0353 Failure to Rescue 30-Day Mortality (risk adjusted)

mortality measure. Analytic difficulties related to post-discharge care have the same likelihood of occurring across hospitals using the 30-day measure but would be more problematic if a uniform window would not be used.

If applicable, Questions to the Steering Committee:

1. Importance to Measure and Report: Y-17; N-3; A-0

(1a. Impact; 1b. Performance gap; 1c. Outcome or Evidence)

Rationale: The measure complements mortality and complication statistics. It provides additional insight into statistics by looking beyond crude mortality and assesses whether hospital systems are in place to prevent a patient complication from progressing to death. This measure is supported by the evidence.

2. Scientific Acceptability of Measure Properties: C-6; P-12; M-2; N-0

(2a. Precise specifications; 2b. Reliability testing; 2c. Validity testing; 2d. Exclusions justified; 2e. Risk adjustment/stratification; 2f. Meaningful differences; 2g. Comparability; 2h. Disparities)

Rationale: The measure contains updated CPT codes. The measure is risk adjusted and the population captured includes patients with and without documented complications. It assumes that if patients die post-surgery, there was an undocumented complication.

3. Usability: C-3; P-10; M-8; N-0

(3a. Meaningful/useful for public reporting and quality improvement; 3b. Harmonized; 3c. Distinctive or additive value to existing measures)

Rationale: The measure uses administrative data, but it may be complicated to track given the 30 day range. This measure has good face validity.

4. Feasibility: C-3; P-10; M-7; N-1

(4a. Clinical data generated during care process; 4b. Electronic sources; 4c. Exclusions – no additional data source; 4d. Susceptibility to inaccuracies/ unintended consequences identified 4e. Data collection strategy can be implemented)

Rationale: This measure has not yet been used in public reporting. There was question regarding feasibility of use of this measure for non-medicare patients.

0351 Death among surgical inpatients with serious, treatable complications (PSI 4)

Originally Submitted Specifications

Description: Percentage of cases having developed specified complications of care with an in-hospital death.

Numerator Statement: All discharges with a disposition of "deceased" (DISP=20) among cases meeting the inclusion and exclusion rules for the denominator.

Denominator Statement: All surgical discharges age 18 years and older or MDC 14 (pregnancy, childbirth, and puerperium) defined by specific DRGs or MS-DRGs and an ICD-9-CM code for an operating room procedure, principal procedure within 2 days of admission OR admission type of elective (ATYPE=3) with potential complications of care listed in Death among Surgical definition (e.g., pneumonia, DVT/PE, sepsis, shock/cardiac arrest, or GI hemorrhage/acute ulcer).

Exclusions: Exclude cases:

• age 90 years and older

• transferred to an acute care facility (DISP = 2)

• missing discharge disposition (DISP=missing), gender (SEX=missing), age (AGE=missing), quarter (DQTR=missing), year (YEAR=missing) or principal diagnosis (DX1 =missing)

NOTE: Additional exclusion criteria is specific to each diagnosis (pneumonia, DVT/PE, sepsis, shock/cardiac arrest, or GI hemorrhage/acute ulcer). See 2a.10.

Adjustment/Stratification: risk adjustment method widely or commercially available The predicted value for each case is computed using a hierarchical model (logistic regression with hospital random effect) and covariates for gender, age in years (in 5-year age groups), modified CMS DRG and AHRQ Comorbidities. The reference population used in the model is the universe of discharges for states that participate in the HCUP State Inpatient Databases (SID) for the year 2007 (updated annually), a database consisting of 43 states and approximately 30 million adult discharges. The expected rate is computed as the sum of the predicted value for each case divided by the number of cases for the unit of analysis of interest (i.e., hospital, state, and region). The risk adjusted rate is computed using indirect standardization as the observed rate divided by the expected rate, multiplied by the reference population rate/User has an option to stratify by Gender, age (5-year age groups), race / ethnicity, primary payer, and custom stratifiers.

Level of Analysis: Facility/ Agency

Type of Measure: Outcome

Data Source: Electronic administrative data/ claims

Updated Specifications

Target Population Age Range: 18 and older

Measure Steward: Agency for Healthcare Research and Quality | 540 Gaither Road | Rockville | Maryland | 20850

Table of Committee's Suggested Modifications and Responses from Developers

0351 Death among surgical inpatients with serious, treatable complications (PSI 4)

Steering Committee Recommendation for Endorsement: Conditional Y-18; N-1; A-0

Rationale: This measure highlights specific complications, which presents opportunities for early interventions and action

If applicable, Conditions/Questions for Developer:

1. 2a.6 Target Population Age Range: Expand the age range to include a larger population.

Note: Discussion of Related and Competing measures may result in additional requests to developers specific to harmonization.

Developer Response:

1. There was an error in the NQF measure maintenance form, which noted age 75 years and older were excluded. The actual exclusion is age 90 years and older.

If applicable, Questions to the Steering Committee:

1. Importance to Measure and Report: Y-19; N-1

(1a. Impact; 1b. Performance gap; 1c. Outcome or Evidence)

Rationale: This goal of this measure is to capture information about a specific set of surgical complications that have been determined to provide opportunity for early intervention and improvement action.

2. Scientific Acceptability of Measure Properties: C-13; P-7; M-0; N-0

(2a. Precise specifications; 2b. Reliability testing; 2c. Validity testing; 2d. Exclusions justified; 2e. Risk adjustment/stratification; 2f. Meaningful differences; 2g. Comparability; 2h. Disparities)

Rationale: An advantage of this measure is that it focuses on a broad population, patients 18 and over.

3. Usability: C-13; P-7; M-0; N-0

(3a. Meaningful/useful for public reporting and quality improvement; 3b. Harmonized; 3c. Distinctive or additive value to existing measures)

Rationale: The measure uses claims data and is currently being widely reported to the public.

4. Feasibility: C-14; P-5; M-0; N-0

(4a. Clinical data generated during care process; 4b. Electronic sources; 4c. Exclusions – no additional data source; 4d. Susceptibility to inaccuracies/ unintended consequences identified 4e. Data collection strategy can be implemented)

Rationale: This measure was considered feasible.

1536 Cataracts: Improvement in Patient's Visual Function within 90 Days Following Cataract Surgery

Originally Submitted Specifications

Description: Percentage of patients aged 18 years and older who had cataract surgery and had improvement in visual function achieved within 90 days following the cataract surgery

Numerator Statement: Patients who had improvement in visual function achieved within 90 days following cataract surgery

Denominator Statement: All patients aged 18 years and older who had cataract surgery

Exclusions: Denominator (Eligible Population): All patients aged 18 years and older who had cataract surgery

•CPT Procedure Codes (with or without modifiers): 66840, 66850, 66852, 66920, 66930, 66940, 66982, 66983, 66984

Adjustment/Stratification: no risk adjustment necessary/This measure can be stratified into two major groups: those patients with ocular co-morbidities and those patients without ocular co-morbidities. An improvement in visual function after cataract surgery would be expected in both groups, however the magnitude of the difference would vary by group. The Cataract Patient Outcomes Research Team found that an important preoperative patient characteristic that was independently associated with failure to improve on one of the outcomes measured (including the VF-14) was ocular comorbidity. The authors explained that this was expected, because it is reasonable to assume that other diseases that impair visual function would be correlated with a reduced improvement in functional status. The National Eye Care Outcomes Network also found that there were differences in the mean postooperative VF-14 scores across groups of patients with and without ocular co-morbidities, as seen in the table below. The study involving the Rasch-scaled short version of the VF-14 also found differences between the preoperative and postoperative visual function test scores and differences between preoperative and postoperative visual function tests, as seen below.

National Eyecare Outcomes Network

Mean VF-14 (postoperative)

- Total 92.7
- With ocular comorbidity 89.9
- Without ocular comorbidity 94.6

Rasch-Scaled Short Version of the VF-14

Patients without Ocular Comorbidity - Preop VF-8R - 68.87

Postop VF-8R - 86.22

Mean Diff = 17.35

Patients with Ocular Comorbidity - Preop VF-8R - 67.71

1536 Cataracts: Improvement in Patient's Visual Function within 90 Days Following Cataract Surgery
Postop VF-8R - 81.58 Mean Diff = 13.87 A list of codes for comorbidities can be found in the AMA PCPI measure for 20/40 visual acuity after cataract surgery: Acute and subacute iridocyclitis 364.00 Acute and subacute iridocyclitis 364.01 Acute and subacute iridocyclitis 362.02 Acute and subacute iridocyclitis 364.03 Acute and subacute iridocyclitis 364.04 Acute and subacute iridocyclitis 364.05 Amblyopia 368.01 Amblyopia 368.02 Amblyopia 368.03 Burn confined to eye and adnexa 940.0 Burn confined to eye and adnexa 940.1 Burn confined to eye and adnexa 940.2 Burn confined to eye and adnexa 940.3 Burn confined to eye and adnexa 940.4 Burn confined to eye and adnexa 940.5 Burn confined to eye and adnexa 940.9 Cataract secondary to ocular disorders 366.32 Cataract secondary to ocular disorders 366.33 Certain types of iridocyclitis 364.21 Certain types of iridocyclitis 364.22 Certain types of iridocyclitis 364.23 Certain types of iridocyclitis 364.24 Certain types of iridocyclitis 364.3 Choroidal degenerations 363.43 Choroidal detachment 363.72 Choroidal hemorrhage and rupture 363.61 Choroidal hemorrhage and rupture 363.62 Choroidal hemorrhage and rupture 363.63 Chorioretinal scars 363.30 Chorioretinal scars 363.31 Chorioretinal scars 363.32 Chorioretinal scars 363.33 Chorioretinal scars 363.35 Chronic iridocyclitis 364.10 Chronic iridocyclitis 364.11 Cloudy cornea 371.01 Cloudy cornea 371.02 Cloudy cornea 371.03 Cloudy cornea 371.04 Corneal edema 371.20 Corneal edema 371.21 Corneal edema 371.22 Corneal edema 371.23 Corneal edema 371.43 Corneal edema 371.44 Corneal opacity and other disorders of cornea 371.00 Corneal opacity and other disorders of cornea 371.03 Corneal opacity and other disorders of cornea 371.04 Degenerative disorders of globe 360.20 Degenerative disorders of globe 360.21 Degenerative disorders of globe 360.23 Degenerative disorders of globe 360.24

1536 Cataracts: Improvement in Patient's Visual Function within 90 Days Following Cataract Surgery
Degenerative disorders of globe 360.29
Degeneration of macula and posterior pole 362.50
Degeneration of macula and posterior pole 362.51
Degeneration of macula and posterior pole 362.52
Degeneration of macula and posterior pole 362.53
Degeneration of macula and posterior pole 362.54
Degeneration of macula and posterior pole 362.55
Degeneration of macula and posterior pole 362.56
Degeneration of macula and posterior pole 362.57
Disseminated chorioretinitis and disseminated retinochoroiditis 363.10
Disseminated chorioretinitis and disseminated retinochoroiditis 363.11
Disseminated chorioretinitis and disseminated retinochoroiditis 363.12
Disseminated chorioretinitis and disseminated retinochoroiditis 363.13
Disseminated chorioretinitis and disseminated retinochoroiditis 363.14
Disseminated chorioretinitis and disseminated retinochoroiditis 363.15
Diabetic retinopathy 362.01
Diabetic retinopathy 362.02
Diabetic retinopathy 362.03
Diabetic retinopathy 362.04
Diabetic retinopathy 362.05
Diabetic retinopathy 362.06
Diabetic macular edema 362.07
Disorders of optic chiasm 377.51
Disorders of optic chiasm 377.52
Disorders of optic chiasm 377.53
Disorders of optic chiasm 377.54
Disorders of visual cortex 377.75
Focal chorioretinitis and focal retinochoroiditis 363.00
Focal chorioretinitis and focal retinochoroiditis 363.01
Focal chorioretinitis and focal retinochoroiditis 363.03
Focal chorioretinitis and focal retinochoroiditis 363.04
Focal chorioretinitis and focal retinochoroiditis 363.05
Focal chorioretinitis and focal retinochoroiditis 363.06
Focal chorioretinitis and focal retinochoroiditis 363.07
Focal chorioretinitis and focal retinochoroiditis 363.08
Glaucoma 365.10
Glaucoma 365.11
Glaucoma 365.12
Glaucoma 365.13
Glaucoma 365.14
Glaucoma 365.15
Glaucoma 365.20
Glaucoma 365.21
Glaucoma 365.22
Glaucoma 365.23
Glaucoma 365.24
Glaucoma 365.31
Glaucoma 365.32
Glaucoma 365.51
Glaucoma 365.52
Glaucoma 365.59
Glaucoma associated with congenital anomalies, dystrophies, and systemic syndromes 365.41
Glaucoma associated with congenital anomalies, dystrophies, and systemic syndromes 365.42
Glaucoma associated with congenital anomalies, dystrophies, and systemic syndromes 365.43
Glaucoma associated with congenital anomalies, dystrophies, and systemic syndromes 365.44

1536 Cataracts: Improvement in Patient's Visual Function within 90 Days Following Cataract Surgery
Glaucoma associated with congenital anomalies, dystrophies, and systemic syndromes 365.60
Glaucoma associated with congenital anomalies, dystrophies, and systemic syndromes 365.61
Glaucoma associated with congenital anomalies, dystrophies, and systemic syndromes 365.62
Glaucoma associated with congenital anomalies, dystrophies, and systemic syndromes 365.63
Glaucoma associated with congenital anomalies, dystrophies, and systemic syndromes 365.64
Glaucoma associated with congenital anomalies, dystrophies, and systemic syndromes 365.65
Glaucoma associated with congenital anomalies, dystrophies, and systemic syndromes 365.81
Glaucoma associated with congenital anomalies, dystrophies, and systemic syndromes 365.82
Glaucoma associated with congenital anomalies, dystrophies, and systemic syndromes 365.83
Glaucoma associated with congenital anomalies, dystrophies, and systemic syndromes 365.89
Glaucoma associated with congenital anomalies, dystrophies, and systemic syndromes 365.9
Hereditary corneal dystrophies 371.50
Hereditary corneal dystrophies 371.51
Hereditary corneal dystrophies 371.52
Hereditary corneal dystrophies 371.53
Hereditary corneal dystrophies 371.54
Hereditary corneal dystrophies 371.55
Hereditary corneal dystrophies 371.56
Hereditary corneal dystrophies 371.57
Hereditary corneal dystrophies 371.58
Hereditary choroidal dystrophies 363.50
Hereditary choroidal dystrophies 363.51
Hereditary choroidal dystrophies 363.52
Hereditary choroidal dystrophies 363.53
Hereditary choroidal dystrophies 363.54
Hereditary choroidal dystrophies 363.55
Hereditary choroidal dystrophies 363.56
Hereditary choroidal dystrophies 363.57
Hereditary retinal dystrophies 362.70
Hereditary retinal dystrophies 362.71
Hereditary retinal dystrophies 362.72
Hereditary retinal dystrophies 362.73
Hereditary retinal dystrophies 362.74
Hereditary retinal dystrophies 362.75
Hereditary retinal dystrophies 362.76
High myopia 360.20
High myopia 360.21
Injury to optic nerve and pathways 950.0
Injury to optic nerve and pathways 950.1
Injury to optic nerve and pathways 950.2
Injury to optic nerve and pathways 950.3
Injury to optic nerve and pathways 950.9
Keratitis 370.03
Moderate or severe impairment, better eye, profound impairment lesser eye 369.10
Moderate or severe impairment, better eye, profound impairment lesser eye 369.11
Moderate or severe impairment, better eye, profound impairment lesser eye 369.12
Moderate or severe impairment, better eye, profound impairment lesser eye 369.13
Moderate or severe impairment, better eye, profound impairment lesser eye 369.14
Moderate or severe impairment, better eye, profound impairment lesser eye 369.15
Moderate or severe impairment, better eye, profound impairment lesser eye 369.16
Moderate or severe impairment, better eye, profound impairment lesser eye 369.17
Moderate or severe impairment, better eye, profound impairment lesser eye 369.18
Nystagmus and iother irregular eye movements 379.51
Open wound of eyeball 871.0
Open wound of eyeball 871.1

1536 Cataracts: Improvement in Patient's Visual Function within 90 Days Following Cataract Surgery			
Open wound of eyeball	871.2		
Open wound of eyeball	871.3		
Open wound of eyeball	871.4		
Open wound of eyeball	871.5		
Open wound of eyeball	871.6		
Open wound of eyeball	871.7		
Open wound of eyeball	871.9		
Optic atrophy	377.10		
Optic atrophy	377.11		
Optic atrophy	377.12		
Optic atrophy	377.13		
Optic atrophy	377.14		
Optic atrophy	377.15		
Optic atrophy	377.16		
Optic neuritis	377.30		
Optic neuritis	377.31		
Optic neuritis	377.32		
Optic neuritis	377.33		
Optic neuritis	377.34		
Optic neuritis	377.39		
Other background retinopathy and retinal vascular changes	362.12		
Other background retinopathy and retinal vascular changes	362.16		
Other background retinopathy and retinal vascular changes	362.18		
Other corneal deformities	371.70		
Other corneal deformities	371.71		
Other corneal deformities	371.72		
Other corneal deformities	371.73		
Other disorders of optic nerve	377.41		
Other disorders of sclera	379.11		
Other disorders of sclera	379.12		
Other endophthalmitis	360.11		
Other endophthalmitis	360.12		
Other endophthalmitis	360.13		
Other endophthalmitis	360.14		
Other endophthalmitis	360.19		
Other retinal disorders	362.81		
Other retinal disorders	362.82		
Other retinal disorders	362.83		
Other retinal disorders	362.84		
Other retinal disorders	362.85		
Other retinal disorders	362.89		
Other and unspecified forms of chorioretinitis and retinochoroiditis	363.20		
Other and unspecified forms of chorioretinitis and retinochoroiditis	363.21		
Other and unspecified forms of chorioretinitis and retinochoroiditis	363.22		
Prior penetrating keratoplasty	371.60		
Prior penetrating keratoplasty	371.61		
Prior penetrating keratoplasty	371.62		
Profound impairment, both eyes	369.00		
Profound impairment, both eyes	369.01		
Profound impairment, both eyes	369.02		
Profound impairment, both eyes	369.03		
Profound impairment, both eyes	369.04		
Profound impairment, both eyes	369.05		
Profound impairment, both eyes	369.06		
Profound impairment, both eyes	369.07		

1536 Cataracts: Improvement in Patient's Visual Function within 90 Days Following Cataract Surgery
Profound impairment, both eyes 369.08 Purulent endophthalmitis 360.00 Purulent endophthalmitis 360.01 Purulent endophthalmitis 360.02 Purulent endophthalmitis 360.03 Purulent endophthalmitis 360.04 Retinal detachment with retinal defect 361.00 Retinal detachment with retinal defect 361.01 Retinal detachment with retinal defect 361.02 Retinal detachment with retinal defect 361.03 Retinal detachment with retinal defect 361.04 Retinal detachment with retinal defect 361.05 Retinal detachment with retinal defect 361.06 Retinal detachment with retinal defect 361.07 Retinal vascular occlusion 362.31 Retinal vascular occlusion 362.32 Retinal vascular occlusion 362.35 Retinal vascular occlusion 362.36 Retinopathy of prematurity 362.21 Scleritis and episcleritis 379.04 Scleritis and episcleritis 379.05 Scleritis and episcleritis 379.06 Scleritis and episcleritis 379.07 Scleritis and episcleritis 379.09 Separation of retinal layers 362.41 Separation of retinal layers 362.42 Separation of retinal layers 362.43 Uveitis 360.11 Uveitis 360.12 Visual field defects 368.41 References: 1. Schein OD, Steinberg EP, Cassard SD et al. Predictors of outcome in patients who underwent cataract surgery. Ophthalmology 1995; 102:817-23. 2. Lum F, Schachat AP, Jampel HD.The development and demise of a cataract surgery database. Jt Comm J Qual Improv. 2002 Mar;28(3):108-14. 3. Gothwal VK, Wright TA, Lamoureux EL, Pesudovs K. Measuring outcomes of cataract surgery using the Visual Function Index-14. J Cataract Refract Surg 2010; 36:1181-8. no risk adjustment necessary Denominator Exclusions: Documentation of medical reason for not improving visual function within 90 days of cataract surgery • Append modifier to CPT Category II Code: -1P Documentation of patient reason for not improving visual function within 90 days of cataract surgery • Append modifier to CPT Category II Code: -2P **Level of Analysis:** Clinicians: Individual **Type of Measure:** Outcome **Data Source:** Survey: Patient **Updated Specifications** **Numerator Statement:** Patients 18 years and older in sample who had improvement in visual function achieved within 90 days following cataract surgery, based on completing a pre-operative and post-operative visual function instrument **Numerator Details:** Patients 18 years and older in sample who had an improvement in their visual function achieved within 90 days following cataract surgery Patients in sample who completed a pre-operative and post-operative visual function instrument, and with the CPT Procedure Codes (with or without modifiers): 66840, 66850, 66852, 66920, 66930, 66940, 66982, 66983, 66984 **Denominator Statement:** All patients aged 18 years and older in sample who had cataract surgery **Denominator Details:** Denominator (Eligible Population): All patients aged 18 years and older in sample who had cataract surgery • CPT Procedure Codes (with or without modifiers): 66840, 66850, 66852, 66920, 66930, 66940, 66982, 66983, 66984 **Use in Public Reporting Initiative:** The plans are to have this used in a public reporting initiative within the next 3 years: the Centers for

1536 Cataracts: Improvement in Patient's Visual Function within 90 Days Following Cataract Surgery

Medicare and Medicaid Services Physician Quality Reporting System.

Use in QI or Other Programs/Initiatives*:* The plan is to use this with the American Academy of Ophthalmology´s Ophthalmic Patient Outcomes Database for quality improvement purposes within 3 years´ time.

Specify the near-term path to achieve electronic capture by most providers: A web-based survey instrument could be used and results uploaded into a data registry. Paper survey instruments could be scanned and incorporated into a data registry. The registry could calculate the results and provide these results as feedback to the physicians and as quality measures to the CMS PQRS.

Describe what you have learned/modified as a result of testing and/or operational use of the measure regarding data collection, availability of data/missing data, timing and frequency of data collection, patient confidentiality, time and cost of data collection, and other feasibility or implementation issues: There is a burden upon the office practice to survey patients pre and post cataract surgery. The majority of these patients are elderly, and they may require assistance/prompting in responding to the surveys. This then will entail time taken out by the practice staff. The follow-up survey also requires close attention. Therefore, we have proposed a minimal sampling size of 30, which will reduce the burden on physicians´ practice and optimize the response rates. The survey would be administered by a third party (a registry for reporting of PQRS measures sponsored by the American Academy of Ophthalmology) to prevent or minimize bias which might be introduced if it is an in-office paper survey with questions asked by the office staff. Options would be provided to the patient, either online survey, mail survey or phone survey, depending on their preferences and abilities, because these patients are elderly and have visual impairment.

Costs to Implement the Measure: There are costs of data collection and follow up of patients who haven´t filled out the surveys. There are no fees associated with proprietary measures. Therefore, we have proposed a sample size of 30, which will reduce the burden of these costs.

Measure Steward: American Academy of Ophthalmology and Hoskins Center for Quality Eye Care | 655 Beach Street | San Francisco | California, 94109-1336

Steering Committee Recommendation for Endorsement: ***Conditional*** *Y-9; N-10; A-0*

Rationale: The Committee verified the importance of patient centered measures but suggested that the measure should be better specified.

If applicable, Conditions/Questions for Developer:

Overarching comment: The numerator, denominator with the inclusions and exclusions should be refined to capture patients relevant to the measure focus and the measure should be tested with the changes that are made.

1. 2a.3 Numerator Details: a) Provide the method (e.g., scale or other method to demonstrate improvement quantatively pre- and post- surgery) to define "improvement"; b) It appears inappropriate to include, in the numerator, patients who do not complete visual function assessments; reevaluate how these cases should be handled; c) Injdicate whether objective vs subjective improvement by survey only; d) Specify whether patient is surveyed both pre-and post-surgery. If only post-surgery, is the patient asked to rate vision preoperatively and asked to rate vision post-operatively, or is the patient asked to rate the number of points of improvement?
2. 2a.9 Denominator Exclusions: Excluding patients who do not want to complete the survey inappropriately inflates the rate.
3. 2a.25 Data Source/Data Collection Instrument: a) Identify the specific tool(s) used for the measure and provide information about the use for which it/they have been validated (e.g., self-administration, provider facilitated administration, etc.); b) Include information about why the objective assessment of visual function/acuity should be supplement with such a measure; c) Define survey methodology: Is it a mail survey, phone survey, in office paper survey with questions asked by office staff? Is the survey of the entire population of those with cataract surgery or a sample? If a sample, please specify sampling methodology.
4. 3a.2 Use in Public Reporting Initiative: Provide plans and expected date (within 3 years) for public reporting.
5. 4e Data Collection Strategy: Clarify more specifically the burden on providers of data collection.

Developer Response:

1. 2a.3 Numerator Details: a) The method to define "improvement" used is the quantitative scale used pre and post surgery to measure visual function with the VF-8R instrument. The scale is from 0-100, with 0 indicating the lack of ability to perform any of the daily activities and 100 indicating full capability of performing the daily activities included in the survey. Currently in the scientific literature, there is no well-established method to define a threshold or interval that indicates improvement on the VF-8R. The Rasch scale has found to be more sensitive to change than the VF-14 in longitudinal studies and has a different scale for scoring than the VF-14. The VF-14 is based on summative scoring, which has no rationale for how numerical values are assigned and how a summary score is produced, and does not give a sense of the degree of change. The Rasch model is based on Item Response Theory, which is based on item difficulty in relationship to an individual's ability and weighs the overall score accordingly, providing a gain in precision. Thus any difference between the pre-operative and post-operative scores on the VF-8R would indicate an improvement in functional activities. The average difference found between pre-operative and post-operative assessment on the VF-8R was 15.39 (Standard error = 2.66).
   In the literature, there have been two studies looking at the clinically important differences for the VF-14 index. One study found that the minimal clinically important difference was 15.57; another study found that the minimally clinically important

1536 Cataracts: Improvement in Patient's Visual Function within 90 Days Following Cataract Surgery

difference was 5.5. b) Regarding the cases that do not complete visual function instruments; these will not be included in the numerator. c) This is subjective improvement by patient self-reporting by survey, as measured by the VF-8R instrument. d) The patient is surveyed both pre- and post-surgery.

2. 2a.9 Denominator Exclusions: We agree and will not exclude patients who do not want to complete the survey.
3. 2a.25 Data Source/Data Collection Instrument: a) The specific tool used for the measure is the VF-8R. The information about the use for which it has been validated is self- administration. There are at least two peer-reviewed studies in the literature reports demonstrating the validity and responsiveness of the self-administered VF-14. b) It is important to supplement the existing measure for objective assessment of visual acuity because this new measure centers on patient quality of life, ability to perform activities of daily living and is a patient-reported outcome. This is the outcome most critical and applicable to the patient. Visual acuity is an objective assessment of visual function but only describes one aspect of visual function. Visual function has multiple components in addition to central near, intermediate, and distance visual acuity. It also encompasses peripheral vision; visual search; binocular vision; depth perception; contrast sensitivity; perception of color; adaptation; and visual processing speed; all of which cannot be measured in a visual acuity test. This measure focuses on the functional disability caused by visual impairment, because many activities of daily living are affected by one or more of these components of visual function. c) The survey methodology is described as follows. The survey would be administered by a third party (a registry for reporting of PQRS measures) to prevent or minimize bias which might be introduced if it is an in-office paper survey with questions asked by the office staff. Options would be provided to the patient, either online survey, mail survey or phone survey, depending on their preferences and abilities. The survey would be of a sample of those individuals with cataract surgery. The sample size would be postulated at 30, because this is a well-accepted statistical sample and used by the CMS for reporting on measure groups in PQRS. Because visual function is reported at 90 days after surgery, this would allow physicians to identify 30 cases from January –August for reporting purposes.
4. 3a.2 Use in Public Reporting Initiative: This is planned for public reporting through the CMS PQRS within the next 3 years.
5. 4e Data Collection Strategy: The sampling strategy of 30 cases, and the use of a third party (a registry for reporting of PQRS measures initiated by the Academy) should significantly alleviate the burden on providers of data collection. Providers would not be responsible for collecting this data from patients and following up on their response.

If applicable, Questions to the Steering Committee:

1. Importance to Measure and Report: Y-18; N-1

(1a. Impact; 1b. Performance gap; 1c. Outcome or Evidence)

Rationale: The Committee recognized the frequent occurrence of cataract surgery in the United States. They also affirmed the importance of patient centered measures. In this measure, visual function is considered a more broad assessment than that of visual acuity.

2. Scientific Acceptability of Measure Properties: C-2; P-12; M-4; N-1

(2a. Precise specifications; 2b. Reliability testing; 2c. Validity testing; 2d. Exclusions justified; 2e. Risk adjustment/stratification; 2f. Meaningful differences; 2g. Comparability; 2h. Disparities)

Rationale: The Committee was advised that the tool used for assessment of visual function had been validated. It was questioned how the measure defined visual improvement. The time window of the measure may need to be extended to take into account mutli-focal implants, which are now being used to improve visual acuity, The Committee suggested measuring the improvement in visual function for patients with and without comorbidities.

3. Usability: C-1; P-15; M-1; N-2

(3a. Meaningful/useful for public reporting and quality improvement; 3b. Harmonized; 3c. Distinctive or additive value to existing measures)

Rationale: The tool is self-administered. The return rate has been 50 percent; which is considered a good rate for surveys. Some effort has been required with contact to patients to increase return rate; this could introduce bias.

4. Feasibility: C-1; P-12; M-4; N-2

(4a. Clinical data generated during care process; 4b. Electronic sources; 4c. Exclusions – no additional data source; 4d. Susceptibility to inaccuracies/ unintended consequences identified 4e. Data collection strategy can be implemented)

Rationale: It was questioned whether patients could accurately assess their visual acuity. In addition to potential bias introduced by calling patients to respond, they also mentioned that the exclusion criteria of "patient refused to participate" may bias the results. Additionally, conducting the survey will incur a cost and the burden on the provider was described as unclear.

1549 Cataracts: Patient Satisfaction within 90 Days Following Cataract Surgery

Originally Submitted Specifications

Description: Percentage of patients aged 18 years and older who had cataract surgery and were satisfied with their care within 90 days following the cataract surgery

1549 Cataracts: Patient Satisfaction within 90 Days Following Cataract Surgery

Numerator Statement: Patients who were satisfied with their care within 90 days following cataract surgery. Valid exclusions for not performing the measure for the reporting calculation include:
•The patient refuses to participate
•The patient is unable to complete the questionnaire
Denominator Statement: All patients aged 18 years and older who had cataract surgery
Exclusions: All patients aged 18 years and older who had cataract surgery
•CPT Procedure Codes (with or without modifiers): 66840, 66850, 66852, 66920, 66930, 66940, 66982, 66983, 66984
Adjustment/Stratification: no risk adjustment necessary/No stratification is required for this measure.
Level of Analysis: Clinician: Individual
Type of Measure: Patient experience
Data Source: Survey: Patient
Updated Specifications
Numerator Statement:Patients 18 years and older in the sample who were satisfied with their care within 90 days following cataract surgery.
Denominator Statement*(Brief text description of the denominator - target population being measured)*
All patients aged 18 years and older in the sample who had cataract surgery
Denominator Details: All patients aged 18 years and older in the sample who had cataract surgery
• CPT Procedure Codes (with or without modifiers): 66840, 66850, 66852, 66920, 66930, 66940, 66982, 66983, 66984
Denominator Exclusions: *(Brief text description of exclusions from the target population)*
Calculation Algorithm: *(Describe the calculation of the measure as a flowchart or series of steps)*
The calculation of the measure would be determination of the number of patients who completed the patient satisfaction survey and were satisfied as the numerator over the number of patients in the sample.
Currently, there is no established method to define a threshold of "satisfaction" with the CAHPS instruments. CAHPS scores are actually normative scores; that is, they provide relative rankings rather than absolute rankings (where is a score is compared with an ´objective´ criterion). We would propose a threshold of the lowest 5% of scores, and then postulate that those individuals scoring above this threshold will have achieved satisfaction.
Sampling (Survey) Methodology: If measure is based on a sample (or survey), provide instructions for obtaining the sample, conducting the survey, and guidance on minimum sample size (response rate).
For this physician-level measure, it is anticipated to be used as a group or composite measure. Utilizing a sample, work in the field has indicated that a sample size of 30 patients would be adequate for typical practice sizes. Based on the Central Limit Theorem, the distribution of an average will tend to be normal with a sample size of 30. This is also the sample size utilized for CMS measure group reporting in PQRS. Therefore, a sample size of 30 patients is proposed. The Academy has a registry for PQRS measures. This survey instrument could be incorporated into the registry and patients could access the web portal in order to enter their results of the satisfaction survey. Other options, such as mail surveys or phone administered surveys, could also be offered, and entered into the registry. This would alleviate any concerns of bias being introduced by having the patient fill it out in the physician´s office.
Use in Public Reporting Initiative: The plan are to have this used in a public reporting initiative within the next 3 years: the Centers for Medicare and Medicaid Services´ Physician Quality Reporting System.
Use in QI or Other Programs/Initiatives: The plan is to use this with the American Academy of Ophthalmology´s Ophthalmic Patient Outcomes Database for quality improvement purposes within 3 years´ time.
Testing of Interpretability: *(Testing that demonstrates the results are understood by the potential users for public reporting and quality improvement)*
Data/Sample: *(Description of the data or sample including number of measured entities; dates of data; if a sample, characteristics of the entities included)*
Methods: *(E.g., focus group, survey, QI project*
Results: *(Qualitative or quantitative results and conclusions)*
Describe what you have learned/modified as a result of testing and/or operational use of the measure regarding data collection, availability of data/missing data, timing and frequency of data collection, patient confidentiality, time and cost of data collection, and other feasibility or implementation issues: There is a burden upon the office practice to survey patients post cataract surgery. The vast majority of patients are elderly and they may require assistance/prompting in responding to the surveys. This then will entail time taken out by the office staff. To ensure compliance with the follow-up service will also require attention. Therefore, we propose a minimal sampling size of 30 patients, which would reduce burden on the physicians´ practices and optimize response rates. The survey would be administered by a third party (a registry for reporting PQRS measures sponsored by the American Academy of Ophthalmology) to prevent or minimize bias which might be introduced if it is an in-office paper survey with questions asked by the office staff. Options would be provided to the patient, either online survey, mail survey or phone survey, depending on their preferences and abilities, because these patients are elderly and have visual impairment.

1549 Cataracts: Patient Satisfaction within 90 Days Following Cataract Surgery

Costs to Implement the Measure*:* There are costs of data collection and follow up of patients who haven´t filled out the surveys. There are no fees associated with proprietary measures. Therefore, we have proposed a sample size of 30, which will reduce the burden of these costs.

Measure Steward: American Academy of Ophthalmology and the Hoskins Center for Quality Eye Care | 655 Beach Street | San Francisco | California, 94109-1336

Steering Committee Recommendation for Endorsement: Conditional Y-5; N-14; A-0

Rationale: The Committee affirmed the importance of measures focusing on cataract surgery and measuring patient satisfaction, but requested changes from the developer.

If applicable, Conditions/Questions for Developer:

Overarching comment: The numerator, denominator with the inclusions and exclusions should be refined to capture patients relevant to the measure focus and the measure should be tested with the changes that are made.

1. 2a.3 Numerator Details: Define satisfaction.
2. 2a. 4 Denominator Statement: Please verify the denominator statement. As submitted, it indicates that all patients who have had cataract surgery are to be surveyed. Please clarify whether that is in fact the expectation. If a sample of patients is, or can be used, details regarding sampling should be included. Define survey methodology: mail survey, phone survey, in-office paper survey or in-office survey with questions asked by staff.
3. 2a.9 Denominator Exclusions: Excluding patients who do not want to complete the survey inappropriately inflates the rate.
4. 2a.25 Data source/Data Collection Instrument: S-CAPHS is identified as the data collection instrument. When invited to do so, the developer of that instrument has indicated they are not ready to submit it for NQF endorsement. Please clarify the evidence upon which selection of the instrument was based and if it is not used in its entirety, how the selected parts were chosen and validated for use
5. 3a.2 Use in Public Reporting Initiative: Provide plans and expected date (within 3 years) for public reporting.
6. 4e Data Collection Strategy: Clarify more specifically the burden of data collection.

Developer Response:

1. 2a.3 Numerator Details: Currently, there is no established method to define a threshold of "satisfaction" with the CAHPS instruments. CAHPS scores are actually normative scores; that is, they provide relative rankings rather than absolute rankings (where is a score is compared with an 'objective' criterion). We would propose a threshold of the lowest 5% of scores, and then postulate that those individuals scoring above this threshold will have achieved satisfaction.
2. 2a. 4 Denominator Statement: The denominator statement is as follows: Patients in the sample of cataract surgery patients. The survey methodology is described as follows. The survey would be administered by a third party (a registry for reporting of PQRS measures) to prevent or minimize bias which might be introduced if it is an in office paper survey with questions asked by the office staff. Options would be provided to the patient, either online survey, mail survey or phone survey, depending on their preferences and abilities. The survey would be of a sample of those individuals with cataract surgery. The sample size would be postulated at 30, because this is a well-accepted statistical sample and used by the CMS for reporting on measure groups in PQRS. Because patient satisfaction is reported at 90 days after surgery, this would allow physicians to identify 30 cases from January –August for reporting purposes.
3. 2a.9 Denominator Exclusions: We agree and will not exclude patients who do not want to complete the survey.
4. 2a.25 Data Source/Data Collection Instrument: The main purpose of the CAHPS Surgical Care Survey is to address the need to assess and improve the experiences of surgical patients. Like other CAHPS surveys, this questionnaire focuses on aspects of surgical quality that are important to patients and for which patients are the best source of information. In particular, the S-CAHPS was selected because it evaluated the informed decisionmaking process from the patient's perspective, an important aspect of patient involvement and engagement in the care process.

   The evidence base upon which the entire S-CAHPS instrument was selected is as follows. American Institute of Research (AIR) and Westat pursued the development of the instrument with the same emphasis on standardization and scientific rigor that characterize all CAHPS products and surveys. The Surgical Care Survey went through the following development process:

- **Literature review**. AIR conducted a comprehensive review of literature on the topic of patients' experiences with surgical care. Based on this review, the team identified the following dimensions of surgical care quality:
    - Information/education
    - Interpersonal manner
    - Pain
    - Emotional support
    - Accessibility/convenience
    - Technical quality of care
    - Efficacy/outcomes of care

1549 Cataracts: Patient Satisfaction within 90 Days Following Cataract Surgery

- Availability
- Environment
- Customization/personalized care
- Patient involvement in care
- Continuity of care
- Overall satisfaction
- Finances

Using these dimensions, the team began work on developing specific domains for survey questions.

- **Meetings with stakeholders and beneficiaries**. The American College of Surgeons (ACS) held meetings with surgical care experts and stakeholders, plus six focus groups with surgical patients to better understand their needs and interests. These meetings provided the team with valuable feedback on potential survey topics and domains, as well as strategies for survey administration.
- **Cognitive testing**. Two rounds of cognitive testing were conducted in English and Spanish. The survey developers revised the instrument according to findings from the interviews, resulting in the 44-item questionnaire used for field testing.
- **Field testing**. In the summer of 2008, ACS went into the field to test the draft instrument with patients who had a non-emergency 90-day global surgical procedure in the last 3 to 6 months. Respondents had the option of filling out the survey on paper or completing it on the Web. A total of 3,215 completed questionnaires were returned (49%): 2,750 by mail and 465 by Web. The development team also conducted an experiment with 100 patients using a Web portal. Patients were sent an e-mail inviting them to complete the survey using the portal; the response rate for the Web portal was 23%.
- **Analysis and revision**. AIR conducted comprehensive psychometric analyses of the field test data. Based on these analyses and input from the CAHPS Consortium, the team made revisions to the questionnaire that are reflected in the final version.

5. 3a.2 Use in Public Reporting Initiative: This is planned for public reporting through the CMS PQRS within the next 3 years.
6. 4e Data Collection Strategy: The sampling strategy of 30 cases, and the use of a third party (a registry for reporting of PQRS measures initiated by the Academy) should significantly alleviate the burden on providers of data collection. Providers would not be responsible for collecting this data from patients and following up on their response.

If applicable, Questions to the Steering Committee:

1. Importance to Measure and Report: Y-13; N-6
(1a. Impact; 1b. Performance gap; 1c. Outcome or Evidence)
Rationale: The Committee affirmed the importance of measures focusing on cataract surgery. Visual function is considered a more broad assessment than that of visual acuity.

2. Scientific Acceptability of Measure Properties: C-1; P-19; M-5; N-3
(2a. Precise specifications; 2b. Reliability testing; 2c. Validity testing; 2d. Exclusions justified; 2e. Risk adjustment/stratification; 2f. Meaningful differences; 2g. Comparability; 2h. Disparities)
Rationale: The specifications were considered unclear and difficult to calculate.

3. Usability: C-3; P-10; M-5; N-1
(3a. Meaningful/useful for public reporting and quality improvement; 3b. Harmonized; 3c. Distinctive or additive value to existing measures)
Rationale: The Committee noted that the measure did not define satisfaction, which made it difficult to use.

4. Feasibility: C-1; P-10; M-6; N-2
(4a. Clinical data generated during care process; 4b. Electronic sources; 4c. Exclusions – no additional data source; 4d. Susceptibility to inaccuracies/ unintended consequences identified 4e. Data collection strategy can be implemented)
Rationale: The Committee noted that conducting the survey will incur a cost and the burden on the provider was described as unclear.

0125 Timing of Antibiotic Prophylaxis for Cardiac Surgery Patients

Originally Submitted Specifications
Description: Percent of patients aged 18 years and older undergoing cardiac surgery who received prophylactic antibiotics within one hour of surgical incision or start of procedure if no incision was required (two hours if receiving vancomycin or fluoroquinolone)
Numerator Statement: Number of patients undergoing cardiac surgery patients who received prophylactic antibiotics within one hour of surgical incision or start of procedure if no incision was required (two hours if vancomycin or fluoroquinolone)
Denominator Statement: Number of patients undergoing cardiac surgery
Exclusions: Cases are removed from the denominator if the patient had a documented contraindication or rationale for not

0125 Timing of Antibiotic Prophylaxis for Cardiac Surgery Patients
administering antibiotic in medical record. Other exclusions include: -Patients who had a principal diagnosis suggestive of preoperative infectious diseases -Patients whose ICD-9-CM principal procedure was performed entirely by Laparoscope -Patients enrolled in clinical trials -Patients with documented infection prior to surgical procedure of interest -Patients who were receiving antibiotics more than 24 hours prior to surgery -Patients who were receiving antibiotics within 24 hours prior to arrival This list will be provided in the STS Adult Cardiac Surgery Database Data Manager's Training Manual as acceptable exclusions. **Adjustment/Stratification:** no risk adjustment necessary/No stratification is required for this measure. **Level of Analysis:** Clinicians : Group, Facility/ Agency, Population : Counties or cities, Population : National, Population : Regional/ network, Population : states **Type of Measure:** Process **Data Source:** Registry data **Updated Specifications** **Rating of Strength/Quality of Evidence:** Class I, Level of Evidence A – "In patients for whom cefazolin is the appropriate prophylactic antibiotic for cardiac surgery, administration within 60 minutes of the skin incision is indicated." Class I, Level of Evidence A – "In patients for whom vancomycin is an appropriate prophylactic antibiotic for cardiac surgery, a dose of 1 to 1.5 g or a weight-adjusted dose of 15 mg/kg administered intravenously slowly over 1 hour, with completion within 1 hour of the skin incision, is recommended." -- Reference: Engelman R, Shahian D, Shemin R, Guy TS, Bratzler D, Edwards F, Jacobs M, Fernando H, Bridges C; Workforce on Evidence-Based Medicine, Society of Thoracic Surgeons. The Society of Thoracic Surgeons practice guideline series: Antibiotic prophylaxis in cardiac surgery, part II: Antibiotic choice. Ann Thorac Surg. 2007 Apr;83(4):1569-76. Review. No abstract available. PMID: 17383396 **Measure Steward:** Society of Thoracic Surgeons | 633 North Saint Clair Street, Suite 2320 | Chicago | Illinois | 60611
Steering Committee Recommendation for Endorsement: Conditional Y-17; N-2; A-0 **Rationale:** The evidence supporting the measure was considered strong.
If applicable, Conditions/Questions for Developer: 1. 1c.5 Rating of Strength/Quality of Evidence: Address the rating of evidence. 2. 2a.1 Numerator Statement: Provide the exact timing of the prophylactic antibiotic. Note: Discussion of Related and Competing measures may result in additional requests to developers specific to harmonization. **Developer Response:** 1. This is addressed in the measure submission form. 2. Exact timing was provided in the original measure submission form. **If applicable, Questions to the Steering Committee:**
1. Importance to Measure and Report: Y-17; N-2 *(1a. Impact; 1b. Performance gap; 1c. Outcome or Evidence)* **Rationale:** The Committee noted controversy regarding the one hour timeframe for antibiotic prophylaxis. The performance gap for the measure was considered small but the outcome of mediastinitis and potentially death suggests measuring continued improvement effort is warranted.
2. Scientific Acceptability of Measure Properties: C-11; P-8; M-0; N-0 *(2a. Precise specifications; 2b. Reliability testing; 2c. Validity testing; 2d. Exclusions justified; 2e. Risk adjustment/stratification; 2f. Meaningful differences; 2g. Comparability; 2h. Disparities)* **Rationale:** The Committee noted that laparoscopic procedures were excluded but in the future would be included in the measure.
3. Usability: C-13; P-6; M-0; N-0 *(3a. Meaningful/useful for public reporting and quality improvement; 3b. Harmonized; 3c. Distinctive or additive value to existing measures)* **Rationale:** The Committee indicated that there were similar measures that may need to be harmonized including: **#0269:** Timing of prophylactic antibiotics - administering physician **#0270:** Timing of antibiotic prophylaxis- ordering physician **#0472:** Prophylactic antibiotic received within one hour prior to surgical incision or at the time of delivery – cesarean section **#0527**: Prophylactic antibiotic received within 1 hour prior to surgical incision SCIP-Inf-1.
4. Feasibility: C-15; P-4; M-0; N-0 *(4a. Clinical data generated during care process; 4b. Electronic sources; 4c. Exclusions – no additional data source; 4d. Susceptibility to inaccuracies/ unintended consequences identified 4e. Data collection strategy can be implemented)* **Rationale:** While data for the measure is drawn from registry, the measure was considered feasible.

0264 Prophylactic Intravenous (IV) Antibiotic Timing

Originally Submitted Specifications

Description: Rate of ASC patients who received IV antibiotics ordered for surgical site infection prophylaxis on time

Numerator Statement: Number of ambulatory surgical center (ASC) admissions with a preoperative order for a prophylactic IV antibiotic for prevention of surgical site infection who received the prophylactic antibiotic on time

Denominator Statement: All ASC admissions with a preoperative order for a prophylactic IV antibiotic for prevention of surgical site infection

Exclusions: ASC admissions with a preoperative order for a prophylactic IV antibiotic for prevention of infections other than surgical site infections (e.g., bacterial endocarditis).

ASC admissions with a preoperative order for a prophylactic antibiotic not administered by the intravenous route.

Adjustment/Stratification: no risk adjustment necessary/No stratification is required for this measure.

Level of Analysis: Facility/ Agency

Type of Measure: Process

Data Source: Paper medical record/ flow-sheet

Updated Specifications

DEFINITIONS:

Admission: completion of registration upon entry into the facility

Prophylactic IV antibiotic for prevention of surgical site infection: an antibiotic prescribed with the intent of reducing the probability of an infection related to an invasive procedure; for purposes of this measures, the following are considered prophylactic for surgical site infection: ampicillin/sulbactam, aztreonam, cefazolin, cefmetazole, cefotetan, cefoxitin, cefuroxime, ciprofloxacin, clindamycin, ertapenem, erythromycin, gatifloxacin, gentamicin, levofloxacin, metronidazole, moxifloxacin, neomycin and vancomycin

On time: antibiotic infusion is initiated within one hour prior to the time of the initial surgical incision or the beginning of the procedure (e.g., introduction of endoscope, insertion of needle, inflation of tourniquet) or two hours prior if vancomycin or a fluoroquinolone is administered

If measure is stratified, provide stratified results: This measure is not stratified

If disparities have been reported/ identified but measure is not specified to detect disparities, provide follow-up plans: At the present time, a federal quality reporting system has not yet been proposed or implemented for ambulatory surgical centers. We anticipate that CMS will issue its proposals for an ASC quality reporting system in the near future. The data the ASC Quality Collaboration currently receives for this measure is collected at the ASC-level or at the level of the corporate parent of the ASC. Corporate parent data submissions combine data from multiple ASCs. Disparity measures by population group require the collection of patient-level data or collection of the data for individual populations of patients. At this time, the ASC Quality Collaboration does not have access to any patient-level or individual population level data that would allow for analysis of subpopulation disparities based on race, sex and age. However, we understand the importance of subpopulation data and are taking steps that would allow us to collect the necessary data. We are actively pursuing the development of a registry that would allow us to develop subpopulation performance data for this measure and others. Potential registry development vendors have been identified and initial communications regarding the project have already taken place. We plan to select a vendor by third quarter of 2011, initiate the development of the registry database immediately upon contract acceptance, and have a functioning registry three months thereafter.

Summary of Measure Results Demonstrating Performance Gap: Although data for 671 ASCs are included in the ASC Quality Collaboration (ASC QC) database for this measure, many report at the corporate level and do not report data for individual ASCs. The ASC QC database includes center-level rates for this measure for 349 ASCs throughout the US. The rates for this measure are based on the 349 individually-reporting ambulatory surgery centers, located throughout the US. The rate for timely administration of a pre-operative antibiotic ranged from a minimum of 0.2% to a maximum of 100%. The mean rate was 96% (SD: 14.6%), while the median rate was 100%. The minimum compliance rate of 0.2% demonstrates that there is a significant opportunity for improvement in this measure.

Data/Sample: Although data for 671 ASCs are included in the ASC QC database, many report at the corporate level and do not report data for individual ASCs. The ASC QC database includes center-level rates for this measure for 349 ASCs throughout the US. The 349 individually-reporting ambulatory surgery centers represent a convenience sample that may be used to assess the opportunity for improvement for this measure. The centers were located throughout the US. Data collected for second calendar quarter of 2010 were included in this portion of the study.

Summary of Measure Results on Disparities by Population Group: This measure is currently collected at the ASC-level or at the level of the corporate parent of the ASC. Disparity measures by population group require the collection of patient-level data or collection of the data for individual populations of patients. The ASC QC is investigating a number of strategies that will make this type of data available and hopes to add this component in the near future.

Data/Sample: Although data for 671 ASCs are included in the ASC QC database, many report at the corporate level and do not report data for individual ASCs. The ASC QC database includes center-level rates for this measure for 349 ASCs throughout the US. The rates

0264 Prophylactic Intravenous (IV) Antibiotic Timing

for this measure were collected for the 349 individually-reporting ambulatory surgery centers throughout the US for services provided during April to June 2010.

Methods to Identify Statistically Significant and Practical or Meaningful Differences in Performance: An individual ASC's rate for timely administration of antibiotic may be compared to the standard rate from the ASC Quality website (http://www.ascquality.org/qualityreport.cfm#Antibiotic). A statistically significant difference in performance may be detected by using a standard test of proportions as outlined in most standard statistical texts. Since each delay in administration of the preoperative antibiotic may represent increased surgical site infection risk for the patient, a rate lower than the 94.4% is also of practical significance.

The null hypothesis for this test is that the sample proportion from the ASC is not different from the industry standard taken from the ASC Quality website. The alternative is that there is a statistically significant difference. We recommend that this test be performed in its two-sided form so that the ASC may determine if they are either statistically higher or lower than the standard. The recommended p-value for this test is the 0.05 level, but ASCs may have justification for different value. Using this statistical method for detecting significant variances from the industry standard will allow users to determine if differences may be due to sampling error or may indicate a true difference in performance.

Measure Scores from Testing or Current Use: The rate for timely administration of antibiotic ranged from a minimum of 0.2% to a maximum of 100%. The mean rate was 96.0% (SD: 14.6%), while the median rate was 100%. The maximum rates of 100% and a third quartile value of 100% demonstrate that there is an opportunity for improvement in this measure and that full compliance (100%) is achievable for all centers.

Measure Steward: ASC Quality Collaboration | 5686 Escondida Blvd S | St. Petersburg | Florida | 33715

Steering Committee Recommendation for Endorsement: Conditional Y-18; N-1; A-0

Rationale: This measure was considered important to measure and report despite its small performance gap. The Committee wants to see disparities information prior to making any determination regarding continued reporting of the measure.

If applicable, Conditions/Questions for Developer:

1. 2a.1 Numerator Statement: Clarify 'on time.' Suggested modification-Instead of 'on time' change to 'one hour.'
2. 2h. Disparities in Care: Please submit any subpopulation performance data that is available for the measures. The committee understands that ASCs do not have a quality reporting system requirement; however, assessment of subpopulation data is important and should be collected and reported for this and other measures.

Developer Response:

In response to your suggestion, we are offering two items for your consideration:

1) Our rational for our current use of 'on time' and
2) What we will do if our rationale is not compelling to the Committee.

For clarification of "on time", please see Section 2a.3. Numerator Details on the measure submission form. The pertinent material is reproduced here:

2a.3. Numerator Details *(All information required to collect or calculate the numerator, including all codes, logic, and definitions)*

DEFINITIONS:

On time: antibiotic infusion is initiated within one hour prior to the time of the initial surgical incision or the beginning of the procedure (e.g., introduction of endoscope, insertion of needle, inflation of tourniquet) or two hours prior if vancomycin or a fluoroquinolone is administered:

This approach was selected in order to allow a concise numerator statement that clearly conveys the performance expectation of the measure, which is that any prophylactic IV antibiotics ordered preoperatively will be given in a timely manner. Defining "on time" separately allows us to avoid inserting a parenthetical modification in the numerator statement to address the two-hour exception for vancomycin and fluoroquinolones. Defining "on time" separately also allows us to simultaneously address several issues pertaining to timeliness: 1) how the time interval is to be measured (from initiation of infusion to the initial surgical incision, 2) how the time interval is to be measured for procedures that do not involve an incision, or that involve the inflation of a tourniquet, and 3) the existence of two allowable timeframes, depending upon the type of antibiotic administered. The data collected using these specifications supports the reliability of this approach. This method has been well received by the facilities that use the measure and we would prefer to continue to specify the measure in this manner.

However, if the measure will not continue to be endorsed in the absence of the modification suggested above , we would then revise the numerator statement to read as follows, which more closely mimics the phrasing of the other related measures:

Number of ambulatory surgical center (ASC) admissions with a preoperative order for a prophylactic IV antibiotic for prevention of surgical site infection with prophylactic antibiotic initiated within one hour prior to surgical incision (two hours if initiating vancomycin or a fluoroquinolone)

We would also delete the current data element definition of "on time" and add a new statement regarding "surgical incision":

DEFINITIONS:

Surgical incision: For purposes of this measure, the initial surgical incision or the beginning of the procedure (e.g., introduction of endoscope, insertion of needle, inflation of tourniquet).

0264 Prophylactic Intravenous (IV) Antibiotic Timing

{At this time, we have not made any changes regarding this specific issue to the measure currently on line. We will make the needed changes once we have direction from the steering committee.}

2h. Disparities in Care: Please submit any subpopulation performance data that is available for the measures. The committee understands that ASCs do not have a quality reporting system requirement; however, assessment of subpopulation data is important and should be collected and reported for this and other measures.

Response: The data the ASC Quality Collaboration currently receives for this measure is collected at the ASC-level or at the level of the corporate parent of the ASC. Corporate parent data submissions combine data from multiple ASCs. Disparity measures by population group require the collection of patient-level data or collection of the data for individual populations of patients. At this time, the ASC Quality Collaboration does not have access to any patient-level or individual population level data that would allow for analysis of subpopulation disparities based on race, sex and age. However, we understand the importance of subpopulation data and are taking steps that would allow us to collect the necessary data. We are actively pursuing the development of a registry that would allow us to develop subpopulation performance data for this measure and others. Potential registry development vendors have been identified and initial communications regarding the project have already taken place. We plan to select a vendor by third quarter of 2011, initiate the development of the registry database immediately upon contract acceptance, and have a functioning registry three months thereafter.

ADDITIONAL INFORMATION and Response from Measure Developer:

We have also revised 1b2/1b3/1b4/2f1/2f2/2f3 for this measure #0264 Antibiotic Timing to provide additional clarity:

1b.2. Summary of Data Demonstrating Performance Gap *(Variation or overall poor performance across providers)*

Although data for 671 ASCs are included in the ASC Quality Collaboration (ASC QC) database for this measure, many report at the corporate level and do not report data for individual ASCs. The ASC QC database includes center-level rates for this measure for 349 ASCs throughout the US. The rates for this measure are based on the 349 individually-reporting ambulatory surgery centers, located throughout the US. The rate for timely administration of a pre-operative antibiotic ranged from a minimum of 0.2% to a maximum of 100%. The mean rate was 96% (SD: 14.6%), while the median rate was 100%. The minimum compliance rate of 0.2% demonstrates that there is a significant opportunity for improvement in this measure.

1b.3. Citations for Data on Performance Gap

Although data for 671 ASCs are included in the ASC QC database, many report at the corporate level and do not report data for individual ASCs. The ASC QC database includes center-level rates for this measure for 349 ASCs throughout the US. The 349 individually-reporting ambulatory surgery centers represent a convenience sample that may be used to assess the opportunity for improvement for this measure. The centers were located throughout the US. Data collected for second calendar quarter of 2010 were included in this portion of the study.

1b.4. Summary of Data on Disparities by Population Group

This measure is currently collected at the ASC-level or at the level of the corporate parent of the ASC. Disparity measures by population group require the collection of patient-level data or collection of the data for individual populations of patients. The ASC QC is investigating a number of strategies that will make this type of data available and hopes to add this component in the near future.

2f.1. Data/Sample (Description of the data or sample including number of measured entities; number of patients; dates of data; if a sample, characteristics of the entities included)

Although data for 671 ASCs are included in the ASC QC database, many report at the corporate level and do not report data for individual ASCs. The ASC QC database includes center-level rates for this measure for 349 ASCs throughout the US. The rates for this measure were collected for the 349 individually-reporting ambulatory surgery centers throughout the US for services provided during April to June 2010.

2f.2. Methods to Identify Statistically Significant and Practical or Meaningful Differences in Performance (Type of analysis and rationale)

An individual ASC's rate for timely administration of antibiotic may be compared to the standard rate from the ASC Quality website (http://www.ascquality.org/qualityreport.cfm#Antibiotic). A statistically significant difference in performance may be detected by using a standard test of proportions as outlined in most standard statistical texts. Since each delay in administration of the preoperative antibiotic may represent increased surgical site infection risk for the patient, a rate lower than the 94.4% is also of practical significance. The null hypothesis for this test is that the sample proportion from the ASC is not different from the industry standard taken from the ASC Quality website. The alternative is that there is a statistically significant difference. We recommend that this test be performed in its two-sided form so that the ASC may determine if they are either statistically higher or lower than the standard. The recommended p-value for this test is the 0.05 level, but ASCs may have justification for different value. Using this statistical method for detecting significant variances from the industry standard will allow users to determine if differences may be due to sampling error or may indicate a true difference in performance.

2f.3. Measure Scores from Testing or Current Use (Description of scores, e.g., distribution by quartile, mean, median, SD, etc.; identification of statistically significant and meaningfully differences in performance)

The rate for timely administration of antibiotic ranged from a minimum of 0.2% to a maximum of 100%. The mean rate was

Table of Committee's Suggested Modifications and Responses from Developers

0264 Prophylactic Intravenous (IV) Antibiotic Timing
96.0% (SD: 14.6%), while the median rate was 100%. The maximum rates of 100% and a third quartile value of 100% demonstrate that there is an opportunity for improvement in this measure and that full compliance (100%) is achievable for all centers. **If applicable, Questions to the Steering Committee:**
1. Importance to Measure and Report: Y-17; N-2 *(1a. Impact; 1b. Performance gap; 1c. Outcome or Evidence)* **Rationale:** Performance on the measure is high; however disparities information is not presented. ASC noted that only about 900 of the eligible 5,200 institutions report.
2. Scientific Acceptability of Measure Properties: C-10; P-9; M-0; N-0 *(2a. Precise specifications; 2b. Reliability testing; 2c. Validity testing; 2d. Exclusions justified; 2e. Risk adjustment/stratification; 2f. Meaningful differences; 2g. Comparability; 2h. Disparities)* **Rationale:** The Committee questioned why the measure focused on antibiotics being provided in a one hour timeframe.
3. Usability: C-12; P-7; M-0; N-0 *(3a. Meaningful/useful for public reporting and quality improvement; 3b. Harmonized; 3c. Distinctive or additive value to existing measures)* **Rationale:** The Committee described the measure as usable.
4. Feasibility: C-13; P-6; M-0; N-0 *(4a. Clinical data generated during care process; 4b. Electronic sources; 4c. Exclusions – no additional data source; 4d. Susceptibility to inaccuracies/ unintended consequences identified 4e. Data collection strategy can be implemented)* **Rationale:** The measure uses procedure codes, which makes it less burdensome for ambulatory surgical centers to collect.

NATIONAL QUALITY FORUM

Related and Competing Measures

NQF Evaluation Criteria: Comparison of Related or Competing Measures

If a measure meets the NQF evaluation criteria **and** there are endorsed or new related measures (either the same measure focus or the same target population), or competing measures (both the same measure focus and the same target population), the measures are compared to address harmonization and/or selection of the best measure.

> **Criterion 5a.** The measure specifications are harmonized with related measures; OR the differences in specifications are justified.
>
> **Criterion 5b.** The measure is superior to competing measures (e.g., is a more valid or efficient way to measure); OR multiple measures are justified.

Guidance for Evaluating Competing Measures

Competing measures are those that essentially address the same target process, condition, event or outcome (numerator) and the same target population (denominator). The goal is to endorse the best measure and minimize confusing or conflicting information.

Competing measures may already be endorsed or may be new submissions. Before competing measures are compared, they must first be evaluated individually and judged to adequately meet all four evaluation criteria to be suitable for a Steering Committee to recommend endorsement. This procedure is intended to give each measure a thorough evaluation and prevent expending time and effort on comparing measures if some competing measures are not evaluated favorably.

If a new measure competes with an NQF-endorsed® measure, the developer should be expected to address how the proposed measure is superior to competing measures, or the added value of endorsing multiple measures. Ideally, the developer will be able to present analyses demonstrating how the submitted measure is superior; however, in many situations that will not be feasible (e.g., no access to an alternative data source) and then the developer should be able to present a rationale for superiority. If the competing measure also is a new submission, the developers can be asked to address that question after the Committee determines that both meet the evaluation criteria.

Determination of the best measure should be based on the evaluation criteria of *Importance to Measure and Report*, *Scientific Acceptability of Measure Properties*, *Usability*, and *Feasibility*. In the absence of empirical data to compare the measures, the Steering Committee will need to compare not only their evaluation ratings, but also the information submitted in support of the criteria. The comparison will require expert judgment and may involve consideration of the pros and cons related to all the criteria. For example, slightly lower reliability, but much greater feasibility might indicate the more feasible measure should be selected.

If the measures are determined to be conceptually the same, then generally they would be expected to be evaluated equally on the subcriteria under *Importance to Measure and Report*, i.e., impact, opportunity for improvement, and evidence supporting the focus of measurement. However, they could differ on opportunity for improvement depending on whether they are new measures or have been in use. For new measures, opportunity for improvement generally will be the same because it is based on epidemiologic and research data. However, measures in use at the time of endorsement maintenance may differ in opportunity for improvement (e.g., one may be "topped out" in terms of performance). When measures are essentially the same on the criterion *Importance to Measure and Report*, the determination of the best measure to recommend for endorsement would be made based on the remaining criteria.

Table 1. Evaluating Competing Measures for Superiority or Justification for Multiple Measures

Determine if need to compare measures for superiority	Determine if need to evaluate competing measures (address the same concepts for measure focus—i.e., the target process, condition, event, or outcome for the same target patient population) for superiority

Assess competing measures for superiority on NQF evaluation criteria and subcriteria	The comparison will require expert judgment and may involve considerations of pros and cons related to all the criteria. **Impact, Opportunity, and Evidence—Importance to Measure and Report:** Competing measures generally will be the same in terms of impact and evidence for the focus of measurement. • Compare measures on opportunity for improvement. For new measures, this generally will be the same. However, measures in use at the time of endorsement maintenance may differ in opportunity for improvement (e.g., one may be "topped out" in terms of performance). **Reliability and Validity—Scientific Acceptability of Measure Properties:** • Compare evidence of reliability. • Compare evidence of validity. Untested measures cannot be considered superior to tested measures because there would be no empirical evidence on which to compare reliability and validity. (However, a new measure, when tested, could ultimately demonstrate superiority and the NQF endorsement maintenance cycles allow for regular submission of new measures.) Compare and identify differences in specifications. *All else being equal*: • Measures with the broadest application (target patient population, settings, level of analysis) are preferred. **Usability:** • Compare evidence of use and usefulness for public reporting. • Compare evidence of use and usefulness for quality improvement. *All else being equal*: • Measures that are publicly reported are preferred. • Measures with the widest use (e.g., settings, numbers of entities reporting performance results) are preferred. • Measures that are in use are preferred over those without evidence of use. **Feasibility:** • Compare the ease of data collection. • Compare the potential for inaccuracies, errors, and unintended consequences. *All else being equal:* • Measures based on data from electronic sources are preferred. • Measures that are freely available are preferred.
If a competing measure does not have clear superiority, Assess justification for multiple measures	If a competing measure does not have clear superiority, is there a justification for endorsing multiple measures? Does the added value offset any burden or negative impact? Measures based on different data types *may provide added value if*: • the additional measure allows transition to an EHR-based measure OR • the additional measure is applicable to additional setting(s) or increases the number of individuals and entities for whom performance results are available and cannot be achieved by expanding the target patient population, setting, or level of analysis of one measure. A rationale for recommending endorsement of multiple competing measures must be provided. Identify analyses needed to conduct a rigorous evaluation of the use and usefulness of the measures

	at the time of endorsement maintenance.

If the Steering Committee is unable to identify the best (superior) measure, multiple endorsed measures may be acceptable and the Steering Committee needs to identify the additive value of endorsement of more than one measure. That is, does having multiple measures add enough value to offset any potential negative impact?

- Value
  - Is an additional measure necessary?
    - to change to an EHR-based measurement;
    - to have broader applicability (if one measure cannot accommodate all settings, e.g., hospital, home health, etc.); or
    - to increase availability of performance results (if one measure cannot be widely implemented, e.g., if measures based on different data types increase the number of entities for whom performance results are available).
  - Is an additional measure unnecessary?
    - unique developer preferences
- Burden
  - Do the different measures affect interpretability across measures?
  - Does having more than one endorsed measure increase the burden of data collection?

Related Measures

Related measures should be harmonized. Measure harmonization refers to the standardization of specifications for related measures with the same measure focus (e.g., ***influenza immunization*** of patients in hospitals or nursing homes), or related measures with the same target population (e.g., eye exam and HbA1c for ***patients with diabetes***), or definitions applicable to many measures (e.g., age designation for children) so that they are uniform or compatible, unless differences are justified (e.g., dictated by the evidence). The dimensions of harmonization can include numerator, denominator, exclusions, and data source and collection instructions. The extent of harmonization depends on the relationship of the measures, the evidence for the specific measure focus, and differences in data sources.
NQF staff has been working with the measure developers for a long time on the issue of harmonization and they have encountered several challenges:

- Review and approval of all changes by the developer's technical panel and organizational leadership takes significant time (sometimes months).
- Developers have different approaches and philosophies about measurement.
- Particularly when there are several related measures, determining which version to harmonize to may be difficult.
- Trending data may be affected by changes in specifications.
- There may be disagreement as to what degree of alignment is needed to achieve harmonization.

Guidance for Steering Committees on evaluating and making recommendations related to measure harmonization was approved by the NQF Board in 2010. Ultimately, measures should not be recommended for endorsement unless measures are completely harmonized or the lack of harmonization has been justified (Table 2).

Table 2. Sample Considerations to Justify Lack of Measure Harmonization

Related Measures	Lack of Harmonization	Assess Justification for Conceptual Differences	Assess Justification for Technical Differences
Same measure focus (numerator); different target population	Inconsistent measure focus (numerator)	The evidence for the measure focus is different for the different target population so that one measure cannot	• Differences in the available data drive differences in the technical specifications for the measure focus. • Effort has been made to reconcile the differences across measures but

Related Measures	Lack of Harmonization	Assess Justification for Conceptual Differences	Assess Justification for Technical Differences
(denominator)		accommodate both target populations. Evidence should always guide measure specifications.	important differences remain.
Same target population (denominator); different measure focus (numerator)	Inconsistent target population (denominator) and/or exclusions	The evidence for the different measure focus necessitates a change in the target population and/or exclusions. Evidence should always guide measure specifications.	• Differences in the available data drive differences in technical specifications for the target population. • Effort has been made to reconcile the differences across measures but important differences remain.
For any related measures	Inconsistent scoring/ computation	The difference does not affect interpretability or burden of data collection. If it does, it adds value that outweighs any concern regarding interpretability or burden of data collection.	The difference does not affect interpretability or burden of data collection. If it does, it adds value that outweighs any concern regarding interpretability or burden of data collection.

NQF staff has identified the following related and competing measures
Phase I:

- Cardiac surgery: IMA
  - 0134: Use of internal mammary artery (IMA) in coronary artery bypass graft (CABG) (STS)
  - 0516: Use of IMA in isolated CABG (STS)

Phase II

- AAA repair
  - 0357: Abdominal aortic aneurysm (AAA) repair volume (IQI 4) (AHRQ)
  - 0359: Abdominal aortic artery (AAA) repair mortality rate (IQI 11) (AHRQ)
  - 0736: Survival predictor for abdominal aortic aneurysm (AAA) (Leapfrog Group)
  - 1523: In-hospital mortality following elective open repair of small AAAs (Society for Vascular Surgery)
  - 1534: In-hospital mortality following elective EVAR of small AAAs (Society for Vascular Surgery)
- Beta blocker
  - 0235: Pre-op beta blocker in patient with isolated CABG (1) (STS)
  - 0127: Pre-operative beta blockage (STS)
  - 0236: Pre-op beta blocker in patient with isolated CABG (2) (STS)
  - 0284: Surgery patients on beta blocker therapy prior to admission who received a beta blocker during the perioperative period (CMS)
- Beta blocker discharge
  - 0117: Beta blockade at discharge
  - 1480: Patient(s) 18 years of age and older on a beta-blocker at admission or within seven days of discharge of an isolated CABG procedure
- Cataracts
  - 1536: Cataracts: Improvement in patient's visual function within 90 days following cataract surgery (AAO and Hoskins Center for Quality Eye Care)
  - 0565: Cataracts: 20/40 or better visual acuity within 90 days following cataract surgery (AMA/PCPI)

- Failure to rescue
  - 0351: Death among surgical inpatients with serious, treatable complications (PSI 4) (AHRQ)
  - 0352: Failure to rescue in-hospital mortality (risk adjusted) (CHOP)
  - 0353: Failure to rescue 30-day mortality (risk adjusted) (CHOP)
- Pancreatic resection
  - 0365: Pancreatic resection mortality rate (IQI 9) (AHRQ)
  - 0366: Pancreatic resection volume (IQI 2) (AHRQ)
  - 0738: Survival predictor for pancreatic resection surgery (Leapfrog Group)
- Prophylactic antibiotics: Discontinued
  - 0529: Prophylactic antibiotics discontinued within 24 hours after surgery end time (CMS)
  - 0637: Discontinuation of prophylactic antibiotics (cardiac procedures) (AMA/PCPI)
- Prophylactic antibiotics: Duration
  - 0128: Duration of antibiotic prophylaxis for cardiac surgery patients (STS)
  - 0271: Discontinuation of prophylactic antibiotics (non-cardiac procedures) (AMA/PCPI)
- Prophylactic antibiotics: Selection
  - 0126: Selection of antibiotic prophylaxis for cardiac surgery patients (STS)
  - 0268: Selection of prophylactic antibiotic: First or second generation cephalosporin (AMA/PCPI)
  - 0528: Prophylactic antibiotic selection for surgical patients (CMS)
  - 0473: Appropriate DVT prophylaxis in women undergoing cesarean delivery (HCA)
- Prophylactic antibiotics: Timing/Received
  - 0269: Timing of prophylactic antibiotics-administering physician (NCQA, AMA/PCPI)
  - 0125: Timing of antibiotic prophylaxis for cardiac surgery patients (STS)
  - 0270: Timing of antibiotic prophylaxis-ordering physician (AMA/PCPI)
  - 0527: Prophylactic antibiotic received within 1 hour prior to surgical incision SCIP-Inf-1 (CMS)
  - 0472: Prophylactic antibiotic received within one hour prior to surgical incision or at the time of delivery-cesarean section (Mass General Hospital/Partners Health Care System)
- Statin medication
  - 0118: Anti-lipid treatment discharge (STS)
  - 1519: Statin therapy at discharge after lower extremity bypass (LEB) (SVS)

Below is a side by side comparison of measure specifications from the related and competing measures identified in Phase I and Phase II.

Table of Related, or Competing Measures and those with potential for Harmonization

Phase I and Phase II

Table of Contents

Cardiac Surgery: IMA

	Maintenance Measure #0134: Use of internal mammary artery (IMA) in coronary artery bypass graft (CABG)	**Endorsed Measure #0516:** Use of IMA in isolated CABG (surgeon level)
Status	Currently undergoing maintenance review	Endorsed 5/2007
Steward	Society of Thoracic Surgeons	Society of Thoracic Surgeons
Description	Percentage of patients aged 18 years and older undergoing isolated coronary artery bypass graft (CABG) who received an internal mammary artery (IMA) graft.	Percentage of patients aged 18 years and older undergoing isolated CABG surgery who received an Internal Mammary Artery (IMA) graft
Type of Measure	Process	Process
Numerator	Number of patients undergoing isolated coronary artery bypass graft (CABG) who received an internal mammary artery (IMA) graft. Time window:	Number of patients who receive IMA graft in isolated CABG Time window:
Numerator Details	Number of isolated CABG procedures in which IMA Artery Used [IMAArtUs (STS Adult Cardiac Surgery Database Version 2.73)] is marked "Left IMA," "Right IMA," or "Both IMAs"	Number of isolated CABG procedures in which "internal mammary arteries used as graft" [IMAArtUs (1560)- STS Adult Cardiac Surgery Database, Version 2.61, sequence number 1560] is marked as 'Left IMA', 'Right IMA', or 'Both IMAs' Please see STS Adult Cardiac Surgery Database Data Collection Form, Version 2.61: http://www.sts.org/documents/pdf/AdultCV2.61DCF_Annotated.pdf
Denominator	All patients undergoing isolated CABG. Time window: 12 months	All patients undergoing isolated CABG Time window: 12 months
Denominator Categories	Female, Male; 18 and older	Female, Male; ≥18 years on date of encounter
Denominator Details	Number of isolated CABG procedures Isolated CABG is determined as a procedure for which all of the following apply: - OpCAB is marked "Yes" - (VADProc is marked "No" or "Missing") or (VADProc is marked "Yes, Implanted" and UnplVAD is marked "yes") - OCarASDTy is marked "PFO" or "missing" - OCarAFibAProc is marked "primarily epicardial" or "missing" and - OpValve, VSAV, VSAVPr, ResectSubA, VSMV, VSMVPr, OpTricus, OpPulm, OpONCard, OCarLVA, OCarVSD,	Number of isolated CABG procedures excluding repeat CABG. Isolated CABG is determined as a procedure for which OpCab (seq no 1280) is marked 'Yes' and OpValve (1290), VAD (1300), OpAortic (1630), OpMitral (1640), OpTricus (1650), OpPulm (1660), OpONCard (1320), OCarLVA (2360), OCarVSD (2370), OCarASD (2380), OCarBati (2390), OCarSVR (2400), OCarCong (2410), OCarLasr (2420), OCarTrma (2430), OCarCrTx (2440), OCarAfib (2470), ONCAoAn (2510), and OCarOthr (2560) are all marked 'No' or 'Missing'. Please see STS Adult Cardiac Surgery Database Data Collection Form, Version 2.61: http://www.sts.org/documents/pdf/AdultCV2.61D

	Maintenance Measure #0134: Use of internal mammary artery (IMA) in coronary artery bypass graft (CABG)	**Endorsed Measure #0516:** Use of IMA in isolated CABG (surgeon level)
	OCarSVR, OCarCong, OCarTrma, OCarCrTx, OCAoProcType, EndoProc, OCTumor, OCPulThromDis, OCarOthr are all marked "no" or "missing"	CF_Annotated.pdf
Exclusions	Cases are removed from the denominator if the patient had a previous CABG prior to the current admission or if IMA was not used and one of the following reasons was provided: - The IMA is not a suitable conduit due to size or flow - Subclavian stenosis - Previous cardiac or thoracic surgery - Previous mediastinal radiation - Emergent or salvage procedure - No LAD disease	Cases are removed from the denominator if there was a prior CABG performed.
Exclusions Details	Cases are removed from the denominator if the patient had a previous CABG prior to the current admission or if IMA was not used and one of the following reasons was provided: - The IMA is not a suitable conduit due to size or flow - Subclavian stenosis - Previous cardiac or thoracic surgery - Previous mediastinal radiation - Emergent or salvage procedure - No LAD disease	Repeat CABG is identified where PrCAB (600) is marked 'Yes' Please see STS Adult Cardiac Surgery Database Data Collection Form, Version 2.61: http://www.sts.org/documents/pdf/AdultCV2.61DCF_Annotated.pdf
Risk Adjustment	No risk adjustment necessary	No risk adjustment necessary
Stratification	N/A	N/A
Type Score	Rate/proportion	Rate/proportion
Algorithm	N/A	N/A
Data Source	Registry data	Electronic health/medical record, electronic clinical data, registry data, paper medical record/flow-sheet
Level of Measurement /Analysis	Clinicians: Group; Facility/agency; Population: National, regional/network, states, counties or cities	Clinician: Individual; Program: Other; All levels
Care Settings	Hospital	Hospital

AAA Repair

	Maintenance Measure 0357: Abdominal aortic aneurysm (AAA) repair volume (IQI 4)	**Maintenance Measure #0359**: Abdominal aortic artery (AAA) repair mortality rate (IQI 11)	**Endorsed Measure 0736:** Survival predictor for abdominal aortic aneurysm (AAA)	**New Candidate Standard 1523**: In-hospital mortality following elective open repair of small AAAs	**New Candidate Standard 1534**: In-hospital mortality following elective EVAR of small AAAs
Status	Currently undergoing maintenance review	Currently undergoing maintenance review	Endorsed 9/2010	Currently undergoing review	Currently undergoing review
Steward	Agency for Healthcare Research and Quality	Agency for Healthcare Research and Quality	Leapfrog Group	Society for Vascular Surgery	Society for Vascular Surgery
Description	Count of discharges with a procedure code of provider-level AAA repair.	Percent of discharges with procedure code of AAA repair with an in-hospital death.	A reliability adjusted measure of AAA repair performance that optimally combines two important domains: AAA hospital volume and AAA operative mortality, to provide predictions on hospital AAA survival rates in patients age 18 and over.	Percentage of aymptomatic patients undergoing open repair of small abdominal aortic aneurysms (AAA)who die while in hospital. This measure is proposed for both hospitals and individual providers.	Percentage of patients undergoing elective endovascular repair of small asymptomatic abdominal aortic aneurysms (AAA) who die while in hospital. This measure is proposed for both hospitals and individual providers.
Type of Measure	Structure/management	Outcome	Outcome	Outcome	Outcome
Numerator	Discharges, age 18 years and older, with an abdominal aortic aneurysm repair procedure and a primary or secondary diagnosis of AAA. Time window: Time window can be determined by user, but	Number of deaths (DISP=20) among cases meeting the inclusion and exclusion rules for the denominator. Time window: Time window can be determined by user, but is generally a calendar year.	Survival rate for patients age 18 and over without AAA rupture who undergo an AAA repair. Time Window: During the hospital admission	Mortality following elective open repair of asymptomatic AAAs in men with < 6 cm dia and women with < 5.5 cm dia AAAs. Time window: Lifetime for provider reporting, annual for hospital reporting	Mortality following elective endovascular AAA repair of asymptomatic AAAs in men with < 6 cm dia and women with < 5.5 cm dia AAAs. Time window: Lifetime for provider reporting, annual for hospital

	Maintenance Measure 0357: Abdominal aortic aneurysm (AAA) repair volume (IQI 4)	**Maintenance Measure #0359**: Abdominal aortic artery (AAA) repair mortality rate (IQI 11)	**Endorsed Measure 0736:** Survival predictor for abdominal aortic aneurysm (AAA)	**New Candidate Standard 1523**: In-hospital mortality following elective open repair of small AAAs	**New Candidate Standard 1534**: In-hospital mortality following elective EVAR of small AAAs
	is generally a calendar year.				reporting
Numerator Details	Discharges, age 18 years and older, with an abdominal aortic aneurysm repair procedure and a primary or secondary diagnosis of AAA in any field. ICD-9-CM AAA procedure codes: 3834 AORTA RESECTION & ANAST 3844 RESECT ABDM AORTA W REPL 3864 EXCISION OF AORTA 3971 ENDO IMPLANT OF GRAFT IN AORTA ICD-9-CM AAA diagnosis codes: 4413 RUPT ABD AORTIC ANEURYSM 4414 ABDOM AORTIC	Number of deaths (DISP=20) among cases meeting the inclusion and exclusion rules for the denominator.	For the observed mortality, the hospital submits the observed deaths for AAA cases in patients without rupture as identified using the denominator and exclusion codes.	A registry that includes hospitalization details, AAA diameter and discharge status is required to identify patients for numerator inclusion. The Society for Vascular Surgery Vascular Quality Initiative (SVS VQI) and the Vascular Study Group of New England (VSGNE) registries records such information. Patients who died in hospital following elective open infrarenal AAA repair if their aneurysm was asymptomatic and small (< 6cm dia in men, <5.5 cm dia in women, judged by preoperative imaging (CT, MR or ultrasound)).	A registry that includes hospitalization details, AAA diameter and discharge status is required to identify patients for numerator inclusion. The Society for Vascular Surgery Vascular Quality Initiative (SVS VQI) and the Vascular Study Group of New England (VSGNE) registries records such information. Patients who died in hospital following endovascular infrarenal AAA repair (EVAR) if their asymptomatic aneurysm was repaired electively and was asymptomatic and small (< 6cm dia in men, <5.5 cm dia in women, judged by preoperative imaging(CT, MR or ultrasound)).

	Maintenance Measure 0357: Abdominal aortic aneurysm (AAA) repair volume (IQI 4)	**Maintenance Measure #0359**: Abdominal aortic artery (AAA) repair mortality rate (IQI 11)	**Endorsed Measure 0736:** Survival predictor for abdominal aortic aneurysm (AAA)	**New Candidate Standard 1523**: In-hospital mortality following elective open repair of small AAAs	**New Candidate Standard 1534**: In-hospital mortality following elective EVAR of small AAAs
	ANEURYSM Exclude cases: • MDC 14 (pregnancy, childbirth, and puerperium)				
Denominator	N/A	Discharges, age 18 years and older, with ICD-9-CM AAA repair code procedure and a diagnosis of AAA in any field. Time window: Time window can be determined by user, but is generally a calendar year.	All hospital patients age 18 and over without rupture who had an AAA repair. Time Window: 12 months	All elective open repairs of asymptomatic AAAs in men with < 6 cm dia and women with < 5.5 cm dia AAAs. Time window: Lifetime for provider reporting, annual for hospital reporting	All elective endovascular repairs of asymptomatic AAAs in men with < 6 cm dia and women with < 5.5 cm dia AAAs. Time window: Lifetime for provider reporting, annual for hospital reporting
Denominator Categories	Female, Male; 18 and older	Female, Male; 18 and older		Female, Male; 18 years or older	Female, Male; 18 years or older
Denominator Details	N/A	Discharges, age 18 years and older, with ICD-9-CM AAA repair code procedure and a diagnosis of AAA in any field. ICD-9-CM AAA repair procedure codes: 3834 AORTA RESECTION & ANAST 3844 RESECT ABDM AORTA W REPL 3864 EXCISION OF AORTA 3971	For the volume predicted mortality, hospitals count the number of all AAA repair cases using the following procedure codes. ICD-9-CM Procedure Codes for AAA repair 3834 Aorta Resection & Anast 3844 Resection Abdominal Aorta with replacement 3864 Excision of aorta 3925 Aorta-iliac-femoral	A registry that includes hospitalization details, AAA diameter and discharge status is required to identify patients for denominator inclusion. The Society for Vascular Surgery Vascular Quality Initiative (SVS VQI) and the Vascular Study Group of New England (VSGNE) registries records such information. Patients who underwent elective open AAA repair	A registry that includes hospitalization details, AAA diameter and discharge status is required to identify patients for denominator inclusion. The Society for Vascular Surgery Vascular Quality Initiative (SVS VQI) and the Vascular Study Group of New England (VSGNE) registries records such information. Patients who underwent endovascular AAA repair are included

	Maintenance Measure 0357: Abdominal aortic aneurysm (AAA) repair volume (IQI 4)	**Maintenance Measure #0359**: Abdominal aortic artery (AAA) repair mortality rate (IQI 11)	**Endorsed Measure 0736:** Survival predictor for abdominal aortic aneurysm (AAA)	**New Candidate Standard 1523**: In-hospital mortality following elective open repair of small AAAs	**New Candidate Standard 1534**: In-hospital mortality following elective EVAR of small AAAs
		ENDO IMPLANT OF GRAFT IN AORTA ICD-9-CM AAA diagnosis codes: 4413 RUPT ABD AORTIC ANEURYSM 4414 ABDOM AORTIC ANEURYSM Exclude cases: • missing discharge disposition (DISP=missing), gender (SEX=missing), age (AGE=missing), quarter (DQTR=missing), year (YEAR=missing) or principal diagnosis (DX1 =missing) • transferring to another short-term hospital (DISP=2) • MDC 14 (pregnancy, childbirth, and puerperium)	bypass 3971 Endo Implant of Graft in Aorta For the observed mortality hospitals count the number of AAA repair cases that also have a diagnosis of unruptured AAA using the folloingng codes. ICD-9CM Codes for AAA without rupture 441.4 Dissection of aorta aneurysm unspecified site 441.7 Thoracoabdominal aneurysm without rupture 441.9 Aortic aneurysm of unspecified site without rupture	are included if their aneurysm was asymptomatic and small (< 6cm dia in men, <5.5 cm dia in women, judged by preoperative imaging(CT, MR or ultrasound)).	if their aneurysm was asymptomatic and small (< 6cm dia in men, <5.5 cm dia in women, judged by preoperative imaging).
Exclusions	Numerator exclusions • MDC 14 (pregnancy, childbirth, and puerperium)	Exclude cases: • missing discharge disposition (DISP=missing), gender (SEX=missing), age (AGE=missing), quarter	Patients with ruptured aneurysm or thoracoabdominal aneurysms.	> 6 cm minor diameter - men > 5.5 cm minor diameter - women Symptomatic AAAs that required	> 6 cm diameter - men > 5.5 cm diameter – women Symptomatic AAAs that required urgent/emergent (non-elective) repair

	Maintenance Measure 0357: Abdominal aortic aneurysm (AAA) repair volume (IQI 4)	**Maintenance Measure #0359**: Abdominal aortic artery (AAA) repair mortality rate (IQI 11)	**Endorsed Measure 0736:** Survival predictor for abdominal aortic aneurysm (AAA)	**New Candidate Standard 1523**: In-hospital mortality following elective open repair of small AAAs	**New Candidate Standard 1534**: In-hospital mortality following elective EVAR of small AAAs
		(DQTR=missing), year (YEAR=missing) or principal diagnosis (DX1 =missing) • transferring to another short-term hospital (DISP=2) • MDC 14 (pregnancy, childbirth, and puerperium)		urgent/emergent (non-elective) repair	
Exclusion Details	This volume measure does not have a denominator.	Exclude cases: • missing discharge disposition (DISP=missing), gender (SEX=missing), age (AGE=missing), quarter (DQTR=missing), year (YEAR=missing) or principal diagnosis (DX1 =missing) • transferring to another short-term hospital (DISP=2) • MDC 14 (pregnancy, childbirth, and puerperium)	For the count of all AAA procedures exclude: 3845 Thoracoabdominal procedures. For the observed mortality domain, exclude all Thoracic Diagnosis Codes and dissection codes for AAA 441.0x General code 441.1 Thoracic aneurysm ruptured 441.2 Thoracic aneurysm without rupture 441.3 Abdominal aneurysm ruptured 441.5 Aortic aneurysm of unspecified site ruptured 441.6 Thoracoabdominal aneurysm ruptured. Mortality Domain does excludes thoracic	Patients undergoing non-elective open repair of symptomatic AAAs or those with AAAs larger than the diameters noted above.	Patients undergoing non-elective open repair of symptomatic AAAs or those with AAAs larger than the diameters noted above.

	Maintenance Measure 0357: Abdominal aortic aneurysm (AAA) repair volume (IQI 4)	**Maintenance Measure #0359**: Abdominal aortic artery (AAA) repair mortality rate (IQI 11)	**Endorsed Measure 0736:** Survival predictor for abdominal aortic aneurysm (AAA)	**New Candidate Standard 1523**: In-hospital mortality following elective open repair of small AAAs	**New Candidate Standard 1534**: In-hospital mortality following elective EVAR of small AAAs
			aneurysm Procedure Code: 38.45 Resection of vessel with replacement, other thoracic vessels.		
Risk Adjustment	No risk adjustment necessary	Risk adjustment method widely or commercially available. The predicted value for each case is computed using a hierarchical model (logistic regression with hospital random effect) and covariates for gender, age in years (in 5-year age groups), All Patient Refined-Diagnosis Related Group (APR-DRG) and APR-DRG risk-of-mortality subclass. The reference population used in the model is the universe of discharges for states that participate in the HCUP State Inpatient Databases (SID) for the year 2007 (updated annually), a database consisting of 43 states and approximately 30 million adult discharges. The expected rate is computed as the sum of the predicted value for each	We used an empirical Bayes approach to combine mortality rates with information on hospital volume at each hospital. In traditional empirical Bayes methods, a point estimate (e.g., mortality rate observed at a hospital) is adjusted for reliability by shrinking it towards the overall mean (e.g., overall mortality rate in the population). We modified this traditional approach by shrinking the observed mortality rate back toward the mortality rate expected given the volume at that hospital—we refer to this as the "volume-predicted mortality". With this approach, the observed mortality rate is weighted according to how reliably it is estimated, with the remaining weight placed	No risk adjustment necessary	No risk adjustment necessary

	Maintenance Measure 0357: Abdominal aortic aneurysm (AAA) repair volume (IQI 4)	**Maintenance Measure #0359**: Abdominal aortic artery (AAA) repair mortality rate (IQI 11)	**Endorsed Measure 0736:** Survival predictor for abdominal aortic aneurysm (AAA)	**New Candidate Standard 1523**: In-hospital mortality following elective open repair of small AAAs	**New Candidate Standard 1534**: In-hospital mortality following elective EVAR of small AAAs
		case divided by the number of cases for the unit of analysis of interest (i.e., hospital, state, and region). The risk adjusted rate is computed using indirect standardization as the observed rate divided by the expected rate, multiplied by the reference population rate.Risk adjustment factors: sex age 18-24; age 25-29; age 30-34; age 35-39; age 40-44; age 45-49; age 50-54; age 55-59; age 60-64; age 65-69; age 70-74; age 75-79; age 80-84; age 85+ each age category*female ADRG 1731 (other vascular procedures-minor) ADRG 1732 (other vascular procedures-moderate) ADRG 1733 (other vascular procedures-major) ADRG 1734 (other vascular procedures-extreme) ADRG 1691 (major thoracic and abdominal	on the information regarding hospital volume [volume-predicted mortality]. Risk adjustment for patient characteristics is not used because in sensitivity analysis, composite measures based on an unadjusted mortality input and a risk-adjusted mortality input had a correlation of (.95) and thus were equally good at predicting future performance. The formula for calculating the survival predictor has two components, one is a volume predicted mortality rate, and the second is an observed mortality rate. The volume predicted mortality rate reflects the hospitals experience performing AAA surgeries (thus, it includes all AAA		

	Maintenance Measure 0357: Abdominal aortic aneurysm (AAA) repair volume (IQI 4)	**Maintenance Measure #0359**: Abdominal aortic artery (AAA) repair mortality rate (IQI 11)	**Endorsed Measure 0736:** Survival predictor for abdominal aortic aneurysm (AAA)	**New Candidate Standard 1523**: In-hospital mortality following elective open repair of small AAAs	**New Candidate Standard 1534**: In-hospital mortality following elective EVAR of small AAAs
		vascular procedures-minor) ADRG 1692 (major thoracic and abdominal vascular procedures-moderate) ADRG 1693 (major thoracic and abdominal vascular procedures-major) ADRG 1694 (major thoracic and abdominal vascular procedures-extreme ADRG 9999 (other)	surgeries) and uses mortality for all hospitals at that specific volume to create the volume predicted mortality. The input data from the hospitals for this domain is a volume count of all AAAs performed in the hospital. The second domain is the observed mortality, for this domain the population is the group of AAA cases without rupture, the data needed for this domain is the number of observed deaths occurring for AAA cases without rupture, within the inpatient setting. The general composite measure calculation is as follows: Predicted Survival = 1-Predicted Mortality Predicted Mortality = (weight)*(mortality) + (1-weight)*(volume predicted mortality)		

	Maintenance Measure 0357: Abdominal aortic aneurysm (AAA) repair volume (IQI 4)	**Maintenance Measure #0359**: Abdominal aortic artery (AAA) repair mortality rate (IQI 11)	**Endorsed Measure 0736:** Survival predictor for abdominal aortic aneurysm (AAA)	**New Candidate Standard 1523**: In-hospital mortality following elective open repair of small AAAs	**New Candidate Standard 1534**: In-hospital mortality following elective EVAR of small AAAs
			Volume predicted mortality* = intercept - coefficient*ln(caseload), where the intercepts and coefficients are derived from regression using the NIS data and the caseload comes from the Leapfrog Hospital Survey (answer to question #1 for each high-risk procedure). *Any negative values are reset to "0" Weight = mortality signal/(mortality signal + [mortality sigma/caseload]), where mortality signal and sigma are derived from the NIS data and the caseload comes from the Leapfrog Hospital Survey (answer to question #1 for each high-risk procedure). Method: We used an empirical Bayes approach to combine mortality rates with information on hospital volume at each hospital. In traditional		

	Maintenance Measure 0357: Abdominal aortic aneurysm (AAA) repair volume (IQI 4)	**Maintenance Measure #0359**: Abdominal aortic artery (AAA) repair mortality rate (IQI 11)	**Endorsed Measure 0736:** Survival predictor for abdominal aortic aneurysm (AAA)	**New Candidate Standard 1523**: In-hospital mortality following elective open repair of small AAAs	**New Candidate Standard 1534**: In-hospital mortality following elective EVAR of small AAAs
			empirical Bayes methods, a point estimate (e.g., mortality rate observed at a hospital) is adjusted for reliability by shrinking it towards the overall mean (e.g., overall mortality rate in the population). We modified this traditional approach by shrinking the observed mortality rate back toward the mortality rate expected given the volume at that hospital—we refer to this as the "volume-predicted mortality". With this approach, the observed mortality rate is weighted according to how reliably it is estimated, with the remaining weight placed on the information regarding hospital volume [volume-predicted mortality]. Risk adjustment for patient characteristics is not used because in sensitivity analysis, composite measures based on an unadjusted		

	Maintenance Measure 0357: Abdominal aortic aneurysm (AAA) repair volume (IQI 4)	**Maintenance Measure #0359**: Abdominal aortic artery (AAA) repair mortality rate (IQI 11)	**Endorsed Measure 0736:** Survival predictor for abdominal aortic aneurysm (AAA)	**New Candidate Standard 1523**: In-hospital mortality following elective open repair of small AAAs	**New Candidate Standard 1534**: In-hospital mortality following elective EVAR of small AAAs
			mortality input and a risk-adjusted mortality input had a correlation of (.95) and thus were equally good at predicting future performance. The formula for calculating the survival predictor has two components, one is a volume predicted mortality rate, and the second is an observed mortality rate. The volume predicted mortality rate reflects the hospitals experience performing AAA surgeries (thus, it includes all AAA surgeries) and uses mortality for all hospitals at that specific volume to create the volume predicted mortality. The input data from the hospitals for this domain is a volume count of all AAAs performed in the hospital.		

	Maintenance Measure 0357: Abdominal aortic aneurysm (AAA) repair volume (IQI 4)	**Maintenance Measure #0359**: Abdominal aortic artery (AAA) repair mortality rate (IQI 11)	**Endorsed Measure 0736:** Survival predictor for abdominal aortic aneurysm (AAA)	**New Candidate Standard 1523**: In-hospital mortality following elective open repair of small AAAs	**New Candidate Standard 1534**: In-hospital mortality following elective EVAR of small AAAs
			The second domain is the observed mortality, for this domain the population is the group of AAA cases without rupture, the data needed for this domain is the number of observed deaths occurring for AAA cases without rupture, within the inpatient setting. The general composite measure calculation is as follows: Predicted Survival = 1-Predicted Mortality Predicted Mortality = (weight)*(mortality) + (1-weight)*(volume predicted mortality) Volume predicted mortality* = intercept - coefficient*ln(caseload), where the intercepts and coefficients are derived from regression using the NIS data and the caseload comes from the Leapfrog Hospital Survey (answer to question #1 for each		

	Maintenance Measure 0357: Abdominal aortic aneurysm (AAA) repair volume (IQI 4)	**Maintenance Measure #0359**: Abdominal aortic artery (AAA) repair mortality rate (IQI 11)	**Endorsed Measure 0736:** Survival predictor for abdominal aortic aneurysm (AAA)	**New Candidate Standard 1523**: In-hospital mortality following elective open repair of small AAAs	**New Candidate Standard 1534**: In-hospital mortality following elective EVAR of small AAAs
			high-risk procedure). *Any negative values are reset to "0" Weight = mortality signal/(mortality signal + [mortality sigma/caseload]), where mortality signal and sigma are derived from the NIS data and the caseload comes from the Leapfrog Hospital Survey (answer to question #1 for each high-risk procedure).		
Stratification	N/A	Gender, age (5-year age groups), race / ethnicity, primary payer, custom		N/A	N/A
Type Score	Count	Rate/proportion		Rate/proportion	Rate/proportion
Algorithm	The volume is the number of discharges with a diagnosis of, and a procedure for AAA.	Each indicator is expressed as a rate, is defined as outcome of interest / population at risk or numerator / denominator. The AHRQ Quality Indicators (AHRQ QI) software performs five steps to produce the rates. 1) Discharge-level data is used to mark inpatient records containing the outcome of interest and 2) the population at risk. For		Identify denominator, exclude non-elective repair of symptomatic or ruptured patients and men with AAA >6 cm, and women with AAA >5.5, find number of deaths Outcome = deaths/ # cases	Identify denominator, exclude non-elective repair of symptomatic or ruptured patients and men with AAA >6 cm, and women with AAA >5.5, find number of deaths Outcome = deaths/ # cases

	Maintenance Measure 0357: Abdominal aortic aneurysm (AAA) repair volume (IQI 4)	**Maintenance Measure #0359**: Abdominal aortic artery (AAA) repair mortality rate (IQI 11)	**Endorsed Measure 0736:** Survival predictor for abdominal aortic aneurysm (AAA)	**New Candidate Standard 1523**: In-hospital mortality following elective open repair of small AAAs	**New Candidate Standard 1534**: In-hospital mortality following elective EVAR of small AAAs
		provider indicators, the population at risk is also derived from hospital discharge records; for area indicators, the population at risk is derived from U.S. Census data. 3) Calculate observed rates. Using output from steps 1 and 2, rates are calculated for user-specified combinations of stratifiers. 4) Calculate expected rates. Regression coefficients from a reference population database are applied to the discharge records and aggregated to the provider or area level. 5) Calculate risk-adjusted rate. Use the indirect standardization to account for case-mix. 6) Calculate smoothed rate. A Univariate shrinkage factor is applied to the risk-adjusted rates. The shrinkage estimate reflects a reliability adjustment unique to each indicator. Full information on calculation algorithms and specifications can be found at			

	Maintenance Measure 0357: Abdominal aortic aneurysm (AAA) repair volume (IQI 4)	**Maintenance Measure #0359**: Abdominal aortic artery (AAA) repair mortality rate (IQI 11)	**Endorsed Measure 0736:** Survival predictor for abdominal aortic aneurysm (AAA)	**New Candidate Standard 1523**: In-hospital mortality following elective open repair of small AAAs	**New Candidate Standard 1534**: In-hospital mortality following elective EVAR of small AAAs
		http://qualityindicators.ahrq.gov/IQI_download.htm			
Data Source	Electronic administrative data/claims	Electronic administrative data/claims	Electronic administrative data/claims	Registry data	Registry data
Level of Measurement /Analysis	Facility/agency	Facility/agency	Facility/agency	Clinicians: Individual, group; Facility/agency; Can be measured at all levels	Clinicians: Individual, group; Facility/agency; Can be measured at all levels
Care Settings	Hospital	Hospital	Hospital	Hospital	Hospital

Beta Blocker

	Endorsed Measure 0235: Pre-op beta blocker in patient with isolated CABG (1)	**Maintenance Measure #0127**: Pre-operative beta blockade	**Endorsed Measure 0236:** Pre-op beta-blocker in patient with isolated CABG (2)	**Maintenance Measure 0284:** Surgery patients on beta blocker therapy prior to admission who received a beta blocker during the perioperative period
Status	Endorsed 5/2007	Currently undergoing maintenance review	Endorsed 5/2007	Currently undergoing maintenance review
Steward	Society of Thoracic Surgeons	Society of Thoracic Surgeons	Centers for Medicare & Medicaid Services	Centers for Medicare & Medicaid Services
Description	Percentage of procedures for which the patient received Beta Blockers within 24 hours preceding surgery/ Total number of isolated CABG procedures.	Percent of patients undergoing isolated CABG who received beta blockers within 24 hours preceding surgery.	Percentage of patients undergoing CABG with documented pre-operative beta blockade who had a coronary artery bypass graft	Percentage of patients on beta blocker therapy prior to admission who received a beta blocker during the peri-operative period
Type of Measure	Process	Process	Process	Process
Numerator	Number of procedures for which the patient received Beta Blockers within 24 hours preceding surgery.	Number of procedures for which the patient received Beta Blockers within 24 hours preceding surgery.	Patients undergoing CABG with documented pre-operative beta blockade. 4115F Beta blocker administered within 24 hours prior to surgical incision	Surgery patients on beta blocker therapy prior to admission who received a beta blocker during the peri-operative period. (The peri-operative period = 24 hours prior to surgical incision through discharge from post-anesthesia care/recovery area.
Numerator Details		Number of isolated CABG procedures in which preoperative beta blockers [MedBeta (STS Adult Cardiac Surgery Database Version 2.73, Sequence number 1710)] is marked "yes".		Data element: Beta-Blocker Perioperative
Denominator	Total number of isolated CABG procedures.	Total number of isolated CABG procedures.	Patients with coronary artery bypass graft. CPT codes: 33510, 33511, 33512, 33513, 33514, 33516, , 33533, 33534, 33535, 33536	All surgery patients on beta blocker therapy prior to arrival.

	Endorsed Measure 0235: Pre-op beta blocker in patient with isolated CABG (1)	**Maintenance Measure #0127**: Pre-operative beta blockade	**Endorsed Measure 0236:** Pre-op beta-blocker in patient with isolated CABG (2)	**Maintenance Measure 0284:** Surgery patients on beta blocker therapy prior to admission who received a beta blocker during the perioperative period
Denominator Categories		Female, Male; 18 and older		Female, Male; Patients >/= 18 years of age
Denominator Details		Number of isolated CABG procedures excluding cases for which preoperative beta blockers were contraindicated. Isolated CABG is determined as a procedure for which all of the following apply (note: full terms for STS field names are provided in brackets []): - OpCAB [Coronary Artery Bypass] is marked "Yes" - (VADProc [VAD Implanted or Removed] is marked "No" or "Missing") or (VADProc is marked "Yes, Implanted" and UnplVAD [Unplanned VAD Insertion] is marked "yes") - OCarASDTy [Atrial Septal Defect Repair] is marked "PFO" or "missing" - OCarAFibAProc [Atrial Fibrillation Ablation Procedure] is marked "primarily epicardial" or "missing" and - OpValve [Valve Surgery], VSAV [Aortic Valve Procedure], VSAVPr [Aortic Valve Procedure Performed], ResectSubA [Resection of sub-aortic stenosis], VSMV [Mitral Valve Procedure], VSMVPr		Data Elements: Admission Date Anesthesia Start Date Beta-Blocker Current Medication Beta-Blocker During Pregnancy Birthdate Clinical Trial Discharge Date ICD-9-CM Principal Procedure Code Laparoscope Perioperative Death Reason for Not Administering Beta-Blocker-Perioperative Sex

	Endorsed Measure 0235: Pre-op beta blocker in patient with isolated CABG (1)	**Maintenance Measure #0127**: Pre-operative beta blockade	**Endorsed Measure 0236:** Pre-op beta-blocker in patient with isolated CABG (2)	**Maintenance Measure 0284:** Surgery patients on beta blocker therapy prior to admission who received a beta blocker during the perioperative period
		[Mitral Valve Procedure Performed], OpTricus [Tricuspid Valve Procedure Performed], OpPulm [Pulmonic Valve Procedure Performed], OpONCard [Other Non-Cardiac Procedure], OCarLVA [Left Ventricular Aneurysm Repair], OCarVSD [Ventricular Septal Defect Repair], OCarSVR [Surgical Ventricular Restoration], OCarCong [Congenital Defect Repair], OCarTrma [surgical procedure for an injury due to Cardiac Trauma], OCarCrTx [Cardiac Transplant], OCAoProcType [Aortic Procedure Type], EndoProc [Endovascular Procedure (TEVAR)], OCTumor [resection of an intracardiac tumor], OCPulThromDis [Pulmonary Thromboembolectomy], OCarOthr [other cardiac procedure] are all marked "no" or "missing"		
Exclusions		Age qualification: For patients <20 years, the data are accepted into the database, but are not included in the national analysis and report.		Age qualification: Patients <18 years of age. Patients: • who did not receive beta blockers due to contraindications documented in the medical record,

	Endorsed Measure 0235: Pre-op beta blocker in patient with isolated CABG (1)	**Maintenance Measure #0127**: Pre-operative beta blockade	**Endorsed Measure 0236:** Pre-op beta-blocker in patient with isolated CABG (2)	**Maintenance Measure 0284:** Surgery patients on beta blocker therapy prior to admission who received a beta blocker during the perioperative period
				• whose ICD-9-CM principal procedure occurred prior to the date of admission. • whose ICD-9-CM principal procedure was performed entirely by laparoscope. • who expired during the perioperative period. • Pregnant taking a beta-blocker prior to admission. • Patients involved in clinical trials
Exclusion Details		Procedures with preoperative beta blockers [MedBeta (STS Adult Cardiac Surgery Database Version 2.73, Sequence number 1710)] marked as "Contraindicated"		Data Elements: Beta-Blocker During Pregnancy Clinical Trial Perioperative Death Reason for Not Administering Beta-Blocker-Perioperative
Risk Adjustment	No risk adjustment necessary	No risk adjustment necessary	No risk adjustment necessary	No risk adjustment necessary
Stratification		N/A	N/A	N/A
Type Score		Rate/proportion	Rate/proportion	Rate/proportion
Algorithm		N/A		Variable Key: Patient Age, Surgery Days 1.Start processing. Run cases that are included in the Surgical Care Improvement Project (SCIP) Initial Patient Population and pass the edits defined in the Transmission Data Processing Flow: Clinical through this measure. 2.Calculate Patient Age. The Patient Age, in years, is equal to the Admission Date minus

	Endorsed Measure 0235: Pre-op beta blocker in patient with isolated CABG (1)	**Maintenance Measure #0127**: Pre-operative beta blockade	**Endorsed Measure 0236:** Pre-op beta-blocker in patient with isolated CABG (2)	**Maintenance Measure 0284:** Surgery patients on beta blocker therapy prior to admission who received a beta blocker during the perioperative period
				the Birthdate. Use the month and day portion of admission date and birthdate to yield the most accurate age. 3.Check Patient Age a.If Patient Age is less than 18 years, the case will proceed to a Measure Category Assignment of B and will not be in the Measure Population. Stop processing. b.If Patient Age is greater than or equal to 18 years, continue processing and proceed to Laparoscope. 4.Check Laparoscope a.If Laparoscope is missing, the case will proceed to a Measure Category Assignment of X and will be rejected. Stop processing. b.If Laparoscope equals 1 or 3, the case will proceed to a Measure Category Assignment of B and will not be in the Measure Population. Stop processing. c.If Laparoscope equals 2, continue processing and proceed to Clinical Trial. 5.Check Clinical Trial a.If Clinical Trial is missing, the case will proceed to a Measure Category Assignment of X and

	Endorsed Measure 0235: Pre-op beta blocker in patient with isolated CABG (1)	**Maintenance Measure #0127**: Pre-operative beta blockade	**Endorsed Measure 0236:** Pre-op beta-blocker in patient with isolated CABG (2)	**Maintenance Measure 0284:** Surgery patients on beta blocker therapy prior to admission who received a beta blocker during the perioperative period
				will be rejected. Stop processing. b.If Clinical Trial equals Yes, the case will proceed to a Measure Category Assignment of B and will not be in the Measure Population. Stop processing. c.If Clinical Trial equals No, continue processing and proceed to Anesthesia Start Date. 6.Check Anesthesia Start Date a.If the Anesthesia Start Date is missing, the case will proceed to a Measure Category Assignment of X and will be rejected. Stop processing. b.If the Anesthesia Start Date equals Unable To Determine, the case will proceed to a Measure Category Assignment of D and will be in the Measure Population. Stop processing. c.If Anesthesia Start Date equals a Non Unable To Determine Value, continue processing and proceed to the Surgery Days calculation. 7.Calculate Surgery Days. Surgery Days, in days, is equal to the Anesthesia Start Date minus the Admission Date. 8.Check Surgery Days

	Endorsed Measure 0235: Pre-op beta blocker in patient with isolated CABG (1)	**Maintenance Measure #0127**: Pre-operative beta blockade	**Endorsed Measure 0236:** Pre-op beta-blocker in patient with isolated CABG (2)	**Maintenance Measure 0284:** Surgery patients on beta blocker therapy prior to admission who received a beta blocker during the perioperative period
				a.If the Surgery Days is less than zero, the case will proceed to a Measure Category Assignment of B and will not be in the Measure Population. Stop processing. b.If the Surgery Days is greater than or equal to zero, continue processing and proceed to Perioperative Death. 9.Check Perioperative Death a.If Perioperative Death is missing, the case will proceed to a Measure Category Assignment of X and will be rejected. Stop processing. b.If Perioperative Death equals Yes, the case will proceed to a Measure Category Assignment of B and will not be in the Measure Population. Stop processing. c.If Perioperative Death equals No, continue processing and proceed to Beta-Blocker Current Medication. 10.Check Beta-Blocker Current Medication a.If the Beta-Blocker Current Medication is missing, the case will proceed to a Measure Category Assignment of X and will be rejected. Stop processing.

	Endorsed Measure 0235: Pre-op beta blocker in patient with isolated CABG (1)	**Maintenance Measure #0127**: Pre-operative beta blockade	**Endorsed Measure 0236:** Pre-op beta-blocker in patient with isolated CABG (2)	**Maintenance Measure 0284:** Surgery patients on beta blocker therapy prior to admission who received a beta blocker during the perioperative period
				b.If the Beta-Blocker Current Medication equals No, the case will proceed to a Measure Category Assignment of B and will not be in the Measure Population. Stop processing. c.If the Beta-Blocker Current Medication equals Yes, continue processing and proceed to Sex. 11.Check Sex a.If Sex is missing, the case will proceed to a Measure Category Assignment of X and will be rejected. Stop processing. b.If Sex equals Female, continue processing and check Beta-Blocker During Pregnancy. 1.If Beta-Blocker During Pregnancy is missing, the case will proceed to a Measure Category Assignment of X and will be rejected. Stop processing. 2.If Beta-Blocker During Pregnancy equals 1 or 3, the case will proceed to a Measure Category Assignment of B and will not be in the Measure Population. Stop processing. 3.If Beta-Blocker During Pregnancy equals 2, continue processing and proceed to Beta-

	Endorsed Measure 0235: Pre-op beta blocker in patient with isolated CABG (1)	**Maintenance Measure #0127**: Pre-operative beta blockade	**Endorsed Measure 0236:** Pre-op beta-blocker in patient with isolated CABG (2)	**Maintenance Measure 0284:** Surgery patients on beta blocker therapy prior to admission who received a beta blocker during the perioperative period
				Blocker Preoperative. c.If Sex equals Male or Unknown, continue processing and proceed to Beta-Blocker Perioperative. 12.Check Beta-Blocker Perioperative a.If Beta-Blocker Perioperative is missing, the case will proceed to a Measure Category Assignment of X and will be rejected. Stop processing. b.If Beta-Blocker Perioperative equals Yes, the case will proceed to a Measure Category Assignment of E and will be in the Numerator Population. Stop processing. c.If Beta-Blocker Perioperative equals No, continue processing and check Reason for Not Administering Beta-Blocker Perioperative. 13.Check Reason for Not Administering Beta-Blocker Perioperative a.If Reason for Not Administering Beta-Blocker Perioperative is missing, the case will proceed to a Measure Category Assignment of X and will be rejected. Stop processing. b.If Reason for Not

	Endorsed Measure 0235: Pre-op beta blocker in patient with isolated CABG (1)	**Maintenance Measure #0127**: Pre-operative beta blockade	**Endorsed Measure 0236:** Pre-op beta-blocker in patient with isolated CABG (2)	**Maintenance Measure 0284:** Surgery patients on beta blocker therapy prior to admission who received a beta blocker during the perioperative period
				Administering Beta-Blocker Perioperative equals Yes, the case will proceed to a Measure Category Assignment of B and will not be in the Measure Population. Stop processing. c.If Reason for Not Administering Beta-Blocker Perioperative equals No, the case will proceed to a Measure Category Assignment of D and will be in the Measure Population. Stop processing.
Data Source	Electronic administrative data/claims	Electronic clinical data	Electronic administrative data/claims	Electronic administrative data/claims; Paper medical record/flow sheet
Level of Measurement /Analysis	Clinicians: Individual	Facility/agency	Clinicians: Individual	Facility/agency,
Care Settings	Hospital	Hospital	Hospital	Hospital

Cataracts

	New Candidate Measure #1536: Cataracts: Improvement in patient's visual function within 90 days following cataract surgery	**Endorsed Measure #0565**: Cataracts: 20/40 or better visual acuity within 90 days following cataract surgery
Status	Currently undergoing review	Endorsed 10/2009
Steward	American Academy of Ophthalmology and Hoskins Center for Quality Eye Care	American Medical Association-Physician Consortium for Performance Improvement
Description	Percentage of patients aged 18 years and older who had cataract surgery and had improvement in visual function achieved within 90 days following the cataract surgery.	Percentage of patients aged 18 years and older with a diagnosis of uncomplicated cataract who had cataract surgery and no significant ocular conditions impacting the visual outcome of surgery and had best-corrected visual acuity of 20/40 or better (distance or near) achieved within 90 days following the cataract surgery.
Type of Measure	Outcome	Outcome
Numerator	Patients who had improvement in visual function achieved within 90 days following cataract surgery.	Patients who had best-corrected visual acuity of 20/40 or better (distance or near) achieved within 90 days following cataract surgery.
Numerator Details	Reporting Numerator includes each of the following instances: A. Patients who had an improvement in their visual function achieved within 90 days following cataract surgery C. Patients who did not complete their visual function assessment within 90 days following cataract surgery but for whom there is a documented medical or patient reason for not doing so D. Patients who did not have an improvement in their visual function achieved within 90 days following cataract surgery and there is no documented medical or patient reason for not doing so For the reporting calculation, documented medical and patient reasons for not doing so include the following: Medical reasons: When cataract surgery was performed for these indications: • Clinically significant anisometropia in the presence of a cataract • The lens opacity interferes with optimal diagnosis or management of posterior segment conditions • The lens causes inflammation (phacolysis, phacoanaphylaxis) • The lens induces angle closure (phacomorphic or phacotopic) Patient reasons: • The patient refuses to participate • The patient is unable to complete the	Patients who had best-corrected visual acuity of 20/40 or better (distance or near) achieved within 90 days following cataract surgery CPT Category II code: 4175F-Best-corrected visual acuity of 20/40 or better (distance or near) achieved within the 90 days following cataract surgery

	New Candidate Measure #1536: Cataracts: Improvement in patient's visual function within 90 days following cataract surgery	**Endorsed Measure #0565**: Cataracts: 20/40 or better visual acuity within 90 days following cataract surgery
	questionnaire	
Denominator	All patients aged 18 years and older who had cataract surgery.	All patients aged 18 years and older who had cataract surgery and no significant pre-operative ocular conditions impacting the visual outcome of surgery.
Denominator Categories	Female, Male; 18 years and older	
Denominator Details	Denominator (Eligible Population): All patients aged 18 years and older who had cataract surgery • CPT Procedure Codes (with or without modifiers): 66840, 66850, 66852, 66920, 66930, 66940, 66982, 66983, 66984	All patients aged 18 years and older who had cataract surgery and no significant pre-operative ocular conditions impacting visual outcomes of surgery. CPT Procedure Codes (with or without modifiers): 66840, 66850, 66852, 66920, 66930, 66940, 66982, 66983, 66984 AND Patients aged 18 years and older
Exclusions	A patient is excluded if the following condition(s) exist: Medical reasons: When cataract surgery was performed for these indications: • Clinically significant anisometropia in the presence of a cataract • The lens opacity interferes with optimal diagnosis or management of posterior segment conditions • The lens causes inflammation (phacolysis, phacoanaphylaxis) • The lens induces angle closure (phacomorphic or phacotopic) Patient reasons: • The patient refuses to participate • The patient is unable to complete the questionnaire	Patients with comorbid conditions that impact the visual outcome of surgery (See Denominator Exclusions Spreadsheet).
Exclusion Details	Documentation of medical reason for not improving visual function within 90 days of cataract surgery • Append modifier to CPT Category II Code: -1P Documentation of patient reason for not improving visual function within 90 days of cataract surgery • Append modifier to CPT Category II Code: -2P	Patients with any of the following comorbid conditions that impact the visual outcome of surgery (See Denominator Exclusions Spreadsheet)
Risk Adjustment	No risk adjustment necessary	No risk adjustment necessary
Stratification	This measure can be stratified into two major groups: those patients with ocular co-morbidities and those patients without ocular co-morbidities. An improvement in visual function after cataract surgery would be expected in both groups, however the magnitude of the difference would	

	New Candidate Measure #1536: Cataracts: Improvement in patient's visual function within 90 days following cataract surgery	**Endorsed Measure #0565**: Cataracts: 20/40 or better visual acuity within 90 days following cataract surgery
	vary by group. The Cataract Patient Outcomes Research Team found that an important preoperative patient characteristic that was independently associated with failure to improve on one of the outcomes measured (including the VF-14) was ocular comorbidity. The authors explained that this was expected, because it is reasonable to assume that other diseases that impair visual function would be correlated with a reduced improvement in functional status. The National Eye Care Outcomes Network also found that there were differences in the mean postooperative VF-14 scores across groups of patients with and without ocular co-morbidities, as seen in the table below.	
Type Score	Rate/proportion	
Algorithm	Calculation for Reporting: For reporting purposes, this measure is calculated by creating a fraction with the following components: Reporting Numerator and Reporting Denominator. Reporting Numerator includes each of the following instances: A. Patients who had an improvement in their visual function achieved within 90 days following cataract surgery C. Patients who did not complete their visual function assessment within 90 days following cataract surgery but for whom there is a documented medical or patient reason for not doing so D. Patients who did not have an improvement in their visual function achieved within 90 days following cataract surgery and there is no documented medical or patient reason for not doing so Reporting Denominator (RD) includes: • Patients aged 18 years and older AND • Had cataract surgery Reporting Calculation A (# of patients meeting measure criteria) + C (# of patients with valid exclusions) + D (# of patients NOT meeting numerator criteria) _____ _____	

	New Candidate Measure #1536: Cataracts: Improvement in patient's visual function within 90 days following cataract surgery	**Endorsed Measure #0565**: Cataracts: 20/40 or better visual acuity within 90 days following cataract surgery
	RD (# of patients in denominator) A (# of patients meeting measure criteria) A (A PD (# of patients in denominator) Components for this measure are defined as: A # of patients who had an improvement in their visual function achieved within 90 days following cataract surgery C # of patients who did not complete their visual function assessment within 90 days following cataract surgery but for whom there is a documented medical or patient reason for not doing so D # of patients who did not have an improvement in their visual function achieved within 90 days following cataract surgery and there is no documented medical or patient reason for not doing so RD # of patients aged 18 years and older who had cataract surgery	
Data Source	Survey: Patient	Electronic administrative data/claims, electronic health/medical record, paper medical record/flow-sheet
Level of Measurement /Analysis	Clinicians: Individual	Clinicians: Individual, group
Care Settings	Ambulatory care: Ambulatory surgery center, clinic, hospital outpatient	Ambulatory care: Clinic

Failure to Rescue

	Maintenance Measure 0352: Failure to rescue in-hospital mortality (risk adjusted)	**Maintenance Measure #0351**: Death among surgical inpatients with serious, treatable complications (PSI 4)	**Maintenance Measure 0353:** Failure to rescue 30-day mortality (risk adjusted)
Status	Currently undergoing maintenance review	Currently undergoing maintenance review	Currently undergoing maintenance review
Steward	Children's Hospital of Philadelphia	Agency for Healthcare Research and Quality	Children's Hospital of Philadelphia
Description	Percentage of patients who died with a complications in the hospital.	Percentage of cases having developed specified complications of care with an in-hospital death.	Percentage of patients who died with a complication within 30 days from admission.
Type of Measure	Outcome	Outcome	Outcome

	Maintenance Measure 0352: Failure to rescue in-hospital mortality (risk adjusted)	**Maintenance Measure #0351**: Death among surgical inpatients with serious, treatable complications (PSI 4)	**Maintenance Measure 0353:** Failure to rescue 30-day mortality (risk adjusted)
Numerator	Patients who died with a complication plus patients who died without documented complications. Death is defined as death in the hospital. All patients in an FTR analysis have developed a complication (by definition). Complicated patient has at least one of the complications defined in Appendix B (see website http://www.research.chop.edu/programs/cor/outcomes.php). Complications are defined using the secondary ICD9 diagnosis and procedure codes and the DRG code of the current admission. Comorbidities are defined in Appendix C (see website http://www.research.chop.edu/programs/cor/outcomes.php) using secondary ICD9 diagnosis codes of the current admission and primary or secondary ICD9 diagnosis codes of previous admission within 90 days of the admission date of the current admission. *When physician part B is available, the definition of complications and comorbidities are augmented to include CPT codes.	All discharges with a disposition of "deceased" (DISP=20) among cases meeting the inclusion and exclusion rules for the denominator.	Patients who died with a complication plus patients who died without documented complications. Death is defined as death within 30 days from admission. All patients in an FTR analysis have developed a complication (by definition). Complicated patient has at least one of the complications defined in Appendix B (see website http://www.research.chop.edu/programs/cor/outcomes.php). Complications are defined using the secondary ICD9 diagnosis and procedure codes and the DRG code of the current admission. Comorbidities are defined in Appendix C(see website http://www.research.chop.edu/programs/cor/outcomes.php) using secondary ICD9 diagnosis codes of the current admission and primary or secondary ICD9 diagnosis codes of previous admission within 90 days of the admission date of the current admission. *When physician part B is available, the definition of complications and comorbidities are augmented to include CPT codes.
Numerator Details	Patients who died with complication and patients who died without documented complications. Death is defined as death in the hospital.	All discharges with a disposition of "deceased" (DISP=20) among cases meeting the inclusion and exclusion rules for the denominator.	Patients who died with complication and patients who died without documented complications. Death is defined as death within 30 days from admission.
Denominator	General Surgery, Orthopedic and Vascular patients in specific DRGs with complications plus patients who died in the hospital without complications. Inclusions: adult patients admitted for one of the procedures in the General	All surgical discharges age 18 years and older or MDC 14 (pregnancy, childbirth, and puerperium) defined by specific DRGs or MS-DRGs and an ICD-9-CM code for an operating room procedure, principal procedure within 2 days of admission OR admission type of elective (ATYPE=3) with potential	General Surgery, Orthopedic and Vascular patients in specific DRGs with complications plus patients who died in the hospital without complications. Inclusions: adult patients admitted for one of the procedures in the General Surgery, Orthopedic or Vascular DRGs (see appendix A

	Maintenance Measure 0352: Failure to rescue in-hospital mortality (risk adjusted)	**Maintenance Measure #0351**: Death among surgical inpatients with serious, treatable complications (PSI 4)	**Maintenance Measure 0353:** Failure to rescue 30-day mortality (risk adjusted)
	Surgery, Orthopedic or Vascular DRGs (see appendix A http://www.research.chop.edu/programs/cor/outcomes.php)	complications of care listed in Death among Surgical definition (e.g., pneumonia, DVT/PE, sepsis, shock/cardiac arrest, or GI hemorrhage/acute ulcer).	http://www.research.chop.edu/programs/cor/outcomes.php) Inclusions: adult patients admitted for one of the procedures in the General Surgery, Orthopedic or Vascular DRGs (see appendix A)
Denominator Categories	Female, Male; 18-90	Female; 18 and older	Female, Male; 18-90
Denominator Details	Adult patients admitted for one of the procedures in the General Surgery, Orthopedic or Vascular DRGs (see Appendix A http://www.research.chop.edu/programs/cor/outcomes.php)who developed an in hospital complication and those who died without a complication.	All surgical discharges age 18 years and older or MDC 14 (pregnancy, childbirth, and puerperium) defined by specific DRGs or MS-DRGs and an ICD-9-CM code for an operating room procedure, principal procedure within 2 days of admission OR admission type of elective (ATYPE=3) with potential complications of care listed in Death among Surgical definition (pneumonia, DVT/PE, sepsis, shock/cardiac arrest, or GI hemorrhage/acute ulcer). See Patient Safety Indicators Appendices: • Appendix A – Operating Room Procedure Codes • Appendix D – Surgical Discharge DRGs • Appendix E – Surgical Discharge MS-DRGs PSI appendices at: http://www.qualityindicators.ahrq.gov/downloads/psi/TechSpecs42/PSI%20Appendices.pdf	Adult patients admitted for one of the procedures in the General Surgery, Orthopedic or Vascular DRGs (see Appendix A http://www.research.chop.edu/programs/cor/outcomes.php) who developed an in hospital complication and those who died without a complication.
Exclusions	Patients over age 90, under age 18.	Exclude cases: • age 90 years and older • transferred to an acute care facility (DISP = 2) • missing discharge disposition (DISP=missing), gender (SEX=missing), age (AGE=missing), quarter (DQTR=missing), year (YEAR=missing) or principal diagnosis (DX1 =missing) NOTE: Additional exclusion	Patients over age 90, under age 18.

	Maintenance Measure 0352: Failure to rescue in-hospital mortality (risk adjusted)	**Maintenance Measure #0351**: Death among surgical inpatients with serious, treatable complications (PSI 4)	**Maintenance Measure 0353:** Failure to rescue 30-day mortality (risk adjusted)
		criteria is specific to each diagnosis (pneumonia, DVT/PE, sepsis, shock/cardiac arrest, or GI hemorrhage/acute ulcer).	
Exclusion Details		Exclude cases: • age 90 years and older • transferred to an acute care facility (DISP = 2) • missing discharge disposition (DISP=missing), gender (SEX=missing), age (AGE=missing), quarter (DQTR=missing), year (YEAR=missing) or principal diagnosis (DX1 =missing) NOTE: Additional exclusion criteria is specific to each diagnosis (pneumonia, DVT/PE, sepsis, shock/cardiac arrest, or GI hemorrhage/acute ulcer).	
Risk Adjustment	Risk Adjustment: Model was developed using logistic regression analysis. Associated data elements: age in years, sex, race, comorbidities, DRGs (combined with and without complications) and procedure codes within DRGs, transfer status. Failure to rescue is adjusted using a logistic regression model where y is a failure and the total N is composed of patients who develop a complication and patients who died without a complication. According to developer: The model adjustment variables can vary. We have found that FTR results are fairly stable, even with little adjustment, since all patients in an FTR analysis have developed a complication (by definition), they are a more homogeneous group of patients than the entire population. Hence severity adjustment plays somewhat less of a role than in other outcome	Risk adjustment method widely or commercially available. The predicted value for each case is computed using a hierarchical model (logistic regression with hospital random effect) and covariates for gender, age in years (in 5-year age groups), modified CMS DRG and AHRQ Comorbidities. The reference population used in the model is the universe of discharges for states that participate in the HCUP State Inpatient Databases (SID) for the year 2007 (updated annually), a database consisting of 43 states and approximately 30 million adult discharges. The expected rate is computed as the sum of the predicted value for each case divided by the number of cases for the unit of analysis of interest (i.e., hospital, state, and region). The risk adjusted rate is computed using indirect standardization as the observed rate divided by the expected rate, multiplied by the reference population rate.	Risk Adjustment: Model was developed using logistic regression analysis. Associated data elements: age in years, sex, race, comorbidities, DRGs (combined with and without complications) and procedure codes within DRGs, transfer status. Failure to rescue is adjusted using a logistic regression model where y is a failure and the total N is composed of patients who develop a complication and patients who died without a complication. According to developer: The model adjustment variables can vary. We have found that FTR results are fairly stable, even with little adjustment, since all patients in an FTR analysis have developed a complication (by definition), they are a more homogeneous group of patients than the entire population. Hence severity adjustment plays somewhat less of a role than in other outcome measures.

	Maintenance Measure 0352: Failure to rescue in-hospital mortality (risk adjusted)	**Maintenance Measure #0351**: Death among surgical inpatients with serious, treatable complications (PSI 4)	**Maintenance Measure 0353:** Failure to rescue 30-day mortality (risk adjusted)
	measures.		
Stratification	Complicated patient has at least one of the complications defined in Appendix B (http://www.research.chop.edu/programs/cor/outcomes.php) Complications are defined using the secondary ICD9 diagnosis and procedure codes and the DRG code of the current admission. When Physician Part B file is available, the definition of complications and comorbidities are augmented to include CPT codes.	User has an option to stratify by Gender, age (5-year age groups), race / ethnicity, primary payer, and custom stratifiers.	Complicated patient has at least one of the complications defined in Appendix B (http://www.research.chop.edu/programs/cor/outcomes.php) Complications are defined using the secondary ICD9 diagnosis and procedure codes and the DRG code of the current admission. When Physician Part B file is available, the definition of complications and comorbidities are augmented to include CPT codes.
Type Score	Rate/proportion	Rate/proportion	Rate/proportion
Algorithm	Refer to website (http://www.research.chop.edu/programs/cor/outcomes.php)	Each indicator is expressed as a rate, is defined as outcome of interest / population at risk or numerator / denominator. The AHRQ Quality Indicators (AHRQ QI) software performs five steps to produce the rates. 1) Discharge-level data is used to mark inpatient records containing the outcome of interest and 2) the population at risk. For provider indicators, the population at risk is also derived from hospital discharge records; for area indicators, the population at risk is derived from U.S. Census data. 3) Calculate observed rates. Using output from steps 1 and 2, rates are calculated for user-specified combinations of stratifiers. 4) Calculate expected rates. Regression coefficients from a reference population database are applied to the discharge records and aggregated to the provider or area level. 5) Calculate risk-adjusted rate. Use the indirect standardization to account for case-mix. 6) Calculate smoothed rate. A Univariate shrinkage factor is applied to the risk-adjusted rates. The	Refer to website (http://www.research.chop.edu/programs/cor/outcomes.php)

	Maintenance Measure 0352: Failure to rescue in-hospital mortality (risk adjusted)	**Maintenance Measure #0351**: Death among surgical inpatients with serious, treatable complications (PSI 4)	**Maintenance Measure 0353:** Failure to rescue 30-day mortality (risk adjusted)
		shrinkage estimate reflects a reliability adjustment unique to each indicator. Full information on calculation algorithms and specifications can be found at http://qualityindicators.ahrq.gov/PSI_download.htm	
Data Source	Electronic administrative data/claims	Electronic administrative data/claims	Electronic administrative data/claims
Level of Measurement /Analysis	Facility/agency; Health plan; Integrate delivery system; Population: National, regional/network, states, counties or cities	Facility/agency	Facility/agency; Health plan; Integrate delivery system; Population: National, regional/network, states, counties or cities
Care Settings	Hospital	Hospital	Hospital

Pancreatic Resection

	Maintenance Measure 0365: Pancreatic resection mortality rate (IQI 9)	**Maintenance Measure #0366**: Pancreatic resection volume (IQI 2)	**Endorsed Measure 0738:** Survival predictor for pancreatic resection surgery
Status	Currently undergoing maintenance review	Currently undergoing maintenance review	Endorsed 9/2010
Steward	Agency for Healthcare Research and Quality	Agency for Healthcare Research and Quality	Leapfrog Group
Description	Percentage of discharges with procedure code of pancreatic resection with an in-hospital death.	Number of discharges with procedure for pancreatic resection.	A reliability adjusted measure of pancreatic resection surgical performance that optimally combines two important domains: Pancreatic resection hospital volume and pancreatic operative mortality, to provide predictions on hospital pancreatic survival rates in patients age 18 and over.
Type of Measure	Outcome	Structure/management	Outcome

	Maintenance Measure 0365: Pancreatic resection mortality rate (IQI 9)	**Maintenance Measure #0366**: Pancreatic resection volume (IQI 2)	**Endorsed Measure 0738:** Survival predictor for pancreatic resection surgery
Numerator	Number of deaths (DISP=20) among cases meeting the inclusion and exclusion rules for the denominator. Time window: Time window can be determined by user, but is generally a calendar year.	Discharges, age 18 years and older, with ICD-9-CM codes for pancreatic resection procedure. Time window: Time window can be determined by user, but is generally a calendar year.	Survival of pancreatic cancer patients age 18 and over who undergo a pancreatic resection. Time window: During the hospital admission
Numerator Details	Number of deaths (DISP=20) among cases meeting the inclusion and exclusion rules for the denominator.	Discharges, age 18 years and older, with ICD-9-CM codes for pancreatic resection procedure. ICD-9-CM pancreatic resection procedure codes: 526 TOTAL PANCREATECTOMY 527 RAD PANCREATICODUODENECT Exclude cases: • MDC 14 (pregnancy, childbirth, and puerperium)	For the observed mortality, the hospital submits the observed deaths for pancreatic resection cases in patients with pancreatic cancer as identified using the population codes.
Denominator	Discharges, age 18 years and older, with ICD-9-CM pancreatic resection code procedure and a diagnosis code of pancreatic cancer in any field. Time window: Time window can be determined by user, but is generally a calendar year.	N/A	All hospital patients age 18 and over with pancreatic cancer who had a pancreatic resection. Time Window : 12 months
Denominator Categories	Female, Male; 18 and older	Female, Male; 18 and older	
Denominator Details	Discharges, age 18 years and older, with ICD-9-CM pancreatic resection code procedure and a diagnosis code of pancreatic cancer in any field. ICD-9-CM pancreatic resection procedure codes:	N/A	For the volume predicted mortality, hospitals count the number of all pancreatic resection cases using the following codes. ICD-9-CM Procedure Codes for Pancreatectomy Any pancreaticoduodenectomy:

	Maintenance Measure 0365: Pancreatic resection mortality rate (IQI 9)	**Maintenance Measure #0366**: Pancreatic resection volume (IQI 2)	**Endorsed Measure 0738:** Survival predictor for pancreatic resection surgery
	526 TOTAL PANCREATECTOMY 527 RAD PANCREATICODUODENECT ICD-9-CM pancreatic cancer diagnosis codes: 1520 MALIGNANT NEOPL DUODENUM 1561 MAL NEO EXTRAHEPAT DUCTS 1562 MAL NEO AMPULLA OF VATER 1570 MAL NEO PANCREAS HEAD 1571 MAL NEO PANCREAS BODY 1572 MAL NEO PANCREAS TAIL 1573 MAL NEO PANCREATIC DUCT 1574 MAL NEO ISLET LANGERHANS 1578 MALIG NEO PANCREAS NEC 1579 MALIG NEO PANCREAS NOS		5251 Proximal Pancreatectomy 5253 Radical Subtot Pancreatectomy 526 Total Pancreatectomy 527 Radical Pancreatectomy For the observed mortality, the hospital counts the number of pancreatic resection cases that also have a pancreatic cancer diagnosis using the following codes ICD-9-CM Codes for pancreatic cancer 1521 MALIGNANT NEOPL JEJUNUM 1522 MALIGNANT NEOPLASM ILEUM 1523 MAL NEO MECKEL'S DIVERT 1528 MAL NEO SMALL BOWEL NEC 1529 MAL NEO SMALL BOWEL NOS 1560 MALIG NEO GALLBLADDER 1561 MAL NEO EXTRAHEPAT DUCTS 1562 MAL NEO AMPULLA OF VATER 1568 MALIG NEO BILIARY NEC 1569 MALIG NEO BILIARY NOS 1570 MAL NEO PANCREAS HEAD 1571 MAL NEO PANCREAS BODY 1572 MAL NEO PANCREAS TAIL 1573 MAL NEO PANCREATIC DUCT 1574 MAL NEO ISLET LANGERHANS 1578 MALIG NEO PANCREAS NEC 1579 MALIG NEO PANCREAS NOS
Exclusions	Exclude cases: • missing discharge	N/A	Patients who do not have a diagnosis of pancreatic cancer

	Maintenance Measure 0365: Pancreatic resection mortality rate (IQI 9)	**Maintenance Measure #0366**: Pancreatic resection volume (IQI 2)	**Endorsed Measure 0738:** Survival predictor for pancreatic resection surgery
	disposition (DISP=missing), gender (SEX=missing), age (AGE=missing), quarter (DQTR=missing), year (YEAR=missing) or principal diagnosis (DX1 =missing) • transferring to another short-term hospital (DISP=2) • MDC 14 (pregnancy, childbirth, and puerperium)		
Exclusion Details	Exclude cases: • missing discharge disposition (DISP=missing), gender (SEX=missing), age (AGE=missing), quarter (DQTR=missing), year (YEAR=missing) or principal diagnosis (DX1 =missing) • transferring to another short-term hospital (DISP=2) • MDC 14 (pregnancy, childbirth, and puerperium)	N/A	Pancreatectomy cases without a pancreatic cancer diagnosis code.
Risk Adjustment	Risk adjustment method widely or commercially available. The predicted value for each case is computed using a hierarchical model (logistic regression with hospital random effect) and covariates for gender, age in years (in 5-year age groups), All Patient Refined-Diagnosis Related Group (APR-DRG) and APR-DRG risk-of-mortality subclass. The reference population used in the model is the universe of discharges for states that participate in the HCUP State Inpatient Databases (SID) for the year 2007 (updated annually), a database consisting of 43 states and approximately 30 million adult discharges. The expected rate is computed as the sum of the predicted value for each case divided by the number of cases for the unit of analysis of interest (i.e., hospital, state, and	No risk adjustment necessary.	We used an empirical Bayes approach to combine mortality rates with information on hospital volume at each hospital. In traditional empirical Bayes methods, a point estimate (e.g., mortality rate observed at a hospital) is adjusted for reliability by shrinking it towards the overall mean (e.g., overall mortality rate in the population). We modified this traditional approach by shrinking the observed mortality rate back toward the mortality rate expected given the volume at that hospital—we refer to this as the "volume-predicted mortality". With this approach, the observed mortality rate is weighted according to how reliably it is estimated, with the remaining weight placed on the information regarding hospital volume [volume-predicted mortality]. Risk adjustment for patient

	Maintenance Measure 0365: Pancreatic resection mortality rate (IQI 9)	**Maintenance Measure #0366**: Pancreatic resection volume (IQI 2)	**Endorsed Measure 0738:** Survival predictor for pancreatic resection surgery
	region). The risk adjusted rate is computed using indirect standardization as the observed rate divided by the expected rate, multiplied by the reference population rate.		characteristics is not used because in sensitivity analysis, composite measures based on an unadjusted mortality input and a risk-adjusted mortality input had a correlation of (.95) and thus were equally good at predicting future performance. The formula for calculating the survival predictor has two components, one is a volume predicted mortality rate, and the second is an observed mortality rate. The volume predicted mortality rate reflects the hospitals experience performing pancreatic resection surgeries (thus, it includes all pancreatic resection surgeries) and uses mortality for all hospitals at that specific volume to create the volume predicted mortality. The input data from the hospitals for this domain is a volume count of all pancreatic resections performed in the hospital. The second domain is the observed mortality, for this domain the population is narrowed to a homogenous group of pancreatic resections with a diagnosis of cancer, the data needed for this domain is the number of observed deaths occurring for pancreatic resection cases with cancer, within the inpatient setting. The general composite measure calculation is as follows: Predicted Survival = 1-Predicted Mortality Predicted Mortality = (weight)*(mortality) + (1-weight)*(volume predicted mortality)

	Maintenance Measure 0365: Pancreatic resection mortality rate (IQI 9)	**Maintenance Measure #0366**: Pancreatic resection volume (IQI 2)	**Endorsed Measure 0738:** Survival predictor for pancreatic resection surgery
			Volume predicted mortality* = intercept - coefficient*ln(caseload), where the intercepts and coefficients are derived from regression using the NIS data and the caseload comes from the Leapfrog Hospital Survey (answer to question #1 for each high-risk procedure). *Any negative values are reset to "0" Weight = mortality signal/(mortality signal + [mortality sigma/caseload]), where mortality signal and sigma are derived from the NIS data and the caseload comes from the Leapfrog Hospital Survey (answer to question #1 for each high-risk procedure). Method: We used an empirical Bayes approach to combine mortality rates with information on hospital volume at each hospital. In traditional empirical Bayes methods, a point estimate (e.g., mortality rate observed at a hospital) is adjusted for reliability by shrinking it towards the overall mean (e.g., overall mortality rate in the population). We modified this traditional approach by shrinking the observed mortality rate back toward the mortality rate expected given the volume at that hospital—we refer to this as the "volume-predicted mortality". With this approach, the observed mortality rate is weighted according to how reliably it is estimated, with the remaining weight placed on the information regarding hospital volume [volume-predicted mortality].

	Maintenance Measure 0365: Pancreatic resection mortality rate (IQI 9)	**Maintenance Measure #0366**: Pancreatic resection volume (IQI 2)	**Endorsed Measure 0738:** Survival predictor for pancreatic resection surgery
			Risk adjustment for patient characteristics is not used because in sensitivity analysis, composite measures based on an unadjusted mortality input and a risk-adjusted mortality input had a correlation of (.95) and thus were equally good at predicting future performance. The formula for calculating the survival predictor has two components, one is a volume predicted mortality rate, and the second is an observed mortality rate. The volume predicted mortality rate reflects the hospitals experience performing pancreatic resection surgeries (thus, it includes all pancreatic resection surgeries) and uses mortality for all hospitals at that specific volume to create the volume predicted mortality. The input data from the hospitals for this domain is a volume count of all pancreatic resections performed in the hospital. The second domain is the observed mortality, for this domain the population is narrowed to a homogenous group of pancreatic resections with a diagnosis of cancer, the data needed for this domain is the number of observed deaths occurring for pancreatic resection cases with cancer, within the inpatient setting. The general composite measure calculation is as follows: Predicted Survival = 1-Predicted Mortality Predicted Mortality = (weight)*(mortality) + (1-

	Maintenance Measure 0365: Pancreatic resection mortality rate (IQI 9)	**Maintenance Measure #0366**: Pancreatic resection volume (IQI 2)	**Endorsed Measure 0738:** Survival predictor for pancreatic resection surgery
			weight)*(volume predicted mortality) Volume predicted mortality* = intercept - coefficient*ln(caseload), where the intercepts and coefficients are derived from regression using the NIS data and the caseload comes from the Leapfrog Hospital Survey (answer to question #1 for each high-risk procedure). *Any negative values are reset to "0" Weight = mortality signal/(mortality signal + [mortality sigma/caseload]), where mortality signal and sigma are derived from the NIS data and the caseload comes from the Leapfrog Hospital Survey (answer to question #1 for each high-risk procedure).
Stratification	User has the optin to stratify by gender, age (5-year age groups), race / ethnicity, primary payer, and custom stratifiers.	N/A	
Type Score	Rate/proportion	Count	
Algorithm	Each indicator is expressed as a rate, is defined as outcome of interest / population at risk or numerator / denominator. The AHRQ Quality Indicators (AHRQ QI) software performs five steps to produce the rates. 1) Discharge-level data is used to mark inpatient records containing the outcome of interest and 2) the population at risk. For provider indicators, the population at risk is also derived from hospital discharge records; for area indicators, the population at risk is derived from U.S. Census data. 3) Calculate observed rates.	The volume is the number of discharges with a procedure for pancreatic resection.	

	Maintenance Measure 0365: Pancreatic resection mortality rate (IQI 9)	**Maintenance Measure #0366**: Pancreatic resection volume (IQI 2)	**Endorsed Measure 0738:** Survival predictor for pancreatic resection surgery
	Using output from steps 1 and 2, rates are calculated for user-specified combinations of stratifiers. 4) Calculate expected rates. Regression coefficients from a reference population database are applied to the discharge records and aggregated to the provider or area level. 5) Calculate risk-adjusted rate. Use the indirect standardization to account for case-mix. 6) Calculate smoothed rate. A Univariate shrinkage factor is applied to the risk-adjusted rates. The shrinkage estimate reflects a reliability adjustment unique to each indicator. Full information on calculation algorithms and specifications can be found at http://qualityindicators.ahrq.gov/IQI_download.htm		
Data Source	Electronic administrative data/claims	Electronic administrative data/claims	Electronic administrative data/claims
Level of Measurement /Analysis	Facility/agency	Facility/agency	Facility/agency
Care Settings	Hospital	Hospital	Hospital

Prophylactic Antibiotics: Discontinued

	Maintenance Measure #0529: Prophylactic antibiotics discontinued within 24 hours after surgery end time	**Endorsed Measure #0637:** Discontinuation of prophylactic antibiotics (cardiac procedures)
Status	Currently undergoing maintenance review	Endorsed 7/2008
Steward	Centers for Medicare & Medicaid Services	American Medical Association - Physician Consortium for Performance Improvement
Description	Surgical patients whose prophylactic antibiotics were discontinued within 24 hours after Anesthesia End Time. The Society of Thoracic Surgeons (STS) Practice Guideline for Antibiotic Prophylaxis in Cardiac Surgery (2006) indicates that there is no reason to extend antibiotics beyond 48 hours for cardiac surgery and very explicitly states that antibiotics should not be extended beyond 48 hours even with tubes and	Percentage of cardiac surgical patients aged 18 years and older undergoing procedures with the indications for prophylactic antibiotics AND who received a prophylactic antibiotic, who have an order for discontinuation of prophylactic antibiotics within 48 hours of surgical end time.

	Maintenance Measure #0529: Prophylactic antibiotics discontinued within 24 hours after surgery end time	**Endorsed Measure #0637:** Discontinuation of prophylactic antibiotics (cardiac procedures)
	drains in place for cardiac surgery.	
Type of Measure	Process	Process
Numerator	Surgical patients whose prophylactic antibiotics were discontinued within 24 hours after surgery end time.	Cardiac surgical patients who have an order for discontinuation of prophylactic antibiotics within 48 hours of surgical end time.
Numerator Details	Data Elements: Anesthesia End Date Anesthesia End Time Antibiotic Administration Date Antibiotic Administration Time	CPT II 4043F: Documentation that an order was given to discontinue prophylactic antibiotics within 48 hours of surgical end time, cardiac procedure. *Note: CPT Category II Code 4043F may be provided for documentation that antibiotic discontinuation was ordered OR that antibiotic discontinuation was accomplished. Report CPT Category II Code 4043F if antibiotics were discontinued within 48 hours.
Denominator	Number of surgical patients with: CABG (ICD-9-CM procedure codes 36.10-36.14, 36.19, 36.15-36.17, 36.2), other cardiac surgery (35.0-35.95, 35.98, 35.99), colon surgery (45.00, 45.03, 45.41, 45.49, 45.50, 45.7-45.90, 45.92-45.95, 46.03, 46.04, 46.1-46.14, 46.52, 46.75, 45.76, 46.91, 46.92, 46.94, 48.5, 48.6-48.69), hip arthroplasty (81.51, 81.52), knee arthroplasty (81.54), abdominal hysterectomy (68.3, 68.4, 68.6), vaginal hysterectomy (68.5-68.59, 68.7), or vascular surgery (38.34, 38.36, 38.37, 38.44, 38.48, 38.49, 38.51, 38.52. 38.64, 38.14, 38.16, 38.18, 39.25, 39.26, 39.29).	All cardiac surgical patients aged 18 years and older undergoing procedures with the indications for prophylactic antibiotics AND who received a prophylactic antibiotic.
Denominator Categories	Female, Male; Patients aged 18 and older	
Denominator Details	Data Elements: Admission Date Anesthesia Start Date Antibiotic Administration Route Antibiotic Name Antibiotic Received Birthdate Clinical Trial Discharge Date ICD-9-CM Principal Diagnosis Code ICD-9-CM Principal Procedure Code Infection Prior to Anesthesia Laparoscope Oral Antibiotics Other Surgeries Perioperative Death Reasons to Extend Antibiotics Surgical Incision Date	CPT II 4046F:Documentation that prophylactic antibiotics were given within 4 hours prior to surgical incision or given intraoperatively; CPT II 4042F:Documentation that prophylactic antibiotics were neither given within 4 hours prior to surgical incision nor given intraoperatively AND CPT Procedure Codes: Cardiothoracic Surgery: 33120, 33130, 33140, 33141, 33202, 33250, 33251, 33256, 33261, 33305, 33315, 33321, 33322, 33332, 33335, 33400, 33401, 33403-33406, 33410, 33411, 33413, 33416, 33422, 33425-33427, 33430, 33460, 33463-33465, 33475, 33496, 33510-33519, 33521-33523, 33530, 33533-33536, 33542, 33545, 33548, 33572, 35021, 35211,

	Maintenance Measure #0529: Prophylactic antibiotics discontinued within 24 hours after surgery end time	**Endorsed Measure #0637:** Discontinuation of prophylactic antibiotics (cardiac procedures)
	Surgical Incision Time	35216, 35241, 35246, 35271, 35276, 35311.
Exclusions	•Principal or admission diagnosis suggestive of pre-operative infectious disease •Infectious diseases (001.0-139.8) •Meningitis (320.0-326) •Ear infection (380.0-380.23; 382.0-382.20) •Endocarditis (421.0-422.99) •Respiratory (460-466.19; 472-476.1; 480-487.1; 490-491.9; 510-511.9; 513-513.1) •Digestive (540-542; 575.0) •Renal (590-590.9; 595.0) •Prostate (601.0-601.9) •Gynecologic (614-614.9; 616-616.4) •Skin (680-686.9) •Musculo-skeletal (711.9; 711.99; 730.0-730.99) •Fever of unknown origin (780.6) •Septic shock (785.59) •Bacteremia (790.7) •Viremia (790.8) •Receiving antibiotics at the time of admission (except colon surgery patients taking oral prophylactic antibiotics); •Medical records do not include antibiotic start date/time, incision date/time, antibiotic end date/time, surgery end date/time; •Receiving antibiotics > 24 hours prior to surgery (except colon surgery patients taking oral prophylactic antibiotics); •No antibiotics received before or during surgery, or within 24 hours after surgery end time (i.e., patient did not receive any prophylactic antibiotics); •Diagnosed with and treated for infections within two days after surgery date •No antibiotics received during hospitalization	Exclude patients for whom prophylactic antibiotics was not ordered by reason of appropriate denominator exclusion. If using electronic data, exclude patients using the following code: If using the medical record or hybrid methodologies, exclude patients who have documentation in the medical record of: medical reason(s) for not discontinuing prophylactic antibiotics within 48 hours of surgical end time, cardiac procedure. If using the EHR methodology, exclude patients using the codes listed in the electronic data collection methodology or who have documentation in the medical record of the appropriate denominator exclusion.
Exclusion Details	Clinical Trial Infection Prior to Anesthesia Laparoscope Other Surgeries Perioperative Death Reasons to Extend Antibiotics	Append a modifier (1P) to the CPT Category II Code to report patients with documented circumstances that meet the denominator exclusion criteria 1P:Documentation of medical reason(s) for not discontinuing prophylactic antibiotics within 48 hours of surgical end time, cardiac procedure.

	Maintenance Measure #0529: Prophylactic antibiotics discontinued within 24 hours after surgery end time	**Endorsed Measure #0637:** Discontinuation of prophylactic antibiotics (cardiac procedures)
Risk Adjustment	No risk adjustment necessary	No risk adjustment necessary
Stratification	The antibiotic prophylaxis measures are stratified according to surgery type. The tables are subsets of Table 5.10 (see link for Specification Manual and Appendix A, Tables 5.01 to 5.08. The specific procedures must be in the large table (Table 5.10) to be eligible for the SCIP measures. The measure specific tables for SCIP-Inf-3 are 5.01 to 5.08.	
Type Score	Rate/proportion	
Algorithm	1.Start processing. Run cases that are included in the Surgical Care Improvement Project (SCIP) Initial Patient Population and pass the edits defined in the Transmission Data Processing Flow: Clinical through this measure. 2.Calculate Patient Age. The Patient Age, in years, is equal to the Admission Date minus the Birthdate. Use the month and day portion of admission date and birthdate to yield the most accurate age. 3.Check Patient Age a.If Patient Age is less than 18 years, the case will proceed to a Measure Category Assignment of B and will not be in the Measure Population. Stop processing for Centers for Medicare and Medicaid Services (CMS). Proceed to step 47 and check the Stratified Measures for Overall Rate (SCIP-Inf-3a) for The Joint Commission. b.If Patient Age is greater than or equal to 18 years, continue processing and proceed to ICD-9-CM Principal Procedure Code. 4.Check ICD-9-CM Principal Procedure Code a.If the ICD-9-CM Principal Procedure Code is not on Table 5.01 or 5.02 or 5.03 or 5.04 or 5.05 or 5.06 or 5.07 or 5.08, the case will proceed to a Measure Category Assignment of B and will not be in the Measure Population. Stop processing for CMS. Proceed to step 47 and check the Stratified Measures for Overall Rate (SCIP-Inf-3a) for The Joint Commission. b.If the ICD-9-CM Principal Procedure Code is on Table 5.01 or 5.02 or 5.03 or 5.04 or 5.05 or 5.06 or 5.07 or 5.08, continue processing and proceed to recheck ICD-9-CM Principal Diagnosis Code. 5.Check ICD-9-CM Principal Diagnosis Code a.If the ICD-9-CM Principal Diagnosis Code is on Table 5.09, the case will proceed to a Measure Category Assignment of B and will not be in the Measure Population. Stop processing for CMS. Proceed to step 47 and check the Stratified Measures for Overall Rate (SCIP-Inf-3a) for The	

	Maintenance Measure #0529: Prophylactic antibiotics discontinued within 24 hours after surgery end time	**Endorsed Measure #0637:** Discontinuation of prophylactic antibiotics (cardiac procedures)
	Joint Commission. b.If the ICD-9-CM Principal Diagnosis Code is not on Table 5.09, continue processing and proceed to Laparoscope. 6.Check Laparoscope a.If Laparoscope is missing, the case will proceed to a Measure Category Assignment of X and will be rejected. Stop processing for CMS. Proceed to step 47 and check the Stratified Measures for Overall Rate (SCIP-Inf-3a) for The Joint Commission. b.If Laparoscope equals 1 or 3, the case will proceed to a Measure Category Assignment of B and will not be in the Measure Population. Stop processing for CMS. Proceed to step 47 and check the Stratified Measures for Overall Rate (SCIP-Inf-3a) for The Joint Commission. c.If Laparoscope equals 2, continue processing and proceed to Clinical Trial. 7.Check Clinical Trial a.If Clinical Trial is missing, the case will proceed to a Measure Category Assignment of X and will be rejected. Stop processing for CMS. Proceed to step 47 and check the Stratified Measures for Overall Rate (SCIP-Inf-3a) for The Joint Commission. b.If Clinical Trial equals Yes, the case will proceed to a Measure Category Assignment of B and will not be in the Measure Population. Stop processing for CMS. Proceed to step 47 and check the Stratified Measures for Overall Rate (SCIP-Inf-3a) for The Joint Commission. c.If Clinical Trial equals No, continue processing and proceed to Anesthesia Start Date. 8.Check Anesthesia Start Date a.If the Anesthesia Start Date is missing, the case will proceed to a Measure Category Assignment of X and will be rejected. Stop processing for CMS. Proceed to step 47 and check the Stratified Measures for Overall Rate (SCIP-Inf-3a) for The Joint Commission. b.If the Anesthesia Start Date equals Unable To Determine, the case will proceed to a Measure Category Assignment of D and will be in the Measure Population. Stop processing for CMS. Proceed to step 47 and check the Stratified Measures for Overall Rate (SCIP-Inf-3a) for The Joint Commission. c.If Anesthesia Start Date equals a Non Unable To Determine Value, continue processing and proceed to the Surgery Days calculation.	

	Maintenance Measure #0529: Prophylactic antibiotics discontinued within 24 hours after surgery end time	**Endorsed Measure #0637:** Discontinuation of prophylactic antibiotics (cardiac procedures)
	9.Calculate Surgery Days. Surgery Days, in days, is equal to the Anesthesia Start Date minus the Admission Date. 10.Check Surgery Days a.If the Surgery Days is less than zero, the case will proceed to a Measure Category Assignment of B and will not be in the Measure Population. Stop processing for CMS. Proceed to step 47 and check the Stratified Measures for Overall Rate (SCIP-Inf-3a) for The Joint Commission. b.If the Surgery Days is greater than or equal to zero, continue processing and proceed to Infection Prior to Anesthesia. 11.Check Infection Prior to Anesthesia a.If Infection Prior to Anesthesia is missing, the case will proceed to a Measure Category Assignment of X and will be rejected. Stop processing for CMS. Proceed to step 47 and check the Stratified Measures for Overall Rate (SCIP-Inf-3a) for The Joint Commission. b.If Infection Prior to Anesthesia equals Yes, the case will proceed to a Measure Category Assignment of B and will not be in the Measure Population. Stop processing for CMS. Proceed to step 47 and check the Stratified Measures for Overall Rate (SCIP-Inf-3a) for The Joint Commission. c.If Infection Prior to Anesthesia equals No, continue processing and proceed to Perioperative Death. 12.Check Perioperative Death a.If Perioperative Death is missing, the case will proceed to a Measure Category Assignment of X and will be rejected. Stop processing for CMS. Proceed to step 47 and check the Stratified Measures for Overall Rate (SCIP-Inf-3a) for The Joint Commission. b.If Perioperative Death equals Yes, the case will proceed to a Measure Category Assignment of B and will not be in the Measure Population. Stop processing for CMS. Proceed to step 47 and check the Stratified Measures for Overall Rate (SCIP-Inf-3a) for The Joint Commission. c.If Perioperative Death equals No, continue processing and proceed to Surgical Incision Date. 13.Check Surgical Incision Date a.If the Surgical Incision Date is missing, the case will proceed to a Measure Category Assignment of X and will be rejected. Stop processing for CMS. Proceed to step 47 and check the Stratified Measures for Overall Rate (SCIP- Inf-3a) for The Joint Commission.	

	Maintenance Measure #0529: Prophylactic antibiotics discontinued within 24 hours after surgery end time	**Endorsed Measure #0637:** Discontinuation of prophylactic antibiotics (cardiac procedures)
	b.If the Surgical Incision Date equals Unable To Determine, the case will proceed to a Measure Category Assignment of D and will be in the Measure Population. Stop processing for CMS. Proceed to step 47 and check the Stratified Measures for Overall Rate (SCIP-Inf-3a) for The Joint Commission. c.If Surgical Incision Date equals a Non Unable To Determine Value, continue processing and proceed to Other Surgeries. 14.Check Other Surgeries a.If Other Surgeries is missing, the case will proceed to a Measure Category Assignment of X and will be rejected. Stop processing for CMS. Proceed to step 47 and check the Stratified Measures for Overall Rate (SCIP-Inf-3a) for The Joint Commission. b.If Other Surgeries equals Yes, the case will proceed to a Measure Category Assignment of B and will not be in the Measure Population. Stop processing for CMS. Proceed to step 47 and check the Stratified Measures for Overall Rate (SCIP-Inf-3a) for The Joint Commission. c.If Other Surgeries equals No, continue processing and proceed to Antibiotic Received. 15.Check Antibiotic Received a.If Antibiotic Received equals 1 or 2, continue processing and proceed to recheck ICD-9-CM Principal Procedure Code b.If Antibiotic Received equals 4, the case will proceed to a Measure Category Assignment of B and will not be in the Measure Population. Stop processing for CMS. Proceed to step 47 and check the Stratified Measures for Overall Rate (SCIP-Inf-3a) for The Joint Commission. c.If Antibiotic Received equals 3, continue processing and proceed to step 19 and check Antibiotic Name. Do not check step 16 ICD-9-CM Principal Procedure Code, step 17 Oral Antibiotics or step 18 Antibiotic Received. 16.Recheck ICD-9-CM Principal Procedure Code only if Antibiotic Received equals 1 or 2 a.If the ICD-9-CM Principal Procedure Code is not on Table 5.03, the case will proceed to a Measure Category Assignment of B and will not be in the measure population. Stop processing for CMS. Proceed to step 47 and check the Stratified Measures for Overall Rate (SCIP-Inf-3a) for The Joint Commission. b.If the ICD-9-CM Principal Procedure Code is on Table 5.03, continue processing and proceed to	

	Maintenance Measure #0529: Prophylactic antibiotics discontinued within 24 hours after surgery end time	**Endorsed Measure #0637:** Discontinuation of prophylactic antibiotics (cardiac procedures)
	check Oral Antibiotics. 17.Check Oral Antibiotics a.If Oral Antibiotics is missing, the case will proceed to a Measure Category Assignment of X and will be rejected. Stop processing for CMS. Proceed to step 47 and check the Stratified Measures for Overall Rate (SCIP-Inf-3a) for The Joint Commission. b.If Oral Antibiotics equals No, the case will proceed to a Measure Category Assignment of B and will not be in the Measure Population. Stop processing for CMS. Proceed to step 47 and check the Stratified Measures for Overall Rate (SCIP-Inf-3a) for The Joint Commission. c.If Oral Antibiotics equals Yes, continue processing and proceed to recheck Antibiotic Received. 18.Recheck Antibiotic Received a.If Antibiotic Received equals 1, the case will proceed to a Measure Category Assignment of B and will not be in the Measure Population. Stop processing for CMS. Proceed to step 47 and check the Stratified Measures for Overall Rate (SCIP-Inf-3a) for The Joint Commission. b.If Antibiotic Received equals 2, continue processing and proceed to Antibiotic Name. 19.Check Antibiotic Name a.If the Antibiotic Grid is not populated, the case will proceed to a Measure Category Assignment of X and will be rejected. Stop processing for CMS. Proceed to step 47 and check the Stratified Measures for Overall Rate (SCIP-Inf-3a) for The Joint Commission. Note: The front-end edits reject cases containing invalid data and/or an incomplete Antibiotic Grid. A complete Antibiotic Grid requires all data elements in the row to contain either a valid value and/or Unable to Determine. b.If the Antibiotic Name is on Table 2.1, continue processing and recheck Antibiotic Name. 20.Recheck Antibiotic Name a.If all of the Antibiotic Names are on Table 3.11, the case will proceed to a Measure Category Assignment of B and will not be in the Measure Population. Stop processing for CMS. Proceed to step 47 and check the Stratified Measures for Overall Rate (SCIP-Inf-3a) for The Joint Commission. b.If at least one of the Antibiotic Names is NOT on Table 3.11, continue processing and proceed to Antibiotic Administration Route. Exclude antibiotic doses on Table 3.11 from further	

	Maintenance Measure #0529: Prophylactic antibiotics discontinued within 24 hours after surgery end time	**Endorsed Measure #0637:** Discontinuation of prophylactic antibiotics (cardiac procedures)
	processing. 21.Check Antibiotic Administration Route a.If the Antibiotic Administration Route is equal to 3 or 10 for all antibiotic doses, the case will proceed to a Measure Category Assignment of B and will not be in the Measure Population. Stop processing for CMS. Proceed to step 47 and check the Stratified Measures for Overall Rate (SCIP-Inf-3a) for The Joint Commission. b.If the Antibiotic Administration Route is equal to 1 or 2 for any antibiotic dose, continue processing and proceed to Antibiotic Administration Date. Proceed only with antibiotic doses on Table 2.1 that are administered via routes 1 or 2. 22.Check Antibiotic Administration Date a.If the Antibiotic Administration Date is equal to Unable to Determine for all antibiotic doses, the case will proceed to a Measure Category Assignment of D and will be in the Measure Population. Stop processing for CMS. Proceed to step 47 and check the Stratified Measures for Overall Rate (SCIP-Inf-3a) for The Joint Commission. b.If the Antibiotic Administration Date is equal to a Non Unable to Determine date for at least one antibiotic dose, continue processing and proceed to the Antibiotic Days I calculation. Note: Proceed only with antibiotic doses that have an associated Non Unable to Determine date. 23.Calculate Antibiotic Days I. Antibiotic Days I, in days, is equal to the Surgical Incision Date minus the Antibiotic Administration Date. 24.Check Antibiotic Days I a.If the Antibiotic Days I is greater than 1 for at least one antibiotic dose, continue processing and recheck the ICD-9-CM Principal Procedure Code. Do not recheck step 27 Antibiotic Days I, step 28 Surgical Incision Time, steps 29 and 30 Antibiotic Administration Time, or step 31 Antibiotic Timing I. b.If the Antibiotic Days I is less than or equal to 1 for all antibiotic doses, continue processing. Proceed to step 27 and recheck Antibiotics Days I. Do not recheck ICD-9-CM Principal Procedure Code or Oral Antibiotics. 25.Recheck ICD-9-CM Principal Procedure Code only if Antibiotic Days I is greater than 1 for at least one antibiotic dose a.If the ICD-9-CM Principal Procedure Code is not on Table 5.03, the case will proceed to a Measure Category Assignment of B and will not	

	Maintenance Measure #0529: Prophylactic antibiotics discontinued within 24 hours after surgery end time	**Endorsed Measure #0637:** Discontinuation of prophylactic antibiotics (cardiac procedures)
	be in the Measure Population. Stop processing for CMS. Proceed to step 47 and check the Stratified Measures for Overall Rate (SCIP-Inf-3a) for The Joint Commission. b.If the ICD-9-CM Principal Procedure Code is on Table 5.03, continue processing and check Oral Antibiotics. 26.Check Oral Antibiotics a.If Oral Antibiotics is missing, the case will proceed to a Measure Category Assignment of X and will be rejected. Stop processing for CMS. Proceed to step 47 and check the Stratified Measures for Overall Rate (SCIP-Inf-3a) for The Joint Commission. b.If Oral Antibiotics equals No, the case will proceed to a Measure Category Assignment of B and will not be in the Measure Population. Stop processing for CMS. Proceed to step 47 and check the Stratified Measures for Overall Rate (SCIP-Inf-3a) for The Joint Commission. c.If Oral Antibiotics equals Yes, continue processing and proceed to step 35 and check Anesthesia End Date. Do not recheck step 27 Antibiotic Days I, step 28 Surgical Incision Time, steps 29 and 30 Antibiotic Administration Time, or 31 Antibiotic Timing I. 27.Recheck Antibiotic Days I only if Antibiotic Days I was less than or equal to 1 for all antibiotic doses a.If the Antibiotic Days I is less than or equal to zero for ALL antibiotic doses, continue processing. Proceed to step 35 and check Anesthesia End Date. Do not check step 28 Surgical Incision Time, step 29 and 30 Antibiotic Administration Time, or step 31 Antibiotic Timing I. b.If the Antibiotic Days I is equal to 1 for ANY antibiotic dose, continue processing and proceed to Surgical Incision Time. 28.Check Surgical Incision Time a.If the Surgical Incision Time is missing, the case will proceed to a Measure Category Assignment of X and will be rejected. Stop processing for CMS. Proceed to step 47 and check the Stratified Measures for Overall Rate (SCIP-Inf-3a) for The Joint Commission. b.If the Surgical Incision Time is equal to Unable to Determine, the case will proceed to a Measure Category Assignment of D and will be in the Measure Population. Stop processing for CMS. Proceed to step 47 and check the Stratified Measures for Overall Rate (SCIP-Inf-3a) for The	

	Maintenance Measure #0529: Prophylactic antibiotics discontinued within 24 hours after surgery end time	**Endorsed Measure #0637:** Discontinuation of prophylactic antibiotics (cardiac procedures)
	Joint Commission. c.If the Surgical Incision Time is equal to a Non Unable to Determine Value, continue processing and check Antibiotic Administration Time. 29.Check Antibiotic Administration Time a.If the Antibiotic Administration Time equals Unable to Determine for all antibiotic doses, the case will proceed to a Measure Category Assignment of D and will be in the Measure Population. Stop processing for CMS. Proceed to step 47 and check the Stratified Measures for Overall Rate (SCIP-Inf-3a) for The Joint Commission. b.If the Antibiotic Administration Time equals a Non Unable to Determine time for at least one antibiotic dose, continue processing and recheck Antibiotic Administration Time. 30.Recheck Antibiotic Administration Time a.If the Antibiotic Administration Time equals Unable to Determine for ANY antibiotic dose with Antibiotic Days I equal to 1, the case will proceed to a Measure Category Assignment of D and will be in the Measure Population. Stop processing for CMS. Proceed to step 47 and check the Stratified Measures for Overall Rate (SCIP-Inf-3a) for The Joint Commission. b.If the Antibiotic Administration Time equals a Non Unable to Determine time for ALL antibiotic doses with Antibiotic Days I equal to 1, continue processing and proceed to the Antibiotic Timing I calculation. 31.Calculate Antibiotic Timing I. Antibiotic Timing I, in minutes, is equal to the Surgical Incision Date and Surgical Incision Time minus the Antibiotic Administration Date and Antibiotic Administration Time. Calculate Antibiotic Timing I for all antibiotic doses with non Unable to Determine date and time. Proceed with antibiotic doses that have Antibiotic Timing I calculated, or Antibiotic Days I less than or equal to zero. 32.Check Antibiotic Timing I a.If the Antibiotic Timing I is greater than 1440 minutes for any antibiotic dose, continue processing and recheck the ICD-9-CM Principal Procedure Code. Proceed with antibiotic does that have Antibiotic Timing I calculated, or Antibiotic Days I less than or equal to zero. b.If the Antibiotic Timing I is less than or equal to 1440 minutes for all antibiotic doses with non Unable to Determine date and time, continue processing. Proceed to step 35 and check Anesthesia End Date. Do not recheck ICD-9-CM	

	Maintenance Measure #0529: Prophylactic antibiotics discontinued within 24 hours after surgery end time	**Endorsed Measure #0637:** Discontinuation of prophylactic antibiotics (cardiac procedures)
	Principal Procedure Code or Oral Antibiotics. 33.Recheck ICD-9-CM Principal Procedure Code only if the Antibiotic Timing I is greater than 1440 minutes for any antibiotic dose a.If the ICD-9-CM Principal Procedure Code is not on Table 5.03, the case will proceed to a Measure Category Assignment of B and will not be in the Measure Population. Stop processing for CMS. Proceed to step 47 and check the Stratified Measures for Overall Rate (SCIP-Inf-3a) for The Joint Commission. b.If the ICD-9-CM Principal Procedure Code is on Table 5.03, continue processing and check Oral Antibiotics. 34.Check Oral Antibiotics a.If Oral Antibiotics is missing, the case will proceed to a Measure Category Assignment of X and will be rejected. Stop processing for CMS. Proceed to step 47 and check the Stratified Measures for Overall Rate (SCIP-Inf-3a) for The Joint Commission. b.If Oral Antibiotics equals No, the case will proceed to a Measure Category Assignment of B and will not be in the Measure Population. Stop processing for CMS. Proceed to step 47 and check the Stratified Measures for Overall Rate (SCIP-Inf-3a) for The Joint Commission. c.If Oral Antibiotics equals Yes, continue processing and proceed to Anesthesia End Date. 35.Check Anesthesia End Date a.If the Anesthesia End Date is missing, the case will proceed to a Measure Category Assignment of X and will be rejected. Stop processing for CMS. Proceed to step 47 and check the Stratified Measures for Overall Rate (SCIP-Inf-3a) for The Joint Commission. b.If the Anesthesia End Date is equal to Unable to Determine, the case will proceed to a Measure Category Assignment of D and will be in the Measure Population. Stop processing for CMS. Proceed to step 47 and check the Stratified Measures for Overall Rate (SCIP-Inf-3a) for The Joint Commission. c.If the Anesthesia End Date is equal to a Non Unable to Determine value, continue processing and proceed to the Antibiotic Days II calculation. 36.Calculate Antibiotic Days II. Antibiotic Days II, in days, is equal to the Antibiotic Administration Date minus the Anesthesia End Date. 37.Set Exclusion Flag, for all cases, to equal No. If all of the antibiotic doses of a case satisfy one of the two following conditions, set Exclusion Flag	

	Maintenance Measure #0529: Prophylactic antibiotics discontinued within 24 hours after surgery end time	**Endorsed Measure #0637:** Discontinuation of prophylactic antibiotics (cardiac procedures)
	(for this case) to equal ?Yes'. These conditions are: a.Antibiotic Days II is greater than 3 days regardless of table on which procedure code is on; OR b.Antibiotic Days II is greater than 2 days AND ICD-9-CM Principal Procedure Code is on Table 5.03, 5.04, 5.05, 5.06, 5.07, or 5.08. 38.Check Exclusion Flag a.If the Exclusion Flag is equal to Yes, the case will proceed to a Measure Category Assignment of B and will not be in the Measure Population. Stop processing for CMS. Proceed to step 47 and check the Stratified Measures for Overall Rate (SCIP-Inf-3a) for The Joint Commission. b.If the Exclusion Flag is equal to No, continue processing and proceed to check Antibiotic Days II. Remove any dose that satisfies one of the two following conditions. These conditions are: 1.Antibiotic Days II is greater than 3 days regardless of procedure on which procedure code is on; OR 2.Antibiotic Days II is greater than 2 days AND ICD-9-CM Principal Procedure Code is on Table 5.03, 5.04, 5.05, 5.06, 5.07 or 5.08. 39.Check Antibiotic Days II a.If the Antibiotic Days II is less than or equal to zero for all antibiotic doses, the case will proceed to a Measure Category Assignment of E and will be in the Numerator Population. Stop processing for CMS. Proceed to step 47 and check the Stratified Measures for Overall Rate (SCIP-Inf-3a) for The Joint Commission. b.If the Antibiotic Days II is greater than zero for at least one antibiotic dose, continue processing and recheck ICD-9-CM Principal Procedure Code. 40.Recheck ICD-9-CM Principal Procedure Code a.If the ICD-9-CM Principal Procedure Code is on Table 5.01 or 5.02, continue processing and recheck Antibiotic Days II. 1.If the Antibiotic Days II is less than 2 days for antibiotic doses, the case will proceed to a Measure Category Assignment of E and will be in the Numerator Population. Stop processing for CMS. Proceed to step 47 and check the Stratified Measures for Overall Rate (SCIP-Inf-3a) for The Joint Commission. 2.If the Antibiotic Days II is greater than or equal to 2 days for at least one antibiotic dose, continue processing and proceed to Anesthesia End Time. b.If the ICD-9-CM Principal Procedure Code is on Table 5.03 or 5.04 or 5.05 or 5.06 or 5.07 or 5.08, continue processing and proceed to Anesthesia	

	Maintenance Measure #0529: Prophylactic antibiotics discontinued within 24 hours after surgery end time	**Endorsed Measure #0637:** Discontinuation of prophylactic antibiotics (cardiac procedures)
	End Time. 41.Check Anesthesia End Time a.If the Anesthesia End Time is missing, the case will proceed to a Measure Category Assignment of X and will be rejected. Stop processing for CMS. Proceed to step 47 and check the Stratified Measures for Overall Rate (SCIP-Inf-3a) for The Joint Commission. b.If the Anesthesia End Time is equal to Unable to Determine, the case will proceed to a Measure Category Assignment of D and will be in the Measure Population. Stop processing for CMS. Proceed to step 47 and check the Stratified Measures for Overall Rate (SCIP-Inf-3a) for The Joint Commission. c.If the Anesthesia End Time is equal to a Non Unable to Determine Value, continue processing and recheck Antibiotic Administration Time. 42.Recheck Antibiotic Administration Time a.If the Antibiotic Administration Time equals Unable to Determine for all antibiotic doses, the case will proceed to a Measure Category Assignment of D and will be in the Measure Population. Stop processing for CMS. Proceed to step 47 and check the Stratified Measures for Overall Rate (SCIP-Inf-3a) for The Joint Commission. b.If the Antibiotic Administration Time equals a Non Unable to Determine time for at least one antibiotic dose, continue processing and proceed to the Antibiotic Timing II calculation. Remove from consideration any antibiotic doses for which Antibiotic Administration Time equals Unable to Determine. 43.Calculate Antibiotic Timing II. Antibiotic Timing II, in minutes, is equal to the Antibiotic Administration Date and Antibiotic Administration Time minus Anesthesia End Date and Anesthesia End Time. 44.Set Exclusion Flag. Set Exclusion Flag, for all cases, to equal ?No'. If all of the antibiotic doses of a case satisfy one of the two following conditions, set Exclusion Flag (for this case) to equal ?Yes'. These conditions are: a.Antibiotic Timing is greater than 4320 minutes; OR b.Antibiotic Timing II is greater than 2880 minutes AND ICD-9-CM Principal Procedure Code is on Table 5.03, 5.04, 5.05, 5.06, 5.07, or 5.08. 45.Check Exclusion Flag a.If the Exclusion Flag equals Yes, the case will	

	Maintenance Measure #0529: Prophylactic antibiotics discontinued within 24 hours after surgery end time	**Endorsed Measure #0637:** Discontinuation of prophylactic antibiotics (cardiac procedures)
	proceed to a Measure Category Assignment of B and will not be in the Measure Population. Stop processing for CMS. Proceed to step 47 and check the Stratified Measures for Overall Rate (SCIP-Inf-3a) for The Joint Commission. b.If the Exclusion Flag equals No, continue processing and recheck ICD-9-CM Principal Procedure Code and Antibiotic Timing II. Remove any dose that satisfies one of the two following conditions. These conditions are: 1.Antibiotic Timing II is greater than 4320 minutes; OR Principal Procedure Code is on Table 5.03, 5.04, 5.05, 5.06, 5.07, or 5.08. 46.Recheck ICD-9-CM Principal Procedure Code and Antibiotic Timing II a.If the ICD-9-CM Principal Procedure Code is on Table 5.01 or 5.02 and Antibiotic Timing II is less than or equal to 2880 minutes for all antibiotic doses, the case will proceed to a Measure Category Assignment of E and will be in the Numerator Population. Stop processing for CMS. Proceed to Stratified Measures for Overall Rate (SCIP-Inf-3a) for The Joint Commission. b.If the ICD-9-CM Principal Procedure Code is on Table 5.01 or 5.02 and Antibiotic Timing II is greater than 2880 minutes for at least one antibiotic dose, continue processing and proceed to check Reasons To Extend Antibiotics. 1.If Reasons To Extend Antibiotics is missing, the case will proceed to a Measure Category Assignment of X and will be rejected. Stop processing for CMS. Proceed to Stratified Measures for Overall Rate (SCIP-Inf-3a) for The Joint Commission. 2.If Reasons To Extend Antibiotics equals 7, the case will proceed to a Measure Category Assignment of D and will be in the Measure Population. Stop processing for CMS. Proceed to Stratified Measures for Overall Rate (SCIP-Inf-3a) for The Joint Commission. 3.If Any Reasons To Extend Antibiotics equals 1, 2, 3, 4, 5, 6 and None equals 7, the case will proceed to a Measure Category Assignment of B and will not be in the Measure Population. Stop processing for CMS. Proceed to Stratified Measures for Overall Rate (SCIP-Inf-3a) for The Joint Commission. c.If the ICD-9-CM Principal Procedure Code is on Table 5.03 or 5.04 or 5.05 or 5.06 or 5.07 or 5.08 and Antibiotic Timing II is less than or equal to 1440 minutes for all antibiotic doses, the case will	

	Maintenance Measure #0529: Prophylactic antibiotics discontinued within 24 hours after surgery end time	**Endorsed Measure #0637:** Discontinuation of prophylactic antibiotics (cardiac procedures)
	proceed to a Measure Category Assignment of E and will be in the Numerator Population. Stop processing for CMS. Proceed to Stratified Measures for Overall Rate (SCIP-Inf-3a) for The Joint Commission. d.If the ICD-9-CM Principal Procedure Code is on Table 5.03 or 5.04 or 5.05 or 5.06 or 5.07 or 5.08 and Antibiotic Timing II is greater than 1440 minutes for at least one antibiotic dose, continue processing and proceed to check Reasons To Extend Antibiotics. 1.If Reasons To Extend Antibiotics is missing, the case will proceed to a Measure Category Assignment of X and will be rejected. Stop processing for CMS. Proceed to Stratified Measures for Overall Rate (SCIP-Inf-3a) for The Joint Commission. 2.If Reasons To Extend Antibiotics equals 7, the case will proceed to a Measure Category Assignment of D and will be in the Measure Population. Stop processing for CMS. Proceed to Stratified Measures for Overall Rate (SCIP-Inf-3a) for The Joint Commission. 3.If Any Reasons To Extend Antibiotics equals 1, 2, 3, 4, 5, 6 and None equals 7, the case will proceed to a Measure Category Assignment of B and will not be in the Measure Population. Stop processing for CMS. Proceed to Stratified Measures for Overall Rate (SCIP-Inf-3a) for The Joint Commission. 47.For The Joint Commission Only, continue processing for the Stratified Measures. Note: Initialize the Measure Category Assignment for each strata measure (b-g) to equal B, not in the Measure Population. Do not change the Measure Category Assignment that was already calculated for the overall rate (SCIP-Inf-3a). The rest of the algorithm will reset the appropriate Measure Category Assignment to be equal to the overall rate´s (SCIP-Inf-3a) Measure Category Assignment. 48.Check Overall Rate Category Assignment a.If the Overall Rate Category Assignment is equal to B or X, set the Measure Category Assignment for the strata measures (SCIP-Inf-3b through SCIP-Inf-3h) to equal B, not in the Measure Population. Stop processing. b.If the Overall Rate Category Assignment is equal to D or E, continue processing and check the ICD-9-CM Principal Procedure Code. 49.Check ICD-9-CM Principal Procedure Code a.If the ICD-9-CM Principal Procedure Code is on	

	Maintenance Measure #0529: Prophylactic antibiotics discontinued within 24 hours after surgery end time	**Endorsed Measure #0637:** Discontinuation of prophylactic antibiotics (cardiac procedures)
	Table 5.01, for Stratified Measure SCIP-Inf-3b, set the Measure Category Assignment for measure SCIP-Inf-3b to equal the Measure Category Assignment for measure SCIP-Inf-3a. Stop processing. b.If the ICD-9-CM Principal Procedure Code is on Table 5.02 or 5.03 or 5.04 or 5.05 or 5.06 or 5.07 or 5.08, continue processing and recheck the ICD-9-CM Principal Procedure Code. 50.Recheck ICD-9-CM Principal Procedure Code a.If the ICD-9-CM Principal Procedure Code is on Table 5.02, for Stratified Measure SCIP-Inf-3c, set the Measure Category Assignment for measure SCIP-Inf-3c to equal the Measure Category Assignment for measure SCIP-Inf-3a. Stop processing. b.If the ICD-9-CM Principal Procedure Code is on Table 5.03 or 5.04 or 5.05 or 5.06 or 5.07 or 5.08, continue processing and recheck the ICD-9-CM Principal Procedure Code. 51.Recheck ICD-9-CM Principal Procedure Code a.If the ICD-9-CM Principal Procedure Code is on Table 5.04, for Stratified Measure SCIP-Inf-3d, set the Measure Category Assignment for measure SCIP-Inf-3d to equal the Measure Category Assignment for measure SCIP-Inf-3a. Stop processing. b.If the ICD-9-CM Principal Procedure Code is on Table 5.03 or 5.05 or 5.06 or 5.07 or 5.08, continue processing and recheck the ICD-9-CM Principal Procedure Code. 52.Recheck ICD-9-CM Principal Procedure Code a.If the ICD-9-CM Principal Procedure Code is on Table 5.05, for Stratified Measure SCIP-Inf-3e, set the Measure Category Assignment for measure SCIP-Inf-3e to equal the Measure Category Assignment for measure SCIP-Inf-3a. Stop processing. b.If the ICD-9-CM Principal Procedure Code is on Table 5.03 or 5.06 or 5.07 or 5.08, continue processing and recheck the ICD-9-CM Principal Procedure Code. 53.Recheck ICD-9-CM Principal Procedure Code a.If the ICD-9-CM Principal Procedure Code is on Table 5.03, for Stratified Measure SCIP-Inf-3f, set the Measure Category Assignment for measure SCIP-Inf-3f to equal the Measure Category Assignment for measure SCIP-Inf-3a. Stop processing. b.If the ICD-9-CM Principal Procedure Code is on Table 5.06 or 5.07 or 5.08, continue processing and recheck the ICD-9-CM Principal Procedure Code.	

	Maintenance Measure #0529: Prophylactic antibiotics discontinued within 24 hours after surgery end time	**Endorsed Measure #0637:** Discontinuation of prophylactic antibiotics (cardiac procedures)
	54.Recheck ICD-9-CM Principal Procedure Code a.If the ICD-9-CM Principal Procedure Code is on Table 5.06 or 5.07, for Stratified Measure SCIP-Inf-3g, set the Measure Category Assignment for measure SCIP-Inf-3g to equal the Measure Category Assignment for measure SCIP-Inf-3a. Stop processing. b.If the ICD-9-CM Principal Procedure Code is on Table 5.08, for Stratified Measure SCIP-Inf-3h, set the Measure Category Assignment for measure SCIP-Inf-3h to equal the Measure Category Assignment for measure SCIP-Inf-3a. Stop processing.	
Data Source	Electronic administrative data/claims, paper medical record/flow-sheet	Electronic health/medical record, paper medical record/flow-sheet
Level of Measurement /Analysis	Facility/agency	Clinicians: Individual, group
Care Settings	Hospital	Hospital, Ambulatory care: Ambulatory surgery center

Prophylactic Antibiotics: Duration

	Maintenance Measure #0128: Duration of antibiotic prophylaxis for cardiac surgery patients	**Endorsed Measure #0271**: Discontinuation of prophylactic antibiotics (non-cardiac procedures)
Status	Currently undergoing maintenance review	Endorsed 7/2008
Steward	Society of Thoracic Surgeons	American Medical Association-Physician Consortium for Performance Improvement
Description	Percent of patients aged 18 years and older undergoing cardiac surgery whose prophylactic antibiotics were discontinued within 48 hours after surgery end time.	Percentage of non-cardiac surgical patients aged 18 years and older undergoing procedures with the indications for prophylactic antibiotics AND who received a prophylactic antibiotic, who have an order for discontinuation of prophylactic antibiotics within 24 hours of surgical end time.
Type of Measure	Process	Process
Numerator	Number of cardiac surgery patients whose prophylactic antibiotics were discontinued within 48 hours after surgery end time.	Non-cardiac surgical patients who have an order for discontinuation of prophylactic antibiotics within 24 hours of surgical end time. Numerator Instructions: There must be documentation of order (written order, verbal order, or standing order/protocol) specifying that prophylactic antibiotic is to be discontinued within 24 hours of surgical end time OR specifying a course of antibiotic administration limited to that 24-hour period (e.g., "to be given every 8 hours for three doses") OR documentation that prophylactic antibiotic was discontinued within 24 hours of

	Maintenance Measure #0128: Duration of antibiotic prophylaxis for cardiac surgery patients	**Endorsed Measure #0271**: Discontinuation of prophylactic antibiotics (non-cardiac procedures)
	Time window: Within 48 hours after surgery end time.	surgical end time.
Numerator Details	Number of cardiac surgery procedures in which appropriate antibiotic discontinuation [AbxDisc (STS Adult Cardiac Surgery Database Version 2.73)] is marked "yes"	CPT II 4049F: Documentation that order was given to discontinue prophylactic antibiotics within 24 hours of surgical end time, non-cardiac procedure. Note: CPT Category II Code 4049F is provided for documentation that antibiotic discontinuation was ordered OR that antibiotic discontinuation was accomplished. Report CPT Category II Code 4049F if antibiotics were discontinued within 24 hours
Denominator	Number of patients undergoing cardiac surgery.	All non-cardiac surgical patients undergoing procedures with the indications for prophylactic antibiotics and who received a prophylactic antibiotic.
Denominator Categories	Female, Male; 18 yrs and older	
Denominator Details	Number of cardiac surgery procedures; A cardiac procedure is determined as a procedure for which at least one of the following is not marked "no" or "missing" (note: full terms for STS field names are provided in brackets []): OpCAB[Coronary Artery Bypass], OpValve[Valve Surgery], VADProc [VAD Implanted or Removed], VSAV [Aortic Valve Procedure], VSMV [Mitral Valve Procedure], OpTricus [Tricuspid Valve Procedure Performed], OpPulm[Pulmonic Valve Procedure Performed], OpOCard [Other Cardiac Procedure other than CABG or Valve], OCarLVA [Left Ventricular Aneurysm Repair], OCarVSD [Ventricular Septal Defect Repair], OCarSVR [Surgical Ventricular Restoration], OCarCong [Congenital Defect Repair], OCarTrma [surgical procedure for an injury due to Cardiac Trauma], OCarCrTx [Cardiac Transplant], OCarACD [Arrhythmia Correction Surgery], OCAoProcType[Aortic Procedure Type], EndoProc [Endovascular Procedure (TEVAR)], OCTumor [resection of an intracardiac tumor], OCPulThromDis [Pulmonary Thromboembolectomy,, OCarOthr [Other Cardiac Procedure other than those listed previously], ECMO [Extracorporeal Membrane Oxygenation], OCarLasr [-Transmyocardial Laser Revascularization], OCarASD [Atrial Septal	CPT II 4046F: Documentation that prophylactic antibiotics were given within 4 hours prior to surgical incision or given intraoperatively; CPT II 4042F: Documentation that prophylactic antibiotics were neither given within 4 hours prior to surgical incision nor given intraoperatively AND • CPT Procedure Codes: Integumentary: 15734, 15738, 19260, 19271, 19272, 19301-19307, 19361, 19364, 19366-19369 Spine: 22325, 22612, 22630, 22800, 22802, 22804, 63030, 63042 Hip Reconstruction: 27125, 27130, 27132, 27134, 27137, 27138 Trauma (Fractures): 27235, 27236, 27244, 27245, 27758, 27759, 27766, 27792, 27814 Knee Reconstruction: 27440-27443, 27445-27447 Vascular: 33877, 33880, 33881, 33883, 33886, 33891, 34800, 34802-34805, 34825, 34830-34832, 34900, 35081, 35091, 35102, 35131, 35141, 35151, 35601, 35606, 35612, 35616, 35621, 35623, 35626, 35631, 35636-35638, 35642, 35645-35647, 35650, 35651, 35654, 35656, 35661, 35663, 35665, 35666, 35671, 36830 Spleen and Lymph Nodes: 38115 Esophagus: 43045, 43100, 43101, 43107, 43108, 43112, 43113, 43116-43118, 43121-43124, 43130, 43135, 43300, 43305, 43310, 43312, 43313, 43320,

	Maintenance Measure #0128: Duration of antibiotic prophylaxis for cardiac surgery patients	**Endorsed Measure #0271**: Discontinuation of prophylactic antibiotics (non-cardiac procedures)
	Defect Repair], OCarAFibSur [Atrial Fibrillation Surgical Procedure]	43324-43326, 43330, 43331, 43340, 43341, 43350, 43351, 43352, 43360, 43361, 43400, 43401, 43405, 43410, 43415, 43420, 43425, 43496 Stomach: 43500-43502, 43510, 43520, 43600, 43605, 43610, 43611, 43620-43622, 43631-43634, 43640, 43641, 43653, 43800, 43810, 43820, 43825, 43830-43832, 43840, 43842, 43843, 43845-43848, 43850, 43855, 43860, 43865, 43870 Small Intestine: 44005, 44010, 44020, 44021, 44050, 44055, 44100, 44120, 44125-44127, 44130, 44132, 44133, 44135, 44136 Biliary Surgery: 47420, 47425, 47460, 47480, 47560, 47561, 47570, 47600, 47605, 47610, 47612, 47620, 47700, 47701, 47711, 47712, 47715, 47719-47721, 47740, 47741, 47760, 47765, 47780, 47785, 47800, 47802, 47900 Pancreas: 48020, 48100, 48120, 48140, 48145, 48146, 48148, 48150, 48152-48155, 48160, 48500, 48510, 48511, 48520, 48540, 48545, 48547, 48548, 48550, 48554, 48556 Abdomen, Peritoneum, and Omentum: 49215, 49568 Renal Transplant: 50300, 50320, 50340, 50360, 50365, 50370, 50380 Neurological Surgery: 22524, 22554, 22558, 22600, 22612, 22630, 35301, 61154, 61312, 61313, 61315, 61510, 61512, 61518, 61548, 61697, 61700, 61750, 61751, 61867, 62223, 62230, 63015, 63020, 63030, 63042, 63045, 63047, 63056, 63075, 63081, 63267, 63276 Cardiothoracic Surgery: 33120, 33130, 33140, 33141, 33202, 33250, 33251, 33256, 33261, 33305, 33315, 33321, 33322, 33332, 33335, 33400, 33401, 33403-33406, 33410, 33411, 33413, 33416, 33422, 33425-33427, 33430, 33460, 33463-33465, 33475, 33496, 33510-33519, 33521-33523, 33530, 33533-33536, 33542, 33545, 33548, 33572, 35211, 35241, 35271 General Thoracic Surgery: 19272, 21627, 21632, 21740, 21750, 21805, 21825, 31760, 31766, 31770, 31775, 31786, 31805, 32095, 32100, 32110, 32120, 32124, 32140, 32141, 32150, 32215, 32220, 32225, 32310, 32320, 32402, 32440, 32442, 32445, 32480, 32482, 32484, 32486, 32488, 32491, 32500, 32501, 32800, 32810, 32815, 32900, 32905, 32906, 32940, 33020, 33025, 33030, 33031, 33050, 33300, 33310, 33320, 34051, 35021, 35216, 35246, 35276, 35311, 35481, 35526, 37616, 38381, 38746, 38747, 39000, 39010, 39200, 39220, 39545, 39561, 60521, 60522, 64746 Foot & Ankle: 27702, 27703, 27704, 27870, 28192, 28193, 28293, 28296, 28299, 28300, 28306, 28307,

	Maintenance Measure #0128: Duration of antibiotic prophylaxis for cardiac surgery patients	**Endorsed Measure #0271**: Discontinuation of prophylactic antibiotics (non-cardiac procedures)
		28308, 28309, 28310, 28320, 28322, 28415, 28420, 28445, 28465, 28485, 28505, 28525, 28531, 28555, 28585, 28615, 28645, 28675, 28705, 28715, 28725, 28730, 28735, 28737, 28740, 28750, 28755, 28760
Exclusions	Exclusions: - Patients who had a principal diagnosis suggestive of preoperative infectious diseases - Patients whose ICD-9-CM principal procedure was performed entirely by Laparoscope - Patients enrolled in clinical trials - Patients with documented infection prior to surgical procedure of interest - Patients who expired perioperatively - Patients who were receiving antibiotics more than 24 hours prior to surgery - Patients who were receiving antibiotics within 24 hours prior to arrival - Patients who did not receive any antibiotics during this hospitalization - Patients with reasons to extend antibiotics This list will be provided in the STS Adult Cardiac Surgery Database Data Manager's Training Manual as acceptable exclusions.	Documentation of medical reason(s) for not discontinuing prophylactic antibiotics within 24 hours of surgical end time.
Exclusion Details	AbxDisc is marked "Exclusion"	Append modifier to CPT Category II code: 4046F-1P
Risk Adjustment	No risk adjustment necessary	No risk adjustment necessary
Stratification		
Type Score	Rate/proportion	
Algorithm		
Data Source	Registry data	Electronic administrative data/claims, lab data, paper medical record/flow-sheet
Level of Measurement /Analysis	Clinicians: Group; Facility/agency; Population: National, regional/network, states, counties or cities	Clinicians: Individual, group
Care Settings	Hospital	Hospital, Ambulatory care: Ambulatory surgery center

Prophylactic Antibiotics: Selection

	Maintenance Measure #0126: Selection of antibiotic prophylaxis for cardiac surgery patients	**Endorsed Measure #0268:** Selection of prophylactic antibiotic: First or second generation cephalosporin	**Maintenance Measure #0528**: Prophylactic antibiotic selection for surgical patients	**Endorsed Measure #0473**: Appropriate DVT prophylaxis in women undergoing cesarean delivery
Status	Currently undergoing maintenance review	Endorsed 7/2008	Currently undergoing maintenance review	Endorsed 10/2008
Steward	Society of Thoracic Surgeons	American Medical Association-Physician Consortium for Performance Improvement	Centers for Medicare & Medicaid Services	Hospital Corporation of America
Description	Percent of patients aged 18 years and older undergoing cardiac surgery who received preoperative prophylactic antibiotics recommended for the operation.	Percentage of surgical patients aged 18 years and older undergoing procedures with the indications for a first OR second generation cephalosporin prophylactic antibiotic, who had an order for cefazolin OR cefuroxime for antimicrobial prophylaxis.	Surgical patients who received prophylactic antibiotics consistent with current guidelines (specific to each type of surgical procedure).	Measure adherance to current ACOG, ACCP recommendations for use of DVT prophylaxis in women undergoing cesarean delivery.
Type of Measure	Process	Process	Process	Process
Numerator	Cardiac surgery patients who received a first generation or second generation cephalosporin prophylactic antibiotic (e.g., cefazolin, cefuroxime, cefamandole) preoperatively or in the event of a documented allergy, an alternate antibiotic choice (e.g., vancomycin, clindamycin) was ordered and administered preoperatively.	Surgical patients who had an order for cefazolin OR cefuroxime for antimicrobial prophylaxis. Numerator Instructions: There must be documentation of order (written order, verbal order, or standing order/protocol) for cefazolin or cefuroxime for antimicrobial prophylaxis OR documentation that cefazolin or cefuroxime was given. Report one of the following CPT Category II codes: •CPT II 4041F: Documentation of order for	Surgical patients who received recommended prophylactic antibiotics for specific surgical procedures.	Number of women undergoing cesarean delivery who receive either fractionated or unfractionated heparin or pneumatic compression devices prior to surgery.

	Maintenance Measure #0126: Selection of antibiotic prophylaxis for cardiac surgery patients	**Endorsed Measure #0268:** Selection of prophylactic antibiotic: First or second generation cephalosporin	**Maintenance Measure #0528**: Prophylactic antibiotic selection for surgical patients	**Endorsed Measure #0473**: Appropriate DVT prophylaxis in women undergoing cesarean delivery
		cefazolin OR cefuroxime for antimicrobial prophylaxis. Note: CPT Category II Code 4041F is provided for antibiotic ordered or antibiotic given. Report CPT Category II Code 4041F if cefazolin OR cefuroxime was given for antimicrobial prophylaxis.		
Numerator Details	Number of cardiac surgery procedures in which appropriate antibiotic selection [AbxSelect (STS Adult Cardiac Surgery Database Version 2.73)] is marked "yes"		Data Elements: Antibiotic Administration Route Antibiotic Allergy Antibiotic Name Oral Antibiotics Vancomycin	
Denominator	Number of patients undergoing cardiac surgery. Time window: 12 months	All surgical patients aged 18 years and older undergoing procedures with the indications for a first or second generation cephalosporin prophylactic antibiotic.	Number of surgical patients with: CABG (ICD-9-CM procedure codes 36.10-36.14, 36.19, 36.15-36.17, 36.2), other cardiac surgery (35.0-35.95, 35.98, 35.99), colon surgery (45.00, 45.03, 45.41, 45.49, 45.50, 45.7-45.90, 45.92-45.95, 46.03, 46.04, 46.1-46.14, 46.52, 46.75, 45.76, 46.91, 46.92, 46.94, 48.5, 48.6-48.69), hip arthroplasty (81.51, 81.52), knee arthroplasty (81.54), abdominal hysterectomy (68.3, 68.4, 68.6), vaginal hysterectomy (68.5-68.59, 68.7), or vascular surgery (38.34 38.36, 38.37, 38.44, 38.48, 38.49, 38.51, 38.52. 38.64, 38.14, 38.16, 38.18, 39.25, 39.26, 39.29).	All women undergoing cesarean delivery.
Denominator Categories	Female, Male; 18 and older		Female, Male; Patients aged 18 or older	
Denominator Details	Number of cardiac surgery procedures; A cardiac procedure is determined as a procedure for	Report one of the following CPT Category II codes: • CPT II 4041F: Documentation of order for cefazolin OR cefuroxime for	Data Elements: Anesthesia End Date Anesthesia End Time Anesthesia Start Date Admission Date	

	Maintenance Measure #0126: Selection of antibiotic prophylaxis for cardiac surgery patients	**Endorsed Measure #0268:** Selection of prophylactic antibiotic: First or second generation cephalosporin	**Maintenance Measure #0528**: Prophylactic antibiotic selection for surgical patients	**Endorsed Measure #0473**: Appropriate DVT prophylaxis in women undergoing cesarean delivery
	which at least one of the following is not marked "no" or "missing" (note: full terms for STS field names are provided in brackets []): OpCAB[Coronary Artery Bypass], OpValve[Valve Surgery], VADProc [VAD Implanted or Removed], VSAV [Aortic Valve Procedure], VSMV [Mitral Valve Procedure], OpTricus [Tricuspid Valve Procedure Performed], OpPulm[Pulmonic Valve Procedure Performed], OpOCard [Other Cardiac Procedure other than CABG or Valve], OCarLVA [Left Ventricular Aneurysm Repair], OCarVSD [Ventricular Septal Defect Repair], OCarSVR [Surgical Ventricular Restoration], OCarCong [Congenital Defect Repair], OCarTrma [surgical procedure for an injury due to Cardiac Trauma], OCarCrTx [Cardiac Transplant], OCarACD [Arrhythmia Correction Surgery], OCAoProcType[Aortic Procedure Type], EndoProc [Endovascular Procedure (TEVAR)], OCTumor [resection of an intracardiac tumor], OCPulThromDis [Pulmonary	antimicrobial prophylaxis. Note: CPT Category II Code 4041F is provided for antibiotic ordered or antibiotic given. Report CPT Category II Code 4041F if cefazolin OR cefuroxime was given for antimicrobial prophylaxis. Denominator (Eligible Population): All surgical patients aged 18 years and older undergoing procedures with the indications for a first or second generation cephalosporin prophylactic antibiotic • CPT Procedure Codes: Integumentary: 15734, 15738, 19260, 19271, 19272, 19301-19307, 19361, 19364, 19366-19369 Spine: 22325, 22612, 22630, 22800, 22802, 22804, 63030, 63042 Hip Reconstruction: 27125, 27130, 27132, 27134, 27137, 27138 Trauma (Fractures): 27235, 27236, 27244, 27245, 27758, 27759, 27766, 27792, 27814 Knee Reconstruction: 27440-27443, 27445-27447	Antibiotic Administration Date Antibiotic Administration Time Antibiotic Received Birthdate Clinical Trial Discharge Date ICD-9-CM Principal Diagnosis Code ICD-9-CM Principal Procedure Code Infection Prior to Anesthesia Laparoscope Perioperative Death Surgical Incision Date Surgical Incision Time	

	Maintenance Measure #0126: Selection of antibiotic prophylaxis for cardiac surgery patients	**Endorsed Measure #0268:** Selection of prophylactic antibiotic: First or second generation cephalosporin	**Maintenance Measure #0528**: Prophylactic antibiotic selection for surgical patients	**Endorsed Measure #0473**: Appropriate DVT prophylaxis in women undergoing cesarean delivery
	Thromboembolectomy,, OCarOthr [Other Cardiac Procedure other than those listed previously], ECMO [Extracorporeal Membrane Oxygenation], OCarLasr [-Transmyocardial Laser Revascularization], OCarASD [Atrial Septal Defect Repair], OCarAFibSur [Atrial Fibrillation Surgical Procedure]	Vascular: 33877, 33880, 33881, 33883, 33886, 33891, 34800, 34802-34805, 34825, 34830-34832, 34900, 35081, 35091, 35102, 35131, 35141, 35151, 35601, 35606, 35612, 35616, 35621, 35623, 35626, 35631, 35636-35638, 35642, 35645-35647, 35650, 35651, 35654, 35656, 35661, 35663, 35665, 35666, 35671, 36830 Spleen and Lymph Nodes: 38115 Esophagus: 43045, 43100, 43101, 43107, 43108, 43112, 43113, 43116-43118, 43121-43124, 43130, 43135, 43300, 43305, 43310, 43312, 43313, 43320, 43324-43326, 43330, 43331, 43340, 43341, 43350, 43351, 43352, 43360, 43361, 43400, 43401, 43405, 43410, 43415, 43420, 43425, 43496 Stomach: 43500-43502, 43510, 43520, 43600, 43605, 43610, 43611, 43620-43622, 43631-43634, 43640, 43641, 43653, 43800, 43810, 43820, 43825, 43830-43832, 43840, 43842, 43843, 43845-43848, 43850, 43855, 43860, 43865, 43870 Small Intestine: 44005, 44010, 44020, 44021, 44050, 44055, 44100, 44120, 44125-44127, 44130, 44132, 44133, 44135, 44136		

	Maintenance Measure #0126: Selection of antibiotic prophylaxis for cardiac surgery patients	**Endorsed Measure #0268:** Selection of prophylactic antibiotic: First or second generation cephalosporin	**Maintenance Measure #0528**: Prophylactic antibiotic selection for surgical patients	**Endorsed Measure #0473**: Appropriate DVT prophylaxis in women undergoing cesarean delivery
		Biliary Surgery: 47420, 47425, 47460, 47480, 47560, 47561, 47570, 47600, 47605, 47610, 47612, 47620, 47700, 47701, 47711, 47712, 47715, 47719-47721, 47740, 47741, 47760, 47765, 47780, 47785, 47800, 47802, 47900 Pancreas: 48020, 48100, 48120, 48140, 48145, 48146, 48148, 48150, 48152-48155, 48160, 48500, 48510, 48511, 48520, 48540, 48545, 48547, 48548, 48550, 48554, 48556 Abdomen, Peritoneum, and Omentum: 49215, 49568 Renal Transplant: 50300, 50320, 50340, 50360, 50365, 50370, 50380 Neurological Surgery: 22524, 22554, 22558, 22600, 22612, 22630, 35301, 61154, 61312, 61313, 61315, 61510, 61512, 61518, 61548, 61697, 61700, 61750, 61751, 61867, 62223, 62230, 63015, 63020, 63030, 63042, 63045, 63047, 63056, 63075, 63081, 63267, 63276 Cardiothoracic Surgery: 33120, 33130, 33140, 33141, 33202, 33250, 33251, 33256, 33261, 33305, 33315, 33321, 33322, 33332, 33335, 33400, 33401, 33403-33406, 33410, 33411, 33413, 33416, 33422, 33425-33427, 33430, 33460,		

	Maintenance Measure #0126: Selection of antibiotic prophylaxis for cardiac surgery patients	**Endorsed Measure #0268:** Selection of prophylactic antibiotic: First or second generation cephalosporin	**Maintenance Measure #0528**: Prophylactic antibiotic selection for surgical patients	**Endorsed Measure #0473**: Appropriate DVT prophylaxis in women undergoing cesarean delivery
		33463-33465, 33475, 33496, 33510-33519, 33521-33523, 33530, 33533-33536, 33542, 33545, 33548, 33572, 35211, 35241, 35271 General Thoracic Surgery: 19272, 21627, 21632, 21740, 21750, 21805, 21825, 31760, 31766, 31770, 31775, 31786, 31805, 32095, 32100, 32110, 32120, 32124, 32140, 32141, 32150, 32215, 32220, 32225, 32310, 32320, 32402, 32440, 32442, 32445, 32480, 32482, 32484, 32486, 32488, 32491, 32500, 32501, 32800, 32810, 32815, 32900, 32905, 32906, 32940, 33020, 33025, 33030, 33031, 33050, 33300, 33310, 33320, 34051, 35021, 35216, 35246, 35276, 35311, 35481, 35526, 37616, 38381, 38746, 38747, 39000, 39010, 39200, 39220, 39545, 39561, 60521, 60522, 64746 Foot & Ankle: 27702, 27703, 27704, 27870, 28192, 28193, 28293, 28296, 28299, 28300, 28306, 28307, 28308, 28309, 28310, 28320, 28322, 28415, 28420, 28445, 28465, 28485, 28505, 28525, 28531, 28555, 28585, 28615, 28645, 28675, 28705, 28715, 28725, 28730, 28735, 28737, 28740, 28750, 28755, 28760		

	Maintenance Measure #0126: Selection of antibiotic prophylaxis for cardiac surgery patients	**Endorsed Measure #0268:** Selection of prophylactic antibiotic: First or second generation cephalosporin	**Maintenance Measure #0528**: Prophylactic antibiotic selection for surgical patients	**Endorsed Measure #0473**: Appropriate DVT prophylaxis in women undergoing cesarean delivery
Exclusions	Exclusions include: - Patients who had a principal diagnosis suggestive of preoperative infectious diseases - Patients whose ICD-9-CM principal procedure was performed entirely by Laparoscope - Patients enrolled in clinical trials - Patients with documented infection prior to surgical procedure of interest - Patients who expired perioperatively - Patients who were receiving antibiotics more than 24 hours prior to surgery - Patients who were receiving antibiotics within 24 hours prior to arrival - Patients who did not receive any antibiotics before or during surgery, or within 24 hours after anesthesia end time (i.e., patient did not receive prophylactic antibiotics) - Patients who did not receive any antibiotics during this hospitalization This list will be provided in the STS Adult Cardiac Surgery Database Data Manager's Training Manual as acceptable exclusions.	Documentation of medical reason(s) for not ordering cefazolin OR cefuroxime for antimicrobial prophylaxis.	•pre-operative infectious disease •Infectious diseases (001.0-139.8) •Meningitis (320.0-326) •Ear infection (380.0-380.23; 382.0-382.20) •Endocarditis (421.0-422.99) •Respiratory (460-466.19; 472-476.1; 480-487.1; 490-491.9; 510-511.9; 513-413.1) •Digestive (540-542; 575.0) •Renal (590-590.9; 595.0) •Prostate (601.0-601.9) •Gynecologic (614-614.9; 616-616.4) •Skin (680-686.9) •Musculo-skeletal (711.9-711.99, 730.0-730.99) •Fever of unknown origin (780.6) •Septic shock (785.59) •Bacteremia (790.7) •Viremia (790.8) •Receiving antibiotics at the time of admission (except colon surgery patients taking oral prophylactic antibiotics) •Medical records do not include antibiotic start date/time or incision date/time, or surgery end date/time •Receiving antibiotics > 24 hours prior to surgery (except colon surgery patients taking oral prophylactic antibiotics) •No antibiotics received before or during surgery, or within 24 hours after surgery end time (i.e., patient did not receive any prophylactic antibiotics)	N/A

	Maintenance Measure #0126: Selection of antibiotic prophylaxis for cardiac surgery patients	**Endorsed Measure #0268:** Selection of prophylactic antibiotic: First or second generation cephalosporin	**Maintenance Measure #0528**: Prophylactic antibiotic selection for surgical patients	**Endorsed Measure #0473**: Appropriate DVT prophylaxis in women undergoing cesarean delivery
	AbxSelect is marked "Exclusion"			
Exclusion Details		Append modifier to CPT Category II code: 4041F-1P	Data Elements: Birthdate Clinical Trial ICD-9-CM Principal Diagnosis Code Infection Prior to Anesthesia Laparoscope Perioperative Death	
Risk Adjustment	No risk adjustment necessary	No risk adjustment necessary	No risk adjustment necessary	No risk adjustment necessary
Stratification	N/A		The antibiotic prophylaxis measures are stratified according to surgery type. The tables are subsets of Table 5.10 (see link for Specification Manual and Appendix A, Tables 5.01 to 5.08. The specific procedures must be in the large table (Table 5.10) to be eligible for the SCIP measures. The measure specific tables for SCIP-Inf-2 are 5.01 to 5.08.	
Type Score	Rate/proportion		Rate/proportion	
Algorithm	N/A		1.Start processing. Run cases that are included in the Surgical Care Improvement Project (SCIP) Initial Patient Population and pass the edits defined in the Transmission Data Processing Flow: Clinical through this measure. 2.Calculate Patient Age. The Patient Age, in years, is equal to the Admission Date minus the Birthdate. Use the month and day portion of admission date and birthdate to yield the most accurate age. 3.Check Patient Age a.If Patient Age is less than 18 years, the case	

	Maintenance Measure #0126: Selection of antibiotic prophylaxis for cardiac surgery patients	**Endorsed Measure #0268:** Selection of prophylactic antibiotic: First or second generation cephalosporin	**Maintenance Measure #0528**: Prophylactic antibiotic selection for surgical patients	**Endorsed Measure #0473**: Appropriate DVT prophylaxis in women undergoing cesarean delivery
			will proceed to a Measure Category Assignment of B and will not be in the Measure Population. Stop processing for Centers for Medicare and Medicaid Services (CMS). Proceed to step 57 and check the Stratified Measures for Overall Rate (SCIP-Inf-2a) for The Joint Commission. b.If Patient Age is greater than or equal to 18 years, continue processing and proceed to ICD-9-CM Principal Procedure Code. 4.Check ICD-9-CM Principal Procedure Code a.If the ICD-9-CM Principal Procedure Code is not on Table 5.01 or 5.02 or 5.03 or 5.04 or 5.05 or 5.06 or 5.07 or 5.08, the case will proceed to a Measure Category Assignment of B and will not be in the Measure Population. Stop processing for CMS. Proceed to step 57 and check the Stratified Measures for Overall Rate (SCIP-Inf-2a) for The Joint Commission. b.If the ICD-9-CM Principal Procedure Code is on Table 5.01 or 5.02 or 5.03 or 5.04 or 5.05 or 5.06 or 5.07 or 5.08, continue processing and proceed to recheck ICD-9-CM Principal Diagnosis Code. 5.Check ICD-9-CM Principal Diagnosis Code a.If the ICD-9-CM Principal Diagnosis Code is on Table 5.09, the case will proceed to a Measure Category Assignment of B and will not be in the Measure Population. Stop processing for CMS. Proceed to step 57 and check the Stratified Measures for Overall Rate (SCIP-Inf-2a) for The Joint Commission. b.If the ICD-9-CM Principal Diagnosis Code is not on Table 5.09, continue processing and proceed to Laparoscope.	

	Maintenance Measure #0126: Selection of antibiotic prophylaxis for cardiac surgery patients	**Endorsed Measure #0268:** Selection of prophylactic antibiotic: First or second generation cephalosporin	**Maintenance Measure #0528**: Prophylactic antibiotic selection for surgical patients	**Endorsed Measure #0473**: Appropriate DVT prophylaxis in women undergoing cesarean delivery
			6.Check Laparoscope a.If Laparoscope is missing, the case will proceed to a Measure Category Assignment of X and will be rejected. Stop processing for CMS. Proceed to step 57 and check the Stratified Measures for Overall Rate (SCIP-Inf-2a) for The Joint Commission. b.If Laparoscope equals 1 or 3, the case will proceed to a Measure Category Assignment of B and will not be in the Measure Population. Stop processing for CMS. Proceed to step 57 and check the Stratified Measures for Overall Rate (SCIP-Inf-2a) for The Joint Commission. c.If Laparoscope equals 2, continue processing and proceed to Clinical Trial. 7.Check Clinical Trial a.If Clinical Trial is missing, the case will proceed to a Measure Category Assignment of X and will be rejected. Stop processing for CMS. Proceed to step 57 and check the Stratified Measures for Overall Rate (SCIP-Inf-2a) for The Joint Commission. b.If Clinical Trial equals Yes, the case will proceed to a Measure Category Assignment of B and will not be in the Measure Population. Stop processing for CMS. Proceed to step 57 and check the Stratified Measures for Overall Rate (SCIP-Inf-2a) for The Joint Commission. c.If Clinical Trial equals No, continue processing and proceed to Anesthesia Start Date. 8.Check Anesthesia Start Date a.If the Anesthesia Start Date is missing, the case will proceed to a Measure Category	

	Maintenance Measure #0126: Selection of antibiotic prophylaxis for cardiac surgery patients	**Endorsed Measure #0268:** Selection of prophylactic antibiotic: First or second generation cephalosporin	**Maintenance Measure #0528**: Prophylactic antibiotic selection for surgical patients	**Endorsed Measure #0473**: Appropriate DVT prophylaxis in women undergoing cesarean delivery
			Assignment of X and will be rejected. Stop processing for CMS. Proceed to step 57 and check the Stratified Measures for Overall Rate (SCIP-Inf-2a) for The Joint Commission. b.If the Anesthesia Start Date equals Unable To Determine, the case will proceed to a Measure Category Assignment of D and will be in the Measure Population. Stop processing for CMS. Proceed to step 57 and check the Stratified Measures for Overall Rate (SCIP-Inf-2a) for The Joint Commission. c.If Anesthesia Start Date equals a Non Unable To Determine Value, continue processing and proceed to the Surgery Days calculation. 9.Calculate Surgery Days. Surgery Days, in days, is equal to the Anesthesia Start Date minus the Admission Date. 10.Check Surgery Days a.If the Surgery Days is less than zero, the case will proceed to a Measure Category Assignment of B and will not be in the Measure Population. Stop processing for CMS. Proceed to step 57 and check the Stratified Measures for Overall Rate (SCIP-Inf-2a) for The Joint Commission. b.If the Surgery Days is greater than or equal to zero, continue processing and proceed to Infection Prior to Anesthesia. 11.Check Infection Prior to Anesthesia a.If Infection Prior to Anesthesia is missing, the case will proceed to a Measure Category Assignment of X and will be rejected. Stop processing for CMS. Proceed to step 57 and check the Stratified Measures for Overall Rate (SCIP-Inf-2a) for The Joint Commission.	

	Maintenance Measure #0126: Selection of antibiotic prophylaxis for cardiac surgery patients	**Endorsed Measure #0268:** Selection of prophylactic antibiotic: First or second generation cephalosporin	**Maintenance Measure #0528**: Prophylactic antibiotic selection for surgical patients	**Endorsed Measure #0473**: Appropriate DVT prophylaxis in women undergoing cesarean delivery
			b.If Infection Prior to Anesthesia equals Yes, the case will proceed to a Measure Category Assignment of B and will not be in the Measure Population. Stop processing for CMS. Proceed to step 57 and check the Stratified Measures for Overall Rate (SCIP-Inf-2a) for The Joint Commission. c.If Infection Prior to Anesthesia equals No, continue processing and proceed to Perioperative Death. 12.Check Perioperative Death a.If Perioperative Death is missing, the case will proceed to a Measure Category Assignment of X and will be rejected. Stop processing for CMS. Proceed to step 57 and check the Stratified Measures for Overall Rate (SCIP-Inf-2a) for The Joint Commission. b.If Perioperative Death equals Yes, the case will proceed to a Measure Category Assignment of B and will not be in the Measure Population. Stop processing for CMS. Proceed to step 57 and check the Stratified Measures for Overall Rate (SCIP-Inf-2a) for The Joint Commission. c.If Perioperative Death equals No, continue processing and proceed to Surgical Incision Date. 13.Check Surgical Incision Date a.If the Surgical Incision Date is missing, the case will proceed to a Measure Category Assignment of X and will be rejected. Stop processing for CMS. Proceed to step 57 and check the Stratified Measures for Overall Rate (SCIP- Inf-2a) for The Joint Commission. b.If the Surgical Incision Date equals Unable	

	Maintenance Measure #0126: Selection of antibiotic prophylaxis for cardiac surgery patients	**Endorsed Measure #0268:** Selection of prophylactic antibiotic: First or second generation cephalosporin	**Maintenance Measure #0528**: Prophylactic antibiotic selection for surgical patients	**Endorsed Measure #0473**: Appropriate DVT prophylaxis in women undergoing cesarean delivery
			To Determine, the case will proceed to a Measure Category Assignment of D and will be in the Measure Population. Stop processing for CMS. Proceed to step 57 and check the Stratified Measures for Overall Rate (SCIP-Inf-2a) for The Joint Commission. c.If Surgical Incision Date equals a Non Unable To Determine Value, continue processing and proceed to Antibiotic Received. 14.Check Antibiotic Received a.If Antibiotic Received equals 1 or 2, continue processing and proceed to recheck ICD-9-CM Principal Procedure Code b.If Antibiotic Received equals 4, the case will proceed to a Measure Category Assignment of B and will not be in the Measure Population. Stop processing for CMS. Proceed to step 57 and check the Stratified Measures for Overall Rate (SCIP-Inf-2a) for The Joint Commission. c.If Antibiotic Received equals 3, continue processing and proceed to step 18 and check Antibiotic Name. Do not check ICD-9-CM Principal Procedure Code, Oral Antibiotics or Antibiotic Received. 15.Recheck ICD-9-CM Principal Procedure Code only if Antibiotic Received equals 1 or 2 a.If the ICD-9-CM Principal Procedure Code is not on Table 5.03, the case will proceed to a Measure Category Assignment of B and will not be in the Measure Population. Stop processing for CMS. Proceed to step 57 and check the Stratified Measures for Overall Rate (SCIP-Inf-2a) for The Joint Commission.	

	Maintenance Measure #0126: Selection of antibiotic prophylaxis for cardiac surgery patients	**Endorsed Measure #0268:** Selection of prophylactic antibiotic: First or second generation cephalosporin	**Maintenance Measure #0528**: Prophylactic antibiotic selection for surgical patients	**Endorsed Measure #0473**: Appropriate DVT prophylaxis in women undergoing cesarean delivery
			b.If the ICD-9-CM Principal Procedure Code is on Table 5.03, continue processing and proceed to check Oral Antibiotics. 16.Check Oral Antibiotics a.If Oral Antibiotics is missing, the case will proceed to a Measure Category Assignment of X and will be rejected. Stop processing for CMS. Proceed to step 57 and check the Stratified Measures for Overall Rate (SCIP-Inf-2a) for The Joint Commission. b.If Oral Antibiotics equals No, the case will proceed to a Measure Category Assignment of B and will not be in the Measure Population. Stop processing for CMS. Proceed to step 57 and check the Stratified Measures for Overall Rate (SCIP-Inf-2a) for The Joint Commission. c.If Oral Antibiotics equals Yes, continue processing and proceed to recheck Antibiotic Received. 17.Recheck Antibiotic Received a.If Antibiotic Received equals 1, the case will proceed to a Measure Category Assignment of B and will not be in the Measure Population. Stop processing for CMS. Proceed to step 57 and check the Stratified Measures for Overall Rate (SCIP-Inf-2a) for The Joint Commission. b.If Antibiotic Received equals 2, continue processing and proceed to Antibiotic Name. 18.Check Antibiotic Name a.If the Antibiotic Grid is not populated, the case will proceed to a Measure Category Assignment of X and will be rejected. Stop processing for CMS. Proceed to step 57 and check the Stratified Measures for Overall	

	Maintenance Measure #0126: Selection of antibiotic prophylaxis for cardiac surgery patients	**Endorsed Measure #0268:** Selection of prophylactic antibiotic: First or second generation cephalosporin	**Maintenance Measure #0528**: Prophylactic antibiotic selection for surgical patients	**Endorsed Measure #0473**: Appropriate DVT prophylaxis in women undergoing cesarean delivery
			Rate (SCIP-Inf-2a) for The Joint Commission. Note: The front-end edits reject cases containing invalid data and/or an incomplete Antibiotic Grid. A complete Antibiotic Grid requires all data elements in the row to contain either a valid value and/or Unable to Determine. b.If the Antibiotic Name is on Table 2.1, continue processing and proceed to Antibiotic Administration Route. 19.Check Antibiotic Administration Route a.If the Antibiotic Administration Route is equal to 3 or 10 for all antibiotic doses, the case will proceed to a Measure Category Assignment of B and will not be in the Measure Population. Stop processing for CMS. Proceed to step 57 and check the Stratified Measures for Overall Rate (SCIP-Inf-2a) for The Joint Commission. b.If the Antibiotic Administration Route is equal to 1 or 2 for any antibiotic dose, continue processing and proceed to Antibiotic Administration Date. Proceed only with antibiotic doses on Table 2.1 that are administered via routes 1 or 2. 20.Check Antibiotic Administration Date a.If the Antibiotic Administration Date is equal to Unable to Determine for all antibiotic doses, the case will proceed to a Measure Category Assignment of D and will be in the Measure Population. Stop processing for CMS. Proceed to step 57 and check the Stratified Measures for Overall Rate (SCIP-Inf-2a) for The Joint Commission. b.If the Antibiotic Administration Date is equal to a Non Unable to Determine date for	

	Maintenance Measure #0126: Selection of antibiotic prophylaxis for cardiac surgery patients	**Endorsed Measure #0268:** Selection of prophylactic antibiotic: First or second generation cephalosporin	**Maintenance Measure #0528**: Prophylactic antibiotic selection for surgical patients	**Endorsed Measure #0473**: Appropriate DVT prophylaxis in women undergoing cesarean delivery
			at least one antibiotic dose, continue processing and proceed to the Antibiotic Days I calculation. Note: Proceed only with antibiotic doses that have an associated Non Unable to Determine date. 21.Calculate Antibiotic Days I. Antibiotic Days I, in days, is equal to the Surgical Incision Date minus the Antibiotic Administration Date. 22.Check Antibiotic Days I a.If the Antibiotic Days I is greater than 1 for at least one antibiotic dose, continue processing and recheck the ICD-9-CM Principal Procedure Code. Do not recheck step 25 Antibiotic Days I, step 26 Surgical Incision Time, step 27 Antibiotic Administration Time, or step 29 Antibiotic Timing I. b.If the Antibiotic Days I is less than or equal to 1 for all antibiotic doses, continue processing. Proceed to step 25 and recheck Antibiotics Days I. Do not recheck ICD-9-CM Principal Procedure Code or Oral Antibiotics. 23.Recheck ICD-9-CM Principal Procedure Code only if the Antibiotics Days was greater than 1 for at least one antibiotic dose a.If the ICD-9-CM Principal Procedure Code is not on Table 5.03, the case will proceed to a Measure Category Assignment of B and will not be in the Measure Population. Stop processing for CMS. Proceed to step 57 and check the Stratified Measures for Overall Rate (SCIP-Inf-2a) for The Joint Commission. b.If the ICD-9-CM Principal Procedure Code is on Table 5.03, continue processing and check Oral Antibiotics.	

	Maintenance Measure #0126: Selection of antibiotic prophylaxis for cardiac surgery patients	**Endorsed Measure #0268:** Selection of prophylactic antibiotic: First or second generation cephalosporin	**Maintenance Measure #0528**: Prophylactic antibiotic selection for surgical patients	**Endorsed Measure #0473**: Appropriate DVT prophylaxis in women undergoing cesarean delivery
			24.Check Oral Antibiotics a.If Oral Antibiotics is missing, the case will proceed to a Measure Category Assignment of X and will be rejected. Stop processing for CMS. Proceed to step 57 and check the Stratified Measures for Overall Rate (SCIP-Inf-2a) for The Joint Commission. b.If Oral Antibiotics equals No, the case will proceed to a Measure Category Assignment of B and will not be in the Measure Population. Stop processing for CMS. Proceed to step 57 and check the Stratified Measures for Overall Rate (SCIP-Inf-2a) for The Joint Commission. c.If Oral Antibiotics equals Yes, continue processing. Proceed to step 33 and check Anesthesia End Date. Do not recheck step 25 Antibiotic Days I, step 26 Surgical Incision Time, step 27 Antibiotic Administration Time, or step 29 Antibiotic Timing I. 25.Recheck Antibiotic Days I only if Antibiotic Days I is less than or equal to 1 for all antibiotic doses a.If the Antibiotic Days I is less than or equal to zero for all antibiotic doses, continue processing. Proceed to step 33 and check Anesthesia End Date. Do not check step 26 Surgical Incision Time, step 27 Antibiotic Administration Time, or step 29 Antibiotic Timing I. b.If the Antibiotic Days I is equal to 1 for ANY antibiotic dose, continue processing and proceed to Surgical Incision Time. 26.Check Surgical Incision Time a.If the Surgical Incision Time is missing, the case will proceed to a Measure Category	

	Maintenance Measure #0126: Selection of antibiotic prophylaxis for cardiac surgery patients	**Endorsed Measure #0268:** Selection of prophylactic antibiotic: First or second generation cephalosporin	**Maintenance Measure #0528**: Prophylactic antibiotic selection for surgical patients	**Endorsed Measure #0473**: Appropriate DVT prophylaxis in women undergoing cesarean delivery
			Assignment of X and will be rejected. Stop processing for CMS. Proceed to step 57 and check the Stratified Measures for Overall Rate (SCIP-Inf-2a) for The Joint Commission. b.If the Surgical Incision Time is equal to Unable to Determine, the case will proceed to a Measure Category Assignment of D and will be in the Measure Population. Stop processing for CMS. Proceed to step 57 and check the Stratified Measures for Overall Rate (SCIP-Inf-2a) for The Joint Commission. c.If the Surgical Incision Time is equal to a Non Unable to Determine Value, continue processing and check Antibiotic Administration Time. 27.Check Antibiotic Administration Time a.If the Antibiotic Administration Time equals Unable to Determine for all antibiotic doses, the case will proceed to a Measure Category Assignment of D and will be in the Measure Population. Stop processing for CMS. Proceed to step 57 and check the Stratified Measures for Overall Rate (SCIP-Inf-2a) for The Joint Commission. b.If the Antibiotic Administration Time equals a Non Unable to Determine time for at least one antibiotic dose, continue processing and recheck Antibiotic Administration Time. 28.Recheck Antibiotic Administration Time a.If the Antibiotic Administration Time equals Unable to Determine for ANY antibiotic dose with Antibiotic Days equal to 1, the case will proceed to a Measure Category Assignment of D and will be in the Measure Population. Stop processing for CMS. Proceed to step 57 and check the	

	Maintenance Measure #0126: Selection of antibiotic prophylaxis for cardiac surgery patients	**Endorsed Measure #0268:** Selection of prophylactic antibiotic: First or second generation cephalosporin	**Maintenance Measure #0528**: Prophylactic antibiotic selection for surgical patients	**Endorsed Measure #0473**: Appropriate DVT prophylaxis in women undergoing cesarean delivery
			Stratified Measures for Overall Rate (SCIP-Inf-2a) for The Joint Commission. b.If the Antibiotic Administration Time equals a Non Unable to Determine time for All antibiotic doses with Antibiotic Days equal to 1, continue processing and proceed to the Antibiotic Timing I calculation. 29.Calculate Antibiotic Timing I. Antibiotic Timing I, in minutes, is equal to the Surgical Incision Date and Surgical Incision Time minus the Antibiotic Administration Date and Antibiotic Administration Time. Calculate Antibiotic Timing I for all antibiotic doses with Non Unable to Determine date and time. Proceed with antibiotic doses that have Antibiotic Timing I calculated, or Antibiotic Days I less than or equal to zero. 30.Check Antibiotic Timing I a.If the Antibiotic Timing I is greater than 1440 minutes for any antibiotic dose, continue processing and recheck the ICD-9-CM Principal Procedure Code. Proceed with antibiotic doses that have Antibiotic Timing I calculated, or Antibiotic Days I less than or equal to zero. b.If the Antibiotic Timing I is less than or equal to 1440 minutes for all antibiotic doses with non Unable to Determine date and time, continue processing and proceed to step 33 and check Anesthesia End Date. Proceed with antibiotic doses that have Antibiotic Timing I calculated, or Antibiotic Days I less than or equal to zero. Do not recheck ICD-9-CM Principal Procedure Code or Oral Antibiotics. 31.Recheck ICD-9-CM Principal Procedure	

	Maintenance Measure #0126: Selection of antibiotic prophylaxis for cardiac surgery patients	**Endorsed Measure #0268:** Selection of prophylactic antibiotic: First or second generation cephalosporin	**Maintenance Measure #0528**: Prophylactic antibiotic selection for surgical patients	**Endorsed Measure #0473**: Appropriate DVT prophylaxis in women undergoing cesarean delivery
			Code only if Antibiotic Timing I is greater than 1440 for any antibiotic dose a.If the ICD-9-CM Principal Procedure Code is not on Table 5.03, the case will proceed to a Measure Category Assignment of B and will not be in the Measure Population. Stop processing for CMS. Proceed to step 57 and check the Stratified Measures for Overall Rate (SCIP-Inf-2a) for The Joint Commission. b.If the ICD-9-CM Principal Procedure Code is on Table 5.03, continue processing and check Oral Antibiotics. 32.Check Oral Antibiotics a.If Oral Antibiotics is missing, the case will proceed to a Measure Category Assignment of X and will be rejected. Stop processing for CMS. Proceed to step 57 and check the Stratified Measures for Overall Rate (SCIP-Inf-2a) for The Joint Commission. b.If Oral Antibiotics equals No, the case will proceed to a Measure Category Assignment of B and will not be in the Measure Population. Stop processing for CMS. Proceed to step 57 and check the Stratified Measures for Overall Rate (SCIP-Inf-2a) for The Joint Commission. c.If Oral Antibiotics equals Yes, continue processing and proceed to Anesthesia End Date. 33.Check Anesthesia End Date a.If the Anesthesia End Date is missing, the case will proceed to a Measure Category Assignment of X and will be rejected. Stop processing for CMS. Proceed to step 57 and check the Stratified Measures for Overall Rate (SCIP-Inf-2a) for The Joint Commission.	

	Maintenance Measure #0126: Selection of antibiotic prophylaxis for cardiac surgery patients	**Endorsed Measure #0268:** Selection of prophylactic antibiotic: First or second generation cephalosporin	**Maintenance Measure #0528**: Prophylactic antibiotic selection for surgical patients	**Endorsed Measure #0473**: Appropriate DVT prophylaxis in women undergoing cesarean delivery
			b.If the Anesthesia End Date equals Unable to Determine, the case will proceed to a Measure Category Assignment of D and will be in the Measure Population. Stop processing for CMS. Proceed to step 57 and check the Stratified Measures for Overall Rate (SCIP-Inf-2a) for The Joint Commission. c.If the Anesthesia End Date equals a Non Unable to Determine Value, continue processing and proceed to the Antibiotic Days II calculation. 34.Calculate Antibiotic Days II. Antibiotic Days II, in days, is equal to the Antibiotic Administration Date minus the Anesthesia End Date. 35.Check Antibiotic Days II a.If the Antibiotic Days II is less than or equal to zero for all doses of all antibiotics, continue processing. Proceed to step 41 and recheck Antibiotic Administration Route. Do not check step 37 Anesthesia End Time, step 38 Antibiotic Administration Time, or step 39 Antibiotic Timing II. b.If the Antibiotic Days II is greater than zero for at least one dose of any antibiotic, continue processing and proceed to Initialize the Abxday flag. 36.Initialize Abxday flag. Initialize Abxday flag to equal ?No´ for each antibiotic dose. Set Abxday flag to equal ´Yes? for each antibiotic dose where Antibiotic Days II is less than or equal to zero. 37.Check Anesthesia End Time a.If the Anesthesia End Time is missing, the case will proceed to a Measure Category Assignment of X and will be rejected. Stop	

	Maintenance Measure #0126: Selection of antibiotic prophylaxis for cardiac surgery patients	**Endorsed Measure #0268:** Selection of prophylactic antibiotic: First or second generation cephalosporin	**Maintenance Measure #0528**: Prophylactic antibiotic selection for surgical patients	**Endorsed Measure #0473**: Appropriate DVT prophylaxis in women undergoing cesarean delivery
			processing for CMS. Proceed to step 57 and check the Stratified Measures for Overall Rate (SCIP-Inf-2a) for The Joint Commission. b.If the Anesthesia End Time is equal to Unable to Determine, continue processing and proceed to check the Abxday flag. 1.If the Abxday flag equals No for All doses, the case will proceed to a Measure Category Assignment of D of will be in the Measure Population. Stop processing for CMS. Proceed to step 57 and check the Stratified Measures for Overall Rate (SCIP-Inf-2a) for The Joint Commission. 2.f the Abxday flag equals Yes for ANY dose, continue processing and proceed to step 41. Proceed only with doses where the Abxflag is equal to Yes. c.If the Anesthesia End Time is equal to a Non Unable to Determine Value, continue processing and recheck Antibiotic Administration Time. 38.Recheck Antibiotic Administration Time a.If the Antibiotic Administration Time equals Unable to Determine for all antibiotic doses, continue processing and proceed to check the Abxday flag. 1.If the Abxday flag equals No for All doses, the case will proceed to a Measure Category Assignment of D of will be in the Measure Population. Stop processing for CMS. Proceed to step 57 and recheck the Stratified Measures for Overall Rate (SCIP-Inf-2a) for The Joint Commission. 2.If the Abxday flag equals Yes for ANY dose, continue processing and proceed to step 41 and recheck the Antibiotic	

	Maintenance Measure #0126: Selection of antibiotic prophylaxis for cardiac surgery patients	**Endorsed Measure #0268:** Selection of prophylactic antibiotic: First or second generation cephalosporin	**Maintenance Measure #0528**: Prophylactic antibiotic selection for surgical patients	**Endorsed Measure #0473**: Appropriate DVT prophylaxis in women undergoing cesarean delivery
			Administration Route. Proceed only with doses where the Abxflag is equal to Yes. Do not check Antibiotic Timing II. b.If the Antibiotic Administration Time equals a Non Unable to Determine time for at least one antibiotic dose, continue processing and proceed to the Antibiotic Timing II calculation. Proceed with both UTD and Non-UTD time. 39.Calculate Antibiotic Timing II. Antibiotic Timing II, in minutes, is equal to the Antibiotic Administration Date and Antibiotic Administration Time minus Anesthesia End Date and Anesthesia End Time. Calculate Antibiotic Timing II for all antibiotic doses with Non Unable to Determine date and time. Proceed with antibiotic doses that have Antibiotic Timing II calculated, or Abxday flag equal to Yes. 40.Check Antibiotic Timing II a.If the Antibiotic Timing II is greater than 1440 minutes for all doses of all Antibiotics with a Non Unable to Determine date and time, continue processing and proceed to check the Abxday Flag. Proceed with antibiotic doses that have Antibiotic Timing II calculated, or Abxday flag equal to Yes. 1.If the Abxday flag equals No for All doses, the case will proceed to a Measure Category Assignment of B of will not be in the Measure Population. Stop processing for CMS. Proceed to step 57 and check the Stratified Measures for Overall Rate (SCIP-Inf-2a) for The Joint Commission. 2.If the Abxday flag equals Yes for ANY dose, continue processing and recheck the	

	Maintenance Measure #0126: Selection of antibiotic prophylaxis for cardiac surgery patients	**Endorsed Measure #0268:** Selection of prophylactic antibiotic: First or second generation cephalosporin	**Maintenance Measure #0528**: Prophylactic antibiotic selection for surgical patients	**Endorsed Measure #0473**: Appropriate DVT prophylaxis in women undergoing cesarean delivery
			Antibiotic Administration Route. Proceed only with doses where the Abxflag is equal to Yes. b.If the Antibiotic Timing II is less than or equal to 1440 minutes for at least one dose of ANY antibiotic, continue processing and proceed to Antibiotic Administration Route. Proceed with antibiotic doses that have Antibiotic Timing II calculated, or Abxday flag equal to Yes. 41.Recheck Antibiotic Administration Route. For each case, proceed ONLY with those antibiotic doses that satisfy at least one of the following conditions: Antibiotic Timing II is less than or equal to 1440 or Abxday flag is equal to Yes. a.If the Antibiotic Administration Route equals 1 for all doses of all Antibiotics, the case will proceed to a Measure Category Assignment of D and will be in the Measure Population. Stop processing for CMS. Proceed to step 57 and check the Stratified Measures for Overall Rate (SCIP-Inf-2a) for The Joint Commission. b.If the Antibiotic Administration Route equals 2 for any dose of any antibiotic, continue processing and proceed to recheck the ICD-9-CM Principal Procedure Code. Note: For each case include only those antibiotics with route IV for further processing. 42.Recheck ICD-9-CM Principal Procedure Code a.If the ICD-9-CM Principal Procedure Code is on Table 5.03, continue processing and proceed to step 46 and recheck Antibiotic	

	Maintenance Measure #0126: Selection of antibiotic prophylaxis for cardiac surgery patients	**Endorsed Measure #0268:** Selection of prophylactic antibiotic: First or second generation cephalosporin	**Maintenance Measure #0528**: Prophylactic antibiotic selection for surgical patients	**Endorsed Measure #0473**: Appropriate DVT prophylaxis in women undergoing cesarean delivery
			Name. Do not recheck to determine if ICD-9-CM Principal Procedure Code is on Tables 5.01, 5.02, 5.04, 5.05, 5.06, 5.07, or 5.08 or if Antibiotic Name is on Table 3.2. b.If the ICD-9-CM Principal Procedure Code is on Tables 5.01, 5.02, 5.04, 5.05, 5.06, 5.07, or 5.08, continue processing and proceed to recheck ICD-9-CM Principal Procedure Code. 43.Recheck ICD-9-CM Principal Procedure Code a.If the ICD-9-CM Principal Procedure Code is on Table 5.06 or 5.07, continue processing and proceed to recheck Antibiotic Name. 1.If the Antibiotic Name is on Table 3.7, the case will proceed to a Measure Category Assignment of E and will be in the Numerator Population. Stop processing for CMS. Proceed to step 57 and check the Stratified Measures for Overall Rate (SCIP-Inf-2a) for The Joint Commission. 2.If the Antibiotic Name is not on Table 3.7, continue processing and proceed to step 46 and recheck Antibiotic Name. Do not recheck to determine if ICD-9-CM Principal Procedure Code is on Tables 5.01, 5.02, 5.04, 5.05, or 5.08 or if Antibiotic Name is on Table 3.2. b.If the ICD-9-CM Principal Procedure Code is on Tables 5.01, 5.02, 5.04, 5.05, or 5.08, continue processing and proceed to recheck ICD-9-CM Principal Procedure Code. 44.Recheck ICD-9-CM Principal Procedure Code a.If the ICD-9-CM Principal Procedure Code is on Table 5.01, 5.02, or 5.08, continue processing and proceed to recheck Antibiotic	

	Maintenance Measure #0126: Selection of antibiotic prophylaxis for cardiac surgery patients	**Endorsed Measure #0268:** Selection of prophylactic antibiotic: First or second generation cephalosporin	**Maintenance Measure #0528**: Prophylactic antibiotic selection for surgical patients	**Endorsed Measure #0473**: Appropriate DVT prophylaxis in women undergoing cesarean delivery
			Name. 1.If the Antibiotic Name is on Table 3.1, the case will proceed to a Measure Category Assignment of E and will be in the Numerator Population. Stop processing for CMS. Proceed to step 57 and check the Stratified Measures for Overall Rate (SCIP-Inf-2a) for The Joint Commission. 2.If the Antibiotic Name is not on Table 3.1, continue processing and proceed to step 46 and recheck Antibiotic Name. Do not recheck to determine if ICD-9-CM Principal Procedure Code is on Tables 5.04 or 5.05 or if Antibiotic Name is on Table 3.2. b.If the ICD-9-CM Principal Procedure Code is on Tables 5.04 or 5.05, continue processing and proceed to recheck Antibiotic Name. 45.Recheck Antibiotic Name a.If the Antibiotic Name is on Table 3.2, the case will proceed to a Measure Category Assignment of E and will be in the Numerator Population. Stop processing for CMS. Proceed to step 57 and check the Stratified Measures for Overall Rate (SCIP-Inf-2a) for The Joint Commission. b.If the Antibiotic Name is not on Table 3.2, continue processing and proceed to recheck Antibiotic Name. 46.Recheck Antibiotic Name a.If the Antibiotic Name is on Table 3.6b, the case will proceed to a Measure Category Assignment of E and will be in the Numerator Population. Stop processing for CMS. Proceed to step 57 and check the Stratified Measures for Overall Rate (SCIP-Inf-2a) for The Joint Commission.	

	Maintenance Measure #0126: Selection of antibiotic prophylaxis for cardiac surgery patients	**Endorsed Measure #0268:** Selection of prophylactic antibiotic: First or second generation cephalosporin	**Maintenance Measure #0528**: Prophylactic antibiotic selection for surgical patients	**Endorsed Measure #0473**: Appropriate DVT prophylaxis in women undergoing cesarean delivery
			b.If the Antibiotic Name is not on Table 3.6b, continue processing and proceed to recheck Antibiotic Name. 47.Recheck Antibiotic Name a.If the Antibiotic Name is on Table 3.5, the case will proceed to a Measure Category Assignment of E and will be in the Numerator Population. Stop processing for CMS. Proceed to step 57 and check the Stratified Measures for Overall Rate (SCIP-Inf-2a) for The Joint Commission. b.If the Antibiotic Name is not on Table 3.5, continue processing and proceed to recheck Antibiotic Name. 48.Recheck Antibiotic Name a.If the Antibiotic Name is on Table 3.2, continue processing and recheck Antibiotic Name. 1.If the Antibiotic Name is on Table 3.6a, the case will proceed to a Measure Category Assignment of E and will be in the Numerator Population. Stop processing for CMS. Proceed to step 57 and check the Stratified Measures for Overall Rate (SCIP-Inf-2a) for The Joint Commission. 2.If the Antibiotic name is not on Table 3.6a, continue processing and proceed to recheck ICD-9-CM Principal Procedure Code. b.If the Antibiotic Name is not on Table 3.2, continue processing and proceed to recheck ICD-9-CM Principal Procedure Code. 49.Recheck ICD-9-CM Principal Procedure Code a.If the ICD-9-CM Principal Procedure Code is on Table 5.01, 5.02, 5.04, 5.05, or 5.08, continue processing and proceed to recheck	

	Maintenance Measure #0126: Selection of antibiotic prophylaxis for cardiac surgery patients	**Endorsed Measure #0268:** Selection of prophylactic antibiotic: First or second generation cephalosporin	**Maintenance Measure #0528**: Prophylactic antibiotic selection for surgical patients	**Endorsed Measure #0473**: Appropriate DVT prophylaxis in women undergoing cesarean delivery
			Antibiotic Name. b.If the ICD-9-CM Principal Procedure Code is on Tables 5.03, 5.06 or 5.07, continue processing and proceed to step 54 and check Antibiotic Allergy, Do not check step 50 and 52 to see if Antibiotic Name is on Tables 3.8 or 3.9, step 51 Antibiotic Allergy or step 53 Vancomycin. 50.Recheck Antibiotic Name only if the ICD-9-CM Principal Procedure Code is on Table 5.01, 5.02, 5.04, 5.05, or 5.08 a.If none of the Antibiotic Names are on Table 3.8 and 3.9, the case will proceed to a Measure Category Assignment of D and will be in the Measure Population. Stop processing for CMS. Proceed to step 57 and check the Stratified Measures for Overall Rate (SCIP-Inf-2a) for The Joint Commission. b.If at least one of the Antibiotic Names are on Table 3.8 or 3.9, continue processing and proceed to Antibiotic Allergy. 51.Check Antibiotic Allergy only if at least one of the Antibiotic Names are on Table 3.8 or 3.9 a.If Antibiotic Allergy is missing, the case will proceed to a Measure Category Assignment of X and will be rejected. Stop processing for CMS. Proceed to step 57 and check the Stratified Measures for Overall Rate (SCIP-Inf-2a) for The Joint Commission. b.If Antibiotic Allergy equals Yes, the case will proceed to a Measure Category Assignment of E and will be in the Numerator Population. Stop processing for CMS. Proceed to step 57 and check the Stratified Measures for Overall Rate (SCIP-	

	Maintenance Measure #0126: Selection of antibiotic prophylaxis for cardiac surgery patients	**Endorsed Measure #0268:** Selection of prophylactic antibiotic: First or second generation cephalosporin	**Maintenance Measure #0528**: Prophylactic antibiotic selection for surgical patients	**Endorsed Measure #0473**: Appropriate DVT prophylaxis in women undergoing cesarean delivery
			Inf-2a) for The Joint Commission. c.If Antibiotic Allergy equals No, continue processing and proceed to recheck Antibiotic Name. 52.Recheck Antibiotic Name a.If none of the Antibiotic Names are on Table 3.8, the case will proceed to a Measure Category Assignment of D and will be in the Measure Population. Stop processing for CMS. Proceed to step 57 and check the Stratified Measures for Overall Rate (SCIP-Inf-2a) for The Joint Commission. b.If at least one of the Antibiotic Names are on Table 3.8, continue processing and proceed to check Vancomycin. 53.Check Vancomycin a.If Vancomycin is missing, the case will proceed to a Measure Category Assignment of X and will be rejected. Stop processing for CMS. Proceed to step 57 and check the Stratified Measures for Overall Rate (SCIP-Inf-2a) for The Joint Commission. b.If any Vancomycin value equals 9 and none of the values equal 1, 2, 3, 4, 5, 6, 7, 8, 10, or 11, the case will proceed to a Measure Category Assignment of D and will be in the Measure Population. Stop processing for CMS. Proceed to step 57 and check the Stratified Measures for Overall Rate (SCIP-Inf-2a) for The Joint Commission. c.If any Vancomycin value equals 1, 2, 3, 4, 5, 6, 7, 8, 10, or 11 and none of the values equals 9, the case will proceed to a Measure Category Assignment of E and will be in the Numerator Population. Stop processing for CMS. Proceed to step 57 and check the	

	Maintenance Measure #0126: Selection of antibiotic prophylaxis for cardiac surgery patients	**Endorsed Measure #0268:** Selection of prophylactic antibiotic: First or second generation cephalosporin	**Maintenance Measure #0528**: Prophylactic antibiotic selection for surgical patients	**Endorsed Measure #0473**: Appropriate DVT prophylaxis in women undergoing cesarean delivery
			Stratified Measures for Overall Rate (SCIP-Inf-2a) for The Joint Commission. 54.Check Antibiotic Allergy only if the ICD-9-CM Principal Procedure Code is on Table 5.03, 5.06, or 5.07 a.If Antibiotic Allergy is missing, the case will proceed to a Measure Category Assignment of X and will be rejected. Stop processing for CMS. Proceed to step 57 and check the Stratified Measures for Overall Rate (SCIP-Inf-2a) for The Joint Commission. b.If Antibiotic Allergy equals No, the case will proceed to a Measure Category Assignment of D and will be in the Measure Population. Stop processing for CMS. Proceed to step 57 and check the Stratified Measures for Overall Rate (SCIP-Inf-2a) for The Joint Commission. c.If Antibiotic Allergy equals Yes, continue processing and proceed to recheck Antibiotic Name. 55.Recheck Antibiotic Name a.If at least one of the Antibiotic Names is on Table 3.9, continue processing and recheck Antibiotic Name. 1.If at least one of the Antibiotic Names is on Tables 2.11 or 3.12 or 2.7, the case will proceed to a Measure Category Assignment of E and will be in the Numerator Population. Stop processing for CMS. Proceed to step 57 and check the Stratified Measures for Overall Rate (SCIP-Inf-2a) for The Joint Commission. 2.If none of the Antibiotic Names are on Tables 2.11 or 3.12 or 2.7, continue processing and recheck Antibiotic Name.	

	Maintenance Measure #0126: Selection of antibiotic prophylaxis for cardiac surgery patients	**Endorsed Measure #0268:** Selection of prophylactic antibiotic: First or second generation cephalosporin	**Maintenance Measure #0528**: Prophylactic antibiotic selection for surgical patients	**Endorsed Measure #0473**: Appropriate DVT prophylaxis in women undergoing cesarean delivery
			b.If none of the Antibiotic Names are on Table 3.9, continue processing and recheck Antibiotic Name. 56.Recheck Antibiotic Name a.If at least one of the Antibiotic Names is on Table 3.6a, continue processing and recheck Antibiotic Name. 1.If at least one of the Antibiotic Names is on Tables 2.11 or 3.12, the case will proceed to a Measure Category Assignment of E and will be in the Numerator Population. Stop processing for CMS. Proceed to Stratified Measures for Overall Rate (SCIP-Inf-2a) for The Joint Commission. 2.If none of the Antibiotic Names are on Tables 2.11 or 3.12, the case will proceed to a Measure Category Assignment of D and will be in the Measure Population. Stop processing for CMS. Proceed to Stratified Measures for Overall Rate (SCIP-Inf-2a) for The Joint Commission. b.If none of the Antibiotic Names are on Table 3.6a, the case will proceed to a Measure Category Assignment of D and will be in the measure population. Stop processing for CMS. Proceed to Stratified Measures for Overall Rate (SCIP-Inf-2a) for The Joint Commission. 57.For The Joint Commission Only, continue processing for the Stratified Measures. Note: Initialize the Measure Category Assignment for each strata measure (b-g) to equal B, not in the Measure Population. Do not change the Measure Category Assignment that was already calculated for the overall rate (SCIP-Inf-2a). The rest of the algorithm will reset	

	Maintenance Measure #0126: Selection of antibiotic prophylaxis for cardiac surgery patients	**Endorsed Measure #0268:** Selection of prophylactic antibiotic: First or second generation cephalosporin	**Maintenance Measure #0528**: Prophylactic antibiotic selection for surgical patients	**Endorsed Measure #0473**: Appropriate DVT prophylaxis in women undergoing cesarean delivery
			the appropriate Measure Category Assignment to be equal to the overall rate´s (SCIP-Inf-2a) Measure Category Assignment. 58.Check Overall Rate Category Assignment a.If the Overall Rate Category Assignment is equal to B or X, set the Measure Category Assignment for the strata measures (SCIP-Inf-2b through SCIP-Inf-2h) to equal B, not in the Measure Population. Stop processing. b.If the Overall Rate Category Assignment is equal to D or E, continue processing and check the ICD-9-CM Principal Procedure Code. Specifications Manual for National Hospital Inpatient Quality Measures Discharges 10-01-10 (4Q10) through 03-31-11 (1Q11) SCIP-Inf-2-30 59.Check ICD-9-CM Principal Procedure Code a.If the ICD-9-CM Principal Procedure Code is on Table 5.01, for Stratified Measure SCIP-Inf-2b, set the Measure Category Assignment for measure SCIP-Inf-2b to equal the Measure Category Assignment for measure SCIP-Inf-2a. Stop processing. b.If the ICD-9-CM Principal Procedure Code is on Table 5.02 or 5.03 or 5.04 or 5.05 or 5.06 or 5.07 or 5.08, continue processing and recheck the If the ICD-9-CM Principal Procedure Code. 60.Recheck ICD-9-CM Principal Procedure Code a.If the ICD-9-CM Principal Procedure Code is on Table 5.02, for Stratified Measure SCIP-Inf-2c, set the Measure Category Assignment for measure SCIP-Inf-2c to equal the Measure	

	Maintenance Measure #0126: Selection of antibiotic prophylaxis for cardiac surgery patients	**Endorsed Measure #0268:** Selection of prophylactic antibiotic: First or second generation cephalosporin	**Maintenance Measure #0528**: Prophylactic antibiotic selection for surgical patients	**Endorsed Measure #0473**: Appropriate DVT prophylaxis in women undergoing cesarean delivery
			Category Assignment for measure SCIP-Inf-2a. Stop processing. b.If the ICD-9-CM Principal Procedure Code is on Table 5.03 or 5.04 or 5.05 or 5.06 or 5.07 or 5.08, continue processing and recheck the If the ICD-9-CM Principal Procedure Code. 61.Recheck ICD-9-CM Principal Procedure Code a.If the ICD-9-CM Principal Procedure Code is on Table 5.04, for Stratified Measure SCIP-Inf-2d, set the Measure Category Assignment for measure SCIP-Inf-2d to equal the Measure Category Assignment for measure SCIP-Inf-2a. Stop processing. b.If the ICD-9-CM Principal Procedure Code is on Table 5.03 or 5.05 or 5.06 or 5.07 or 5.08, continue processing and recheck the If the ICD-9-CM Principal Procedure Code. 62.Recheck ICD-9-CM Principal Procedure Code a.If the ICD-9-CM Principal Procedure Code is on Table 5.05, for Stratified Measure SCIP-Inf-2e, set the Measure Category Assignment for measure SCIP-Inf-2e to equal the Measure Category Assignment for measure SCIP-Inf-2a. Stop processing. b.If the ICD-9-CM Principal Procedure Code is on Table 5.03 or 5.06 or 5.07 or 5.08, continue processing and recheck the If the ICD-9-CM Principal Procedure Code. 63.Recheck ICD-9-CM Principal Procedure Code a.If the ICD-9-CM Principal Procedure Code is on Table 5.03, for Stratified Measure SCIP-Inf-2f, set the Measure Category Assignment for measure SCIP-Inf-2f to equal the Measure	

	Maintenance Measure #0126: Selection of antibiotic prophylaxis for cardiac surgery patients	**Endorsed Measure #0268:** Selection of prophylactic antibiotic: First or second generation cephalosporin	**Maintenance Measure #0528**: Prophylactic antibiotic selection for surgical patients	**Endorsed Measure #0473**: Appropriate DVT prophylaxis in women undergoing cesarean delivery
			Category Assignment for measure SCIP-Inf-2a. Stop processing. b.If the ICD-9-CM Principal Procedure Code is on Table 5.06 or 5.07 or 5.08, continue processing and recheck the If the ICD-9-CM Principal Procedure Code. 64.Recheck ICD-9-CM Principal Procedure Code a.If the ICD-9-CM Principal Procedure Code is on Table 5.06 or 5.07, for Stratified Measure SCIP-Inf-2g, set the Measure Category Assignment for measure SCIP-Inf-2g to equal the Measure Category Assignment for measure SCIP-Inf-2a. Stop processing. b.If the ICD-9-CM Principal Procedure Code is on Table 5.08, for Stratified Measure SCIP-Inf-2h, set the Measure Category Assignment for measure SCIP-Inf-2h to equal the Measure Category Assignment for measure SCIP-Inf-2a. Stop processing. **2a.22. Describe the method for discriminating performance** *(E.g., significance testing)* Benchmarks are established using the ABC methodology, based on the actual performance of the top facilities. ABC benchmarks identify superior performance and encourage poorer performers to improve. It is data-driven, peer-group performance feedback. Achievable Benchmarks of Care TM: developed at the University of Alabama at Birmingham for AHRQ. This methodology identifies benchmark care levels already achieved by "best-in-class" care givers. Development of benchmarks that are realistic	

	Maintenance Measure #0126: Selection of antibiotic prophylaxis for cardiac surgery patients	**Endorsed Measure #0268:** Selection of prophylactic antibiotic: First or second generation cephalosporin	**Maintenance Measure #0528**: Prophylactic antibiotic selection for surgical patients	**Endorsed Measure #0473**: Appropriate DVT prophylaxis in women undergoing cesarean delivery
			and achievable may help to motivate providers that are having difficulty improving care. The benchmarks represent a measureable level of excellence that always exceeds average performance. It ensures that all superior providers contribute to the benchmark but also ensures that providers with high performance but very low numbers of cases do not unduly influence benchmark levels. Additional information can be found at http://main.uab.edu/show.asp?durki=14527	
Data Source	Registry data	Electronic administrative data/claims, lab data, paper medical record/flow-sheet	Electronic administrative data/claims, paper medical record/flow-sheet	Paper medical record/flow-sheet
Level of Measurement /Analysis	Clinicians: Group; Facility/agency; Population: National, regional/network, states, counties or cities	Clinicians: Individual	Facility/agency	Facility/agency
Care Settings	Hospital	Hospital, Ambulatory care: Ambulatory surgery center	Hospital	Hospital

Prophylactic Antibiotics: Timing/Received

	Endorsed Measure #0269: Timing of prophylactic antibiotics - administering physician	**Maintenance Measure #0125**: Timing of antibiotic prophylaxis for cardiac surgery patients	**Endorsed Measure #0270:** Timing of antibiotic prophylaxis- ordering physician	**Maintenance Measure #0527**: Prophylactic antibiotic received within 1 hour prior to surgical incision SCIP-Inf-1	**Endorsed Measure #0472:** Prophylactic antibiotic received within one hour prior to surgical incision or at the time of delivery – cesarean section.
Status	Endorsed 11/2007	Currently undergoing maintenance review	Endorsed 7/2008	Currently undergoing maintenance review	Endorsed 10/2008

	Endorsed Measure #0269: Timing of prophylactic antibiotics - administering physician	**Maintenance Measure #0125**: Timing of antibiotic prophylaxis for cardiac surgery patients	**Endorsed Measure #0270:** Timing of antibiotic prophylaxis- ordering physician	**Maintenance Measure #0527**: Prophylactic antibiotic received within 1 hour prior to surgical incision SCIP-Inf-1	**Endorsed Measure #0472:** Prophylactic antibiotic received within one hour prior to surgical incision or at the time of delivery – cesarean section.
Steward	National Committee for Quality Assurance, American Medical Association-Physician Consortium for Performance Improvement	Society of Thoracic Surgeons	American Medical Association-Physician Consortium for Performance Improvement	Centers for Medicare & Medicaid Services	Massachusetts General Hospital/Partners Health Care System
Description	Percentage of surgical patients aged > 18 years with indications for prophylactic parenteral antibiotics for whom administration of the antibiotic has been initiated within one hour (if vancomycin, two hours) prior to the surgical incision or start of procedure when no incision is required.	Percent of patients aged 18 years and older undergoing cardiac surgery who received prophylactic antibiotics within one hour of surgical incision or start of procedure if no incision was required (two hours if receiving vancomycin or fluoroquinolone).	Percentage of surgical patients aged 18 years and older undergoing procedures with the indications for prophylactic parenteral antibiotics, who have an order for prophylactic antibiotic to be given within one hour (if fluoroquinolone or vancomycin, two hours), prior to the surgical incision (or start of procedure when no incision is required)	Surgical patients with prophylactic antibiotics initiated within one hour prior to surgical incision. Patients who received vancomycin or a fluoroquinolone for prophylactic antibiotics should have the antibiotics initiated within two hours prior to surgical incision. Due to the longer infusion time required for vancomycin or a fluoroquinolone, it is acceptable to start these antibiotics within two hours prior to incision time.	Percentage of patients undergoing cesarean section who receive prophylactic antibiotics within one hour prior to surgical incision or at the time of delivery.
Type of Measure	Process	Process	Process	Process	Process
Numerator	Surgical patients for whom administration of a prophylactic antibiotic has been initiated within one hour (if vancomycin, two	Cardiac surgery patients who received prophylactic antibiotics within one hour of surgical incision or start of procedure if no	Surgical patients who have an order for prophylactic antibiotic to be given within one hour (if fluoroquinolone or	Surgical patients who received prophylactic antibiotics within 1 hour of surgical incision (2 hours if receiving	Number of patients who received prophylactic antibiotics within one hour prior to surgical incision or at the time of

	Endorsed Measure #0269: Timing of prophylactic antibiotics - administering physician	**Maintenance Measure #0125**: Timing of antibiotic prophylaxis for cardiac surgery patients	**Endorsed Measure #0270:** Timing of antibiotic prophylaxis- ordering physician	**Maintenance Measure #0527**: Prophylactic antibiotic received within 1 hour prior to surgical incision SCIP-Inf-1	**Endorsed Measure #0472:** Prophylactic antibiotic received within one hour prior to surgical incision or at the time of delivery – cesarean section.
	hours) prior to the surgical incision (or start of procedure when no incision is required). The antimicrobial drugs listed below are considered prophylactic antibiotics for the purposes of this measure: •Ampicillin/sulbactam •Aztreonam •Cefazolin •Cefmetazole •Cefotetan •Cefoxitin •Cefuroxime •Ciprofloxacin •Clindamycin •Erythromycin base •Gatifloxacin •Gentamicin •Levofloxacin •Metronidazole •Moxifloxacin •Neomycin •Vancomycin	incision was required (two hours if vancomycin or fluoroquinolone). Time window: Within one hour of surgical incision or start of procedure if no incision was required (two hours if vancomycin or fluoroquinolone).	vancomycin, two hours) prior to the surgical incision (or start of procedure when no incision is required). Numerator Instructions: There must be documentation of order (written order, verbal order, or standing order/protocol) specifying that antibiotic is to be given within one hour (if fluoroquinolone or vancomycin, two hours) prior to the surgical incision (or start of procedure when no incision is required) OR documentation that antibiotic has been given within one hour (if fluoroquinolone or vancomycin, two hours) prior to the surgical incision (or start of procedure when no incision is required).	vancomycin).	delivery. Because delivery and administration of antibiotics are unlikely to be exactly simultaneous and watches imperfectly synchronized, in operational use there must be an allowance for a discrete period of time in the application of "at the time of delivery." We propose that administration should be considered acceptable if given within 10 minutes of delivery/cord clamping for those in whom prophylactic antibiotics are not given preooperatively.
Numerator Details	Electronic Collection: G-codes or CPT Category II are used to report the numerator of the measure: 1. If reporting G-codes	Number of cardiac surgery procedures in which timing of appropriate antibiotic administration	Report one of the following CPT Category II codes: Identify patients with documentation of order	Data Elements: Anesthesia Start Date Antibiotic Administration Date Antibiotic Administration	

	Endorsed Measure #0269: Timing of prophylactic antibiotics - administering physician	**Maintenance Measure #0125**: Timing of antibiotic prophylaxis for cardiac surgery patients	**Endorsed Measure #0270:** Timing of antibiotic prophylaxis- ordering physician	**Maintenance Measure #0527**: Prophylactic antibiotic received within 1 hour prior to surgical incision SCIP-Inf-1	**Endorsed Measure #0472:** Prophylactic antibiotic received within one hour prior to surgical incision or at the time of delivery – cesarean section.
	submit the appropriate G-code. 2. If reporting CPT Category II codes submit the appropriate CPT Category II code. Identify surgical patients who were administered prophylactic antibiotics (See Table 2A) within one hour (if vancomycin, two hours) prior to the surgical incision (or start of procedure when no incision is required): •? GXXXXX: Clinician documented to have given the prophylactic antibiotic within one hour (if vancomycin, two hours) prior to the surgical incision (or start of procedure when no incision is required). OR ? CPT II XXXXF: Documentation that prophylactic antibiotic was given within one hour (if vancomycin, two hours) prior to surgical incision (or start of	[AbxTiming (STS Adult Cardiac Surgery Database Version 2.73)] is marked "yes"	for prophylactic antibiotic: • CPT II 4047F: Documentation of order for prophylactic antibiotic to be given within one hour (if fluoroquinolone or vancomycin, two hours) prior to surgical incision (or start of procedure when no incision is required). OR Documentation that prophylactic antibiotic has been given within one hour prior to the surgical incision (or start of procedure when no incision is required). • CPT II 4048F: Documentation that prophylactic antibiotic was given within one hour (if fluoroquinolone or vancomycin, two hours) prior to surgical incision (or start of procedure when no incision is required).	Time Surgical Incision Date Surgical Incision Time	

	Endorsed Measure #0269: Timing of prophylactic antibiotics - administering physician	**Maintenance Measure #0125**: Timing of antibiotic prophylaxis for cardiac surgery patients	**Endorsed Measure #0270:** Timing of antibiotic prophylaxis- ordering physician	**Maintenance Measure #0527**: Prophylactic antibiotic received within 1 hour prior to surgical incision SCIP-Inf-1	**Endorsed Measure #0472:** Prophylactic antibiotic received within one hour prior to surgical incision or at the time of delivery – cesarean section.
	procedure when no incision is required). Medical Records: There must be documentation of order (written order, verbal order, or standing order/protocol) specifying that antibiotic is to be given within one hour (if vancomycin, two hours) prior to the surgical incision (or start of procedure when no incision is required). A sample should be determined using the most accurate data available in the settings in which the measure will be implemented. Sample sizes may be defined by different implementers. Hybrid: Users should follow the requirements of electronic data collection, select a sample of patients, and then supplement the electronic data where needed with medical record abstraction of data elements to fulfill measure				

	Endorsed Measure #0269: Timing of prophylactic antibiotics - administering physician	**Maintenance Measure #0125**: Timing of antibiotic prophylaxis for cardiac surgery patients	**Endorsed Measure #0270:** Timing of antibiotic prophylaxis- ordering physician	**Maintenance Measure #0527**: Prophylactic antibiotic received within 1 hour prior to surgical incision SCIP-Inf-1	**Endorsed Measure #0472:** Prophylactic antibiotic received within one hour prior to surgical incision or at the time of delivery – cesarean section.
	reporting requirements. EHR: Electronic Health Record (EHR) users may opt to use this methodology or the electronic data collection methodology described previously. EHR users should collect data on 100% of their denominator population instead of a sample. EHR users may opt to use the codes listed in the electronic data collection methodology to identify patients with documentation of administration of prophylactic antibiotic.				
Denominator	All surgical patients aged 18 years and older who have an order for a prophylactic parenteral antibiotic to be given within one hour (if vancomycin, two hours) prior to the surgical incision (or start of procedure when no incision is required).	Number of patients undergoing cardiac surgery. Time window: 12 months	All surgical patients aged 18 years and older undergoing procedures with the indications for prophylactic parenteral antibiotics Denominator (Eligible Population): All surgical patients aged 18 years and older undergoing procedures with the indications for	Number of surgical patients with: CABG (ICD-9-CM procedure codes 36.10-36.14, 36.19, 36.15-36.17, 36.2), other cardiac surgery (35.0-35.95, 35.98, 35.99), colon surgery (45.00, 45.03, 45.41, 45.49, 45.50, 45.7-45.90, 45.92-45.95, 46.03, 46.04, 46.1-46.14, 46.52, 46.75, 45.76,	All patients undergoing cesarean section without evidence of prior infection or already receiving prophylactic antibiotics for other reasons.

	Endorsed Measure #0269: Timing of prophylactic antibiotics - administering physician	**Maintenance Measure #0125**: Timing of antibiotic prophylaxis for cardiac surgery patients	**Endorsed Measure #0270:** Timing of antibiotic prophylaxis- ordering physician	**Maintenance Measure #0527**: Prophylactic antibiotic received within 1 hour prior to surgical incision SCIP-Inf-1	**Endorsed Measure #0472:** Prophylactic antibiotic received within one hour prior to surgical incision or at the time of delivery – cesarean section.
			prophylactic parenteral antibiotics.	46.91, 46.92, 46.94, 48.5, 48.6-48.69), hip arthroplasty (81.51, 81.52), knee arthroplasty (81.54), abdominal hysterectomy (68.3, 68.4, 68.6), vaginal hysterectomy (68.5-68.59, 68.7), or vascular surgery (38.34, 38.36, 38.37, 38.44, 38.48, 38.49, 38.51, 38.52. 38.64, 38.14, 38.16, 38.18, 39.25, 39.26, 39.29)	
Denominator Categories		Female, Male; 18 and older		Female, Male; Patients aged 18 and older	
Denominator Details	Electronic Collection: G-code, CPT-II code, and patient demographics (age, etc) are used to determine patients that are included in the measure: •? GXXXXX: Patient documented to have order for prophylactic parenteral antibiotic to be given within one hour (if vancomycin, two hours) prior to surgical incision (or start of procedure when no incision is required). OR •? CPT II XXXXF:	Number of cardiac surgery procedures; A cardiac procedure is determined as a procedure for which at least one of the following is not marked "no" or "missing" (note: full terms for STS field names are provided in brackets []): OpCAB[Coronary Artery Bypass], OpValve[Valve Surgery], VADProc [VAD Implanted or Removed], VSAV [Aortic Valve Procedure], VSMV [Mitral Valve Procedure],	• CPT Procedure Codes Integumentary: 15734, 15738, 19260, 19271, 19272, 19301-19307, 19361, 19364, 19366-19369 Le Fort Fractures: 21422, 21423, 21346-21348, 21432, 21433, 21435, 21436 Mandibular Fracture: 21454, 21461, 21462, 21465, 21470 Spine: 22325, 22612, 22630, 22800, 22802, 22804, 63030, 63042 Hip Reconstruction: 27125, 27130, 27132, 27134, 27137, 27138 Trauma (Fractures): 27235,	Included Populations: An ICD-9-CM Principal Procedure Code of selected surgeries (as defined in Appendix A, Table 5.10 for ICD-9-CM codes). AND An ICD-9-CM Principal Procedure Code of selected surgeries (as defined in Appendix A, Table 5.01-5.08 for ICD-9-CM codes).	

	Endorsed Measure #0269: Timing of prophylactic antibiotics - administering physician	**Maintenance Measure #0125**: Timing of antibiotic prophylaxis for cardiac surgery patients	**Endorsed Measure #0270:** Timing of antibiotic prophylaxis- ordering physician	**Maintenance Measure #0527**: Prophylactic antibiotic received within 1 hour prior to surgical incision SCIP-Inf-1	**Endorsed Measure #0472:** Prophylactic antibiotic received within one hour prior to surgical incision or at the time of delivery – cesarean section.
	Documentation of order for prophylactic parenteral antibiotic to be given within one hour (if vancomycin, two hours) prior to surgical incision (or start of procedure when no incision is required). Medical Records: There must be documentation of order (written order, verbal order, or standing order/protocol) specifying that antibiotic is to be given within one hour (if vancomycin, two hours) prior to the surgical incision (or start of procedure when no incision is required). A sample should be determined using the most accurate data available in the settings in which the measure will be implemented. Sample sizes may be defined by different implementers. Hybrid: Users should follow the requirements of	OpTricus [Tricuspid Valve Procedure Performed], OpPulm[Pulmonic Valve Procedure Performed], OpOCard [Other Cardiac Procedure other than CABG or Valve], OCarLVA [Left Ventricular Aneurysm Repair], OCarVSD [Ventricular Septal Defect Repair], OCarSVR [Surgical Ventricular Restoration], OCarCong [Congenital Defect Repair], OCarTrma [surgical procedure for an injury due to Cardiac Trauma], OCarCrTx [Cardiac Transplant], OCarACD [Arrhythmia Correction Surgery], OCAoProcType[Aortic Procedure Type], EndoProc [Endovascular Procedure (TEVAR)], OCTumor [resection of an intracardiac tumor], OCPulThromDis [Pulmonary Thromboembolectomy,, OCarOthr [Other Cardiac Procedure other than	27236, 27244, 27245, 27758, 27759, 27766, 27792, 27814 Knee Reconstruction: 27440-27443, 27445-27447 Laryngectomy: 31360, 31365, 31367, 31368, 31370, 31375, 31380, 31382, 31390, 31395 Vascular: 33877, 33880, 33881, 33883, 33886, 33891, 34800, 34802-34805, 34825, 34830-34832, 34900, 35081, 35091, 35102, 35131, 35141, 35151, 35601, 35606, 35612, 35616, 35621, 35623, 35626, 35631, 35636-35638, 35642, 35645-35647, 35650, 35651, 35654, 35656, 35661, 35663, 35665, 35666, 35671, 36830 Spleen and Lymph Nodes: 38115 Glossectomy: 41130, 41135, 41140, 41145, 41150, 41153, 41155 Esophagus: 43045, 43100, 43101, 43107, 43108, 43112, 43113, 43116-43118, 43121-43124, 43130, 43135, 43300, 43305, 43310, 43312, 43313, 43320, 43324-43326, 43330, 43331, 43340, 43341, 43350, 43351, 43352, 43360, 43361, 43400, 43401, 43405, 43410,		

	Endorsed Measure #0269: Timing of prophylactic antibiotics - administering physician	**Maintenance Measure #0125**: Timing of antibiotic prophylaxis for cardiac surgery patients	**Endorsed Measure #0270:** Timing of antibiotic prophylaxis- ordering physician	**Maintenance Measure #0527**: Prophylactic antibiotic received within 1 hour prior to surgical incision SCIP-Inf-1	**Endorsed Measure #0472:** Prophylactic antibiotic received within one hour prior to surgical incision or at the time of delivery – cesarean section.
	electronic data collection, select a sample of patients, and then supplement the electronic data where needed with medical record abstraction of data elements to fulfill measure reporting requirements. EHR: Electronic Health Record (EHR) users may opt to use this methodology or the electronic data collection methodology described previously. EHR users should collect data on 100% of their denominator population instead of a sample. EHR users may opt to use the codes listed in the electronic data collection methodology to identify all patients aged 18 years and older who have an order for a parenteral antibiotic to be given within one hour (if vancomycin, two hours) prior to the surgical incision (or start of	those listed previously], ECMO [Extracorporeal Membrane Oxygenation], OCarLasr [-Transmyocardial Laser Revascularization], OCarASD [Atrial Septal Defect Repair], OCarAFibSur [Atrial Fibrillation Surgical Procedure]	43415, 43420, 43425, 43496 Stomach: 43500-43502, 43510, 43520, 43600, 43605, 43610, 43611, 43620-43622, 43631-43634, 43640, 43641, 43653, 43800, 43810, 43820, 43825, 43830-43832, 43840, 43842, 43843, 43845-43848, 43850, 43855, 43860, 43865, 43870 Small Intestine: 44005, 44010, 44020, 44021, 44050, 44055, 44100, 44120, 44125-44127, 44130, 44132, 44133, 44135, 44136 Colon and Rectum: 43880, 44025, 44110, 44111, 44140, 44141, 44143-44147, 44150, 44151, 44155-44158, 44160, 44202, 44204-44208, 44210-44212, 44300, 44310, 44312, 44314, 44316, 44320, 44322, 44340, 44345, 44346, 44602-44605, 44615, 44620, 44625, 44626, 44640, 44650, 44660, 44661, 44700, 44950, 51597 Anus and Rectum: 45108, 45110-45114, 45116, 45119-45121, 45123, 45126, 45130, 45135, 45136, 45150, 45160, 45170, 45190, 45500, 45505, 45520, 45540, 45541, 45550, 45560, 45562, 45563, 45800,		

	Endorsed Measure #0269: Timing of prophylactic antibiotics - administering physician	**Maintenance Measure #0125**: Timing of antibiotic prophylaxis for cardiac surgery patients	**Endorsed Measure #0270:** Timing of antibiotic prophylaxis- ordering physician	**Maintenance Measure #0527**: Prophylactic antibiotic received within 1 hour prior to surgical incision SCIP-Inf-1	**Endorsed Measure #0472:** Prophylactic antibiotic received within one hour prior to surgical incision or at the time of delivery – cesarean section.
	procedure when no incision is required).		45805, 45820, 45825 Hepatic Surgery: 47133, 47135, 47136, 47140-47142 Biliary Surgery: 47420, 47425, 47460, 47480, 47560, 47561, 47570, 47600, 47605, 47610, 47612, 47620, 47700, 47701, 47711, 47712, 47715, 47719-47721, 47740, 47741, 47760, 47765, 47780, 47785, 47800, 47802, 47900 Pancreas: 48020, 48100, 48120, 48140, 48145, 48146, 48148, 48150, 48152-48155, 48160, 48500, 48510, 48511, 48520, 48540, 48545, 48547, 48548, 48550, 48554, 48556 Abdomen, Peritoneum, and Omentum: 49215, 49568 Renal Transplant: 50300, 50320, 50340, 50360, 50365, 50370, 50380 Gynecologic Surgery: 58150, 58152, 58180, 58200, 58210, 58260, 58262, 58263, 58267, 58270, 58275, 58280, 58285, 58290-58294 Acoustic Neuroma: 61591, 61595, 61596, 61598, 61520, 61526, 61530, 61606, 61616, 61618, 61619, 69720, 69955, 69960, 69970		

	Endorsed Measure #0269: Timing of prophylactic antibiotics - administering physician	**Maintenance Measure #0125**: Timing of antibiotic prophylaxis for cardiac surgery patients	**Endorsed Measure #0270:** Timing of antibiotic prophylaxis- ordering physician	**Maintenance Measure #0527**: Prophylactic antibiotic received within 1 hour prior to surgical incision SCIP-Inf-1	**Endorsed Measure #0472:** Prophylactic antibiotic received within one hour prior to surgical incision or at the time of delivery – cesarean section.
			Cochlear Implants: 69930 Neurological Surgery: 22524, 22554, 22558, 22600, 22612, 22630, 35301, 61154, 61312, 61313, 61315, 61510, 61512, 61518, 61548, 61697, 61700, 61750, 61751, 61867, 62223, 62230, 63015, 63020, 63030, 63042, 63045, 63047, 63056, 63075, 63081, 63267, 63276 Cardiothoracic Surgery: 33120, 33130, 33140, 33141, 33202, 33250, 33251, 33256, 33261, 33305, 33315, 33321, 33322, 33332, 33335, 33400, 33401, 33403-33406, 33410, 33411, 33413, 33416, 33422, 33425-33427, 33430, 33460, 33463-33465, 33475, 33496, 33510-33519, 33521-33523, 33530, 33533-33536, 33542, 33545, 33548, 33572, 35211, 35241, 35271 Cardiothoracic (Pacemaker): 33203, 33206-33208, 33212-33218, 33220, 33222-33226, 33233-33238, 33240, 33241, 33243, 33244, 33249, 33254, 33255 Genitourinary Surgery: 51550, 51555, 51565, 51570, 51575, 51580, 51585, 51590,		

	Endorsed Measure #0269: Timing of prophylactic antibiotics - administering physician	**Maintenance Measure #0125**: Timing of antibiotic prophylaxis for cardiac surgery patients	**Endorsed Measure #0270:** Timing of antibiotic prophylaxis- ordering physician	**Maintenance Measure #0527**: Prophylactic antibiotic received within 1 hour prior to surgical incision SCIP-Inf-1	**Endorsed Measure #0472:** Prophylactic antibiotic received within one hour prior to surgical incision or at the time of delivery – cesarean section.
			51595, 51596, 51920, 51925, 52450, 52601, 52612, 52614, 52620, 52630, 52647, 52648, 54401, 54405, 54406, 54408, 54410, 54415, 54416, 55801, 55810, 55812, 55815, 55821, 55831, 55840, 55842, 55845 General Thoracic Surgery: 19272, 21627, 21632, 21740, 21750, 21805, 21825, 31760, 31766, 31770, 31775, 31786, 31805, 32095, 32100, 32110, 32120, 32124, 32140, 32141, 32150, 32215, 32220, 32225, 32310, 32320, 32402, 32440, 32442, 32445, 32480, 32482, 32484, 32486, 32488, 32491, 32500, 32501, 32800, 32810, 32815, 32900, 32905, 32906, 32940, 33020, 33025, 33030, 33031, 33050, 33300, 33310, 33320, 34051, 35021, 35216, 35246, 35276, 35311, 35481, 35526, 37616, 38381, 38746, 38747, 39000, 39010, 39200, 39220, 39545, 39561, 60521, 60522, 64746. Foot & Ankle: 27702, 27703, 27704, 27870, 28192, 28193, 28293, 28296, 28299, 28300, 28306, 28307, 28308, 28309, 28310, 28320, 28322, 28415, 28420, 28445, 28465,		

	Endorsed Measure #0269: Timing of prophylactic antibiotics - administering physician	**Maintenance Measure #0125**: Timing of antibiotic prophylaxis for cardiac surgery patients	**Endorsed Measure #0270:** Timing of antibiotic prophylaxis- ordering physician	**Maintenance Measure #0527**: Prophylactic antibiotic received within 1 hour prior to surgical incision SCIP-Inf-1	**Endorsed Measure #0472:** Prophylactic antibiotic received within one hour prior to surgical incision or at the time of delivery – cesarean section.
			28485, 28505, 28525, 28531, 28555, 28585, 28615, 28645, 28675, 28705, 28715, 28725, 28730, 28735, 28737, 28740, 28750, 28755, 28760		
Exclusions	N/A	Cases are removed from the denominator if the patient had a documented contraindication or rationale for not administering antibiotic in medical record. Other exclusions include: - Patients who had a principal diagnosis suggestive of preoperative infectious diseases - Patients whose ICD-9-CM principal procedure was performed entirely by Laparoscope - Patients enrolled in clinical trials - Patients with documented infection prior to surgical procedure of interest - Patients who were receiving antibiotics more than 24 hours prior to surgery - Patients who were	Documentation of medical reason(s) for not ordering antibiotics to be given within one hour (if fluoroquinolone or vancomycin, two hours) prior to the surgical incision (or start of procedure when no incision is required).	•Principal or admission diagnosis suggestive of pre-operative infectious disease •Infectious diseases (001.0-139.8) •Meningitis (320.0-326) •Ear infection (380.0-380.23; 382.0-382.20) •Endocarditis (421.0-422.99) oRespiratory (460-466.19; 472-476.1; 480-487.8; 490-491.9; 510-511.9; 513-513.1) •Digestive (540-542; 575.0) •Renal (590-590.9; 595.0) •Prostate (601.0-601.9) •Gynecologic (614-614.9; 616-616.4) •Skin (680-686.9) •Musculo-skeletal (711.9-711.99, 730-730.99) •Fever of unknown origin (780.6)	

	Endorsed Measure #0269: Timing of prophylactic antibiotics - administering physician	**Maintenance Measure #0125**: Timing of antibiotic prophylaxis for cardiac surgery patients	**Endorsed Measure #0270:** Timing of antibiotic prophylaxis- ordering physician	**Maintenance Measure #0527**: Prophylactic antibiotic received within 1 hour prior to surgical incision SCIP-Inf-1	**Endorsed Measure #0472:** Prophylactic antibiotic received within one hour prior to surgical incision or at the time of delivery – cesarean section.
		receiving antibiotics within 24 hours prior to arrival This list will be provided in the STS Adult Cardiac Surgery Database Data Manager's Training Manual as acceptable exclusions.		•Septic shock (785.59) •Bacteremia (790.7) •Viremia (790.8) •Receiving antibiotics at the time of admission (except colon surgery patients taking oral prophylactic antibiotics) •Medical records do not include antibiotic start date/time or incision date/time •Receiving antibiotics more than 24 hours prior to surgery (except colon surgery patients taking oral prophylactic antibiotics) •Colon surgery patients who received oral prophylactic antibiotics only	
Exclusion Details		Timing of appropriate antibiotic administration (AbxTiming) is marked "Exclusion"	Append modifier to CPT Category II code: 4047F-1P	Data Elements: Admission Date Antibiotic Received Birthdate Clinical Trial Discharge Date Infection Prior to	

	Endorsed Measure #0269: Timing of prophylactic antibiotics - administering physician	**Maintenance Measure #0125**: Timing of antibiotic prophylaxis for cardiac surgery patients	**Endorsed Measure #0270:** Timing of antibiotic prophylaxis- ordering physician	**Maintenance Measure #0527**: Prophylactic antibiotic received within 1 hour prior to surgical incision SCIP-Inf-1	**Endorsed Measure #0472:** Prophylactic antibiotic received within one hour prior to surgical incision or at the time of delivery – cesarean section.
				Anesthesia Laparoscope Oral Antibiotics Other Surgeries	
Risk Adjustment	No risk adjustment necessary	No risk adjustment necessary	No risk adjustment necessary	No risk adjustment necessary	No risk adjustment necessary
Stratification		N/A		The antibiotic prophylaxis measures are stratified according to surgery type. The tables are subsets of Table 5.10 (see link for Specification Manual and Appendix A, Tables 5.01 to 5.08. The specific procedures must be in the large table (Table 5.10) to be eligible for the SCIP measures. The measure specific tables for SCIP-Inf-1 are 5.01 to 5.08.	
Type Score		Rate/proportion		Rate/proportion	
Algorithm		N/A		1.Start processing. Run cases that are included in the Surgical Care Improvement Project (SCIP) Initial Patient Population and pass the edits defined in the Transmission Data Processing Flow: Clinical through this measure. 2.Calculate Patient Age. The Patient Age, in years,	

	Endorsed Measure #0269: Timing of prophylactic antibiotics - administering physician	**Maintenance Measure #0125**: Timing of antibiotic prophylaxis for cardiac surgery patients	**Endorsed Measure #0270:** Timing of antibiotic prophylaxis- ordering physician	**Maintenance Measure #0527**: Prophylactic antibiotic received within 1 hour prior to surgical incision SCIP-Inf-1	**Endorsed Measure #0472:** Prophylactic antibiotic received within one hour prior to surgical incision or at the time of delivery – cesarean section.
				is equal to the Admission Date minus the Birthdate. Use the month and day portion of admission date and birthdate to yield the most accurate age. 3.Check Patient Age a.If the Patient Age is less than 18 years, the case will proceed to a Measure Category Assignment of B and will not be in the Measure Population. Stop processing for Centers for Medicare and Medicaid Services (CMS). Proceed to step 36 and check the Stratified Measures for Overall Rate (SCIP-Inf-1a) for The Joint Commission. b.If the Patient Age is greater than or equal to 18 years, continue processing and proceed to ICD-9-CM Principal Procedure Code. 4.Check ICD-9-CM Principal Procedure Code a.If the ICD-9-CM Principal Procedure Code is not on Table 5.01 or 5.02 or 5.03 or 5.04 or 5.05 or 5.06 or 5.07 or 5.08, the case will proceed to a	

	Endorsed Measure #0269: Timing of prophylactic antibiotics - administering physician	**Maintenance Measure #0125**: Timing of antibiotic prophylaxis for cardiac surgery patients	**Endorsed Measure #0270:** Timing of antibiotic prophylaxis- ordering physician	**Maintenance Measure #0527**: Prophylactic antibiotic received within 1 hour prior to surgical incision SCIP-Inf-1	**Endorsed Measure #0472:** Prophylactic antibiotic received within one hour prior to surgical incision or at the time of delivery – cesarean section.
				Measure Category Assignment of B and will not be in the Measure Population. Stop processing for CMS. Proceed to step 36 and check the Stratified Measures for Overall Rate (SCIP-Inf-1a) for The Joint Commission. b.If the ICD-9-CM Principal Procedure Code is on Table 5.01 or 5.02 or 5.03 or 5.04 or 5.05 or 5.06 or 5.07 or 5.08, continue processing and proceed to recheck ICD-9-CM Principal Procedure Code. 5.Recheck ICD-9-CM Principal Procedure Code a.If the ICD-9-CM Principal Procedure Code is on Table 5.06 or 5.07, continue processing and check ICD-9-CM Other Procedure Code. 1.If any of the ICD-9-CM Other Procedure Codes are on Table 4.07, the case will proceed to a Measure Category Assignment of B and will not be in the Measure Population. Stop	

	Endorsed Measure #0269: Timing of prophylactic antibiotics - administering physician	**Maintenance Measure #0125**: Timing of antibiotic prophylaxis for cardiac surgery patients	**Endorsed Measure #0270:** Timing of antibiotic prophylaxis- ordering physician	**Maintenance Measure #0527**: Prophylactic antibiotic received within 1 hour prior to surgical incision SCIP-Inf-1	**Endorsed Measure #0472:** Prophylactic antibiotic received within one hour prior to surgical incision or at the time of delivery – cesarean section.
				processing for CMS. Proceed to step 36 and check the Stratified Measures for Overall Rate (SCIP-Inf-1a) for The Joint Commission. 2.If all of the ICD-9-CM Other Procedure Codes are missing or none are on Table 4.07, continue processing and proceed to ICD-9-CM Principal Diagnosis Code. b.If the ICD-9-CM Principal Procedure Code is not on Table 5.06 or 5.07, continue processing and proceed to ICD-9-CM Principal Diagnosis Code. 6.Check ICD-9-CM Principal Diagnosis Code a.If the ICD-9-CM Principal Diagnosis Code is on Table 5.09, the case will proceed to a Measure Category Assignment of B and will not be in the Measure Population. Stop processing for CMS. Proceed to step 36 and check the Stratified Measures for Overall Rate (SCIP-Inf-1a) for The Joint	

	Endorsed Measure #0269: Timing of prophylactic antibiotics - administering physician	**Maintenance Measure #0125**: Timing of antibiotic prophylaxis for cardiac surgery patients	**Endorsed Measure #0270:** Timing of antibiotic prophylaxis- ordering physician	**Maintenance Measure #0527**: Prophylactic antibiotic received within 1 hour prior to surgical incision SCIP-Inf-1	**Endorsed Measure #0472:** Prophylactic antibiotic received within one hour prior to surgical incision or at the time of delivery – cesarean section.
				Commission. b.If the ICD-9-CM Principal Diagnosis Code is not on Table 5.09, continue processing and proceed to Laparoscope. 7.Check Laparoscope a.If Laparoscope is missing, the case will proceed to a Measure Category Assignment of X and will be rejected. Stop processing for CMS. Proceed to step 36 and check the Stratified Measures for Overall Rate (SCIP-Inf-1a) for The Joint Commission. b.If Laparoscope equals 1 or 3, the case will proceed to a Measure Category Assignment of B and will not be in the Measure Population. Stop processing for CMS. Proceed to step 36 and check the Stratified Measures for Overall Rate (SCIP-Inf-1a) for The Joint Commission. c.If Laparoscope equals 2, continue processing and proceed to Clinical Trial.	

	Endorsed Measure #0269: Timing of prophylactic antibiotics - administering physician	**Maintenance Measure #0125**: Timing of antibiotic prophylaxis for cardiac surgery patients	**Endorsed Measure #0270:** Timing of antibiotic prophylaxis- ordering physician	**Maintenance Measure #0527**: Prophylactic antibiotic received within 1 hour prior to surgical incision SCIP-Inf-1	**Endorsed Measure #0472:** Prophylactic antibiotic received within one hour prior to surgical incision or at the time of delivery – cesarean section.
				8.Check Clinical Trial a.If Clinical Trial is missing, the case will proceed to a Measure Category Assignment of X and will be rejected. Stop processing for CMS. Proceed to step 36 and check the Stratified Measures for Overall Rate (SCIP-Inf-1a) for The Joint Commission. b.If Clinical Trial equals Yes, the case will proceed to a Measure Category Assignment of B and will not be in the Measure Population. Stop processing for CMS. Proceed to step 36 and check the Stratified Measures for Overall Rate (SCIP-Inf-1a) for The Joint Commission. c.If Clinical Trial equals No, continue processing and proceed to Anesthesia Start Date. 9.Check Anesthesia Start Date a.If the Anesthesia Start Date is missing, the case will proceed to a Measure	

	Endorsed Measure #0269: Timing of prophylactic antibiotics - administering physician	**Maintenance Measure #0125**: Timing of antibiotic prophylaxis for cardiac surgery patients	**Endorsed Measure #0270:** Timing of antibiotic prophylaxis- ordering physician	**Maintenance Measure #0527**: Prophylactic antibiotic received within 1 hour prior to surgical incision SCIP-Inf-1	**Endorsed Measure #0472:** Prophylactic antibiotic received within one hour prior to surgical incision or at the time of delivery – cesarean section.
				Category Assignment of X and will be rejected. Stop processing for CMS. Proceed to step 36 and check the Stratified Measures for Overall Rate (SCIP-Inf-1a) for The Joint Commission. b.If the Anesthesia Start Date equals Unable To Determine, the case will proceed to a Measure Category Assignment of D and will be in the Measure Population. Stop processing for CMS. Proceed to step 36 and check the Stratified Measures for Overall Rate (SCIP-Inf-1a) for The Joint Commission c.If Anesthesia Start Date equals a Non Unable To Determine Value, continue processing and proceed to the Surgery Days calculation. 10.Calculate Surgery Days. Surgery Days, in days, is equal to the Anesthesia Start Date minus the Admission Date. 11.Check Surgery Days	

	Endorsed Measure #0269: Timing of prophylactic antibiotics - administering physician	**Maintenance Measure #0125**: Timing of antibiotic prophylaxis for cardiac surgery patients	**Endorsed Measure #0270:** Timing of antibiotic prophylaxis- ordering physician	**Maintenance Measure #0527**: Prophylactic antibiotic received within 1 hour prior to surgical incision SCIP-Inf-1	**Endorsed Measure #0472:** Prophylactic antibiotic received within one hour prior to surgical incision or at the time of delivery – cesarean section.
				a.If the Surgery Days is less than zero, the case will proceed to a Measure Category Assignment of B and will not be in the Measure Population. Stop processing for CMS. Proceed to step 36 and check the Stratified Measures for Overall Rate (SCIP-Inf-1a) for The Joint Commission. b.If the Surgery Days is greater than or equal to zero, continue processing and proceed to Infection Prior to Anesthesia. 12.Check Infection Prior to Anesthesia a.If Infection Prior to Anesthesia is missing, the case will proceed to a Measure Category Assignment of X and will be rejected. Stop processing for CMS. Proceed to step 36 and check the Stratified Measures for Overall Rate (SCIP-Inf-1a) for The Joint Commission. b.If Infection Prior to Anesthesia equals Yes, the	

	Endorsed Measure #0269: Timing of prophylactic antibiotics - administering physician	**Maintenance Measure #0125**: Timing of antibiotic prophylaxis for cardiac surgery patients	**Endorsed Measure #0270:** Timing of antibiotic prophylaxis- ordering physician	**Maintenance Measure #0527**: Prophylactic antibiotic received within 1 hour prior to surgical incision SCIP-Inf-1	**Endorsed Measure #0472:** Prophylactic antibiotic received within one hour prior to surgical incision or at the time of delivery – cesarean section.
				case will proceed to a Measure Category Assignment of B and will not be in the Measure Population. Stop processing for CMS. Proceed to step 36 and check the Stratified Measures for Overall Rate (SCIP-Inf-1a) for The Joint Commission. c.If Infection Prior to Anesthesia equals No, continue processing and proceed to Other Surgeries. 13.Check Other Surgeries a.If Other Surgeries is missing, the case will proceed to a Measure Category Assignment of X and will be rejected. Stop processing for CMS. Proceed to step 36 and check the Stratified Measures for Overall Rate (SCIP-Inf-1a) for The Joint Commission. b.If Other Surgeries equals Yes, the case will proceed to a Measure Category Assignment of B and will not be in the Measure	

	Endorsed Measure #0269: Timing of prophylactic antibiotics - administering physician	**Maintenance Measure #0125**: Timing of antibiotic prophylaxis for cardiac surgery patients	**Endorsed Measure #0270:** Timing of antibiotic prophylaxis- ordering physician	**Maintenance Measure #0527**: Prophylactic antibiotic received within 1 hour prior to surgical incision SCIP-Inf-1	**Endorsed Measure #0472:** Prophylactic antibiotic received within one hour prior to surgical incision or at the time of delivery – cesarean section.
				Population. Stop processing for CMS. Proceed to step 36 and check the Stratified Measures for Overall Rate (SCIP-Inf-1a) for The Joint Commission. c.If Other Surgeries equals No, continue processing and proceed to Surgical Incision Date. 14.Check Surgical Incision Date a.If the Surgical Incision Date is missing, the case will proceed to a Measure Category Assignment of X and will be rejected. Stop processing for CMS. Proceed to step 36 and check the Stratified Measures for Overall Rate (SCIP- Inf-1a) for The Joint Commission. b.If the Surgical Incision Date equals Unable To Determine, the case will proceed to a Measure Category Assignment of D and will be in the Measure Population. Stop processing for CMS. Proceed to step 36 and	

	Endorsed Measure #0269: Timing of prophylactic antibiotics - administering physician	**Maintenance Measure #0125**: Timing of antibiotic prophylaxis for cardiac surgery patients	**Endorsed Measure #0270:** Timing of antibiotic prophylaxis- ordering physician	**Maintenance Measure #0527**: Prophylactic antibiotic received within 1 hour prior to surgical incision SCIP-Inf-1	**Endorsed Measure #0472:** Prophylactic antibiotic received within one hour prior to surgical incision or at the time of delivery – cesarean section.
				check the Stratified Measures for Overall Rate (SCIP-Inf-1a) for The Joint Commission. c.If Surgical Incision Date equals a Non Unable To Determine Value, continue processing and proceed to Antibiotic Received. 15.Check Antibiotic Received a.If Antibiotic Received equals 1 or 2, continue processing and proceed to recheck ICD-9-CM Principal Procedure Code b.If Antibiotic Received equals 4, the case will proceed to a Measure Category Assignment of D and will be in the Measure Population. Stop processing for CMS. Proceed to step 36 and check the Stratified Measures for Overall Rate (SCIP-Inf-1a) for The Joint Commission. c.If Antibiotic Received equals 3, continue processing and proceed to step 19 and check Antibiotic Name. Do not	

	Endorsed Measure #0269: Timing of prophylactic antibiotics - administering physician	**Maintenance Measure #0125**: Timing of antibiotic prophylaxis for cardiac surgery patients	**Endorsed Measure #0270:** Timing of antibiotic prophylaxis- ordering physician	**Maintenance Measure #0527**: Prophylactic antibiotic received within 1 hour prior to surgical incision SCIP-Inf-1	**Endorsed Measure #0472:** Prophylactic antibiotic received within one hour prior to surgical incision or at the time of delivery – cesarean section.
				check ICD-9-CM Principal Procedure Code, Oral Antibiotics or Antibiotic Received. 16.Recheck ICD-9-CM Principal Procedure Code only if Antibiotic Received equals 1 or 2 a.If the ICD-9-CM Principal Procedure Code is not on Table 5.03, the case will proceed to a Measure Category Assignment of B and will not be in the measure population. Stop processing for CMS. Proceed to step 36 and check the Stratified Measures for Overall Rate (SCIP-Inf-1a) for The Joint Commission. b.If the ICD-9-CM Principal Procedure Code is on Table 5.03, continue processing and proceed to check Oral Antibiotics. 17.Check Oral Antibiotics a.If Oral Antibiotics is missing, the case will proceed to a Measure Category Assignment of X and will be rejected. Stop	

	Endorsed Measure #0269: Timing of prophylactic antibiotics - administering physician	**Maintenance Measure #0125**: Timing of antibiotic prophylaxis for cardiac surgery patients	**Endorsed Measure #0270:** Timing of antibiotic prophylaxis- ordering physician	**Maintenance Measure #0527**: Prophylactic antibiotic received within 1 hour prior to surgical incision SCIP-Inf-1	**Endorsed Measure #0472:** Prophylactic antibiotic received within one hour prior to surgical incision or at the time of delivery – cesarean section.
				processing for CMS. Proceed to step 36 and check the Stratified Measures for Overall Rate (SCIP-Inf-1a) for The Joint Commission. b. If Oral Antibiotics equals No, the case will proceed to a Measure Category Assignment of B and will not be in the Measure Population. Stop processing for CMS. Proceed to step 36 and check the Stratified Measures for Overall Rate (SCIP-Inf-1a) for The Joint Commission. c.If Oral Antibiotics equals Yes, continue processing and proceed to recheck Antibiotic Received. 18.Recheck Antibiotic Received a.If Antibiotic Received equals 1, the case will proceed to a Measure Category Assignment of D and will be in the Measure Population. Stop processing for CMS. Proceed to step 36 and check the Stratified	

	Endorsed Measure #0269: Timing of prophylactic antibiotics - administering physician	**Maintenance Measure #0125**: Timing of antibiotic prophylaxis for cardiac surgery patients	**Endorsed Measure #0270:** Timing of antibiotic prophylaxis- ordering physician	**Maintenance Measure #0527**: Prophylactic antibiotic received within 1 hour prior to surgical incision SCIP-Inf-1	**Endorsed Measure #0472:** Prophylactic antibiotic received within one hour prior to surgical incision or at the time of delivery – cesarean section.
				Measures for Overall Rate (SCIP-Inf-1a) for The Joint Commission. b.If Antibiotic Received equals 2, continue processing and proceed to Antibiotic Name. 19.Check Antibiotic Name a.If the Antibiotic Grid is not populated, the case will proceed to a Measure Category Assignment of X and will be rejected. Stop processing for CMS. Proceed to step 36 and check the Stratified Measures for Overall Rate (SCIP-Inf-1a) for The Joint Commission. Note: The front-end edits reject cases containing invalid data and/or an incomplete Antibiotic Grid. A complete Antibiotic Grid requires all data elements in the row to contain either a valid value and/or Unable to Determine. b.If the Antibiotic Name is on Table 2.1, continue processing and proceed to Antibiotic Administration	

	Endorsed Measure #0269: Timing of prophylactic antibiotics - administering physician	**Maintenance Measure #0125**: Timing of antibiotic prophylaxis for cardiac surgery patients	**Endorsed Measure #0270:** Timing of antibiotic prophylaxis- ordering physician	**Maintenance Measure #0527**: Prophylactic antibiotic received within 1 hour prior to surgical incision SCIP-Inf-1	**Endorsed Measure #0472:** Prophylactic antibiotic received within one hour prior to surgical incision or at the time of delivery – cesarean section.
				Route. 20.Check Antibiotic Administration Route a.If the Antibiotic Administration Route is equal to 3 or 10 for all antibiotic doses, the case will proceed to a Measure Category Assignment of D and will be in the Measure Population. Stop processing for CMS. Proceed to step 36 and check the Stratified Measures for Overall Rate (SCIP-Inf-1a) for The Joint Commission. b.If the Antibiotic Administration Route is equal to 1 or 2 for any antibiotic dose, continue processing and proceed to Antibiotic Administration Date. Proceed only with antibiotic doses on Table 2.1 that are administered via routes 1 or 2. 21.Check Antibiotic Administration Date a.If the Antibiotic Administration Date is equal to Unable to Determine for all	

	Endorsed Measure #0269: Timing of prophylactic antibiotics - administering physician	**Maintenance Measure #0125**: Timing of antibiotic prophylaxis for cardiac surgery patients	**Endorsed Measure #0270:** Timing of antibiotic prophylaxis- ordering physician	**Maintenance Measure #0527**: Prophylactic antibiotic received within 1 hour prior to surgical incision SCIP-Inf-1	**Endorsed Measure #0472:** Prophylactic antibiotic received within one hour prior to surgical incision or at the time of delivery – cesarean section.
				antibiotic doses, the case will proceed to a Measure Category Assignment of D and will be in the Measure Population. Stop processing for CMS. Proceed to step 36 and check the Stratified Measures for Overall Rate (SCIP-Inf-1a) for The Joint Commission. b.If the Antibiotic Administration Date is equal to a Non Unable to Determine date for at least one antibiotic dose, continue processing and proceed to the Antibiotic Days I calculation. Note: Proceed only with antibiotic doses that have an associated non Unable to Determine date. 22.Calculate Antibiotic Days I. Antibiotic Days I, in days, is equal to the Surgical Incision Date minus the Antibiotic Administration Date. 23.Check Antibiotic Days I a.If the Antibiotic Days I is greater than 1 for at least one antibiotic dose,	

	Endorsed Measure #0269: Timing of prophylactic antibiotics - administering physician	**Maintenance Measure #0125**: Timing of antibiotic prophylaxis for cardiac surgery patients	**Endorsed Measure #0270:** Timing of antibiotic prophylaxis- ordering physician	**Maintenance Measure #0527**: Prophylactic antibiotic received within 1 hour prior to surgical incision SCIP-Inf-1	**Endorsed Measure #0472:** Prophylactic antibiotic received within one hour prior to surgical incision or at the time of delivery – cesarean section.
				continue processing and recheck the ICD-9-CM Principal Procedure Code. b.If the Antibiotic Days I is less than or equal to 1 for all antibiotic doses, continue processing. Proceed to step 26 and recheck Antibiotics Days I. Do not recheck ICD-9-CM Principal Procedure Code or Oral Antibiotics. 24.Recheck ICD-9-CM Principal Procedure Code only if the Antibiotic Days I is greater than 1 for at least one antibiotic dose a.If the ICD-9-CM Principal Procedure Code is not on Table 5.03, the case will proceed to a Measure Category Assignment of B and will not be in the Measure Population. Stop processing for CMS. Proceed to step 36 and check the Stratified Measures for Overall Rate (SCIP-Inf-1a) for The Joint Commission. b.If the ICD-9-CM Principal Procedure Code	

	Endorsed Measure #0269: Timing of prophylactic antibiotics - administering physician	**Maintenance Measure #0125**: Timing of antibiotic prophylaxis for cardiac surgery patients	**Endorsed Measure #0270:** Timing of antibiotic prophylaxis- ordering physician	**Maintenance Measure #0527**: Prophylactic antibiotic received within 1 hour prior to surgical incision SCIP-Inf-1	**Endorsed Measure #0472:** Prophylactic antibiotic received within one hour prior to surgical incision or at the time of delivery – cesarean section.
				is on Table 5.03, continue processing and check Oral Antibiotics. 25.Check Oral Antibiotics a.If Oral Antibiotics is missing, the case will proceed to a Measure Category Assignment of X and will be rejected. Stop processing for CMS. Proceed to step 36 and check the Stratified Measures for Overall Rate (SCIP-Inf-1a) for The Joint Commission. b. If Oral Antibiotics equals No, the case will proceed to a Measure Category Assignment of B and will not be in the Measure Population. Stop processing for CMS. Proceed to step 36 and check the Stratified Measures for Overall Rate (SCIP-Inf-1a) for The Joint Commission. c.If Oral Antibiotics equals Yes, continue processing and proceed to step 27 and check Surgical Incision Time. Do not recheck Antibiotic Days I.	

	Endorsed Measure #0269: Timing of prophylactic antibiotics - administering physician	**Maintenance Measure #0125**: Timing of antibiotic prophylaxis for cardiac surgery patients	**Endorsed Measure #0270:** Timing of antibiotic prophylaxis- ordering physician	**Maintenance Measure #0527**: Prophylactic antibiotic received within 1 hour prior to surgical incision SCIP-Inf-1	**Endorsed Measure #0472:** Prophylactic antibiotic received within one hour prior to surgical incision or at the time of delivery – cesarean section.
				26.Recheck Antibiotic Days I a.If the Antibiotic Days I is less than zero for all antibiotic doses, the case will proceed to a Measure Category Assignment of D and will be in the Measure Population. Stop processing for CMS. Proceed to step 36 and check the Stratified Measures for Overall Rate (SCIP-Inf-1a) for The Joint Commission. b.If the Antibiotic Days I is greater than or equal to zero for any antibiotic dose, continue processing and proceed to Surgical Incision Time. 27.Check Surgical Incision Time a.If the Surgical Incision Time is missing, the case will proceed to a Measure Category Assignment of X and will be rejected. Stop processing for CMS. Proceed to step 36 and check the Stratified Measures for Overall Rate (SCIP-Inf-1a) for The Joint	

	Endorsed Measure #0269: Timing of prophylactic antibiotics - administering physician	**Maintenance Measure #0125**: Timing of antibiotic prophylaxis for cardiac surgery patients	**Endorsed Measure #0270:** Timing of antibiotic prophylaxis- ordering physician	**Maintenance Measure #0527**: Prophylactic antibiotic received within 1 hour prior to surgical incision SCIP-Inf-1	**Endorsed Measure #0472:** Prophylactic antibiotic received within one hour prior to surgical incision or at the time of delivery – cesarean section.
				Commission. b.If the Surgical Incision Time is equal to Unable to Determine, the case will proceed to a Measure Category Assignment of D and will be in the Measure Population. Stop processing for CMS. Proceed to step 36 and check the Stratified Measures for Overall Rate (SCIP-Inf-1a) for The Joint Commission. c.If the Surgical Incision Time is equal to a Non Unable to Determine Value, continue processing and check Antibiotic Administration Time. 28.Check Antibiotic Administration Time a.If the Antibiotic Administration Time equals Unable to Determine for all antibiotic doses, the case will proceed to a Measure Category Assignment of D and will be in the Measure Population. Stop processing for CMS.	

	Endorsed Measure #0269: Timing of prophylactic antibiotics - administering physician	**Maintenance Measure #0125**: Timing of antibiotic prophylaxis for cardiac surgery patients	**Endorsed Measure #0270:** Timing of antibiotic prophylaxis- ordering physician	**Maintenance Measure #0527**: Prophylactic antibiotic received within 1 hour prior to surgical incision SCIP-Inf-1	**Endorsed Measure #0472:** Prophylactic antibiotic received within one hour prior to surgical incision or at the time of delivery – cesarean section.
				Proceed to step 36 and check the Stratified Measures for Overall Rate (SCIP-Inf-1a) for The Joint Commission. b.If the Antibiotic Administration Time equals a Non Unable to Determine time for at least one antibiotic dose, continue processing and proceed to the Antibiotic Timing I calculation. Note: Proceed only with antibiotic doses that have an associated non Unable to Determine time. 29.Calculate Antibiotic Timing I. Antibiotic Timing I, in minutes, is equal to the Surgical Incision Date and Surgical Incision Time minus the Antibiotic Administration Date and Antibiotic Administration Time. 30.Check Antibiotic Timing I a.If the Antibiotic Timing I is greater than 1440 minutes for any antibiotic dose, continue processing and recheck the ICD-9-CM	

	Endorsed Measure #0269: Timing of prophylactic antibiotics - administering physician	**Maintenance Measure #0125**: Timing of antibiotic prophylaxis for cardiac surgery patients	**Endorsed Measure #0270:** Timing of antibiotic prophylaxis- ordering physician	**Maintenance Measure #0527**: Prophylactic antibiotic received within 1 hour prior to surgical incision SCIP-Inf-1	**Endorsed Measure #0472:** Prophylactic antibiotic received within one hour prior to surgical incision or at the time of delivery – cesarean section.
				Principal Procedure Code. b.If the Antibiotic Timing I is less than or equal to 1440 minutes for all antibiotic doses, continue processing. Proceed to step 33 and recheck Antibiotic Timing I. Do not recheck ICD-9-CM Principal Procedure Code or Oral Antibiotics. 31.Recheck ICD-9-CM Principal Procedure Code only if the Antibiotic Timing I is greater than 1440 minutes for any antibiotic dose a.If the ICD-9-CM Principal Procedure Code is not on Table 5.03, the case will proceed to a Measure Category Assignment of B and will not be in the Measure Population. Stop processing for CMS. Proceed to step 36 and check the Stratified Measures for Overall Rate (SCIP-Inf-1a) for The Joint Commission. b.If the ICD-9-CM Principal Procedure Code	

	Endorsed Measure #0269: Timing of prophylactic antibiotics - administering physician	**Maintenance Measure #0125**: Timing of antibiotic prophylaxis for cardiac surgery patients	**Endorsed Measure #0270:** Timing of antibiotic prophylaxis- ordering physician	**Maintenance Measure #0527**: Prophylactic antibiotic received within 1 hour prior to surgical incision SCIP-Inf-1	**Endorsed Measure #0472:** Prophylactic antibiotic received within one hour prior to surgical incision or at the time of delivery – cesarean section.
				is on Table 5.03, continue processing and check Oral Antibiotics. 32.Check Oral Antibiotics a.If Oral Antibiotics is missing, the case will proceed to a Measure Category Assignment of X and will be rejected. Stop processing for CMS. Proceed to step 36 and check the Stratified Measures for Overall Rate (SCIP-Inf-1a) for The Joint Commission. b.If Oral Antibiotics equals No, the case will proceed to a Measure Category Assignment of B and will not be in the Measure Population. Stop Specifications Manual for National Hospital Inpatient Quality Measures Discharges 10-01-10 (4Q10) through 03-31-11 (1Q11) SCIP-Inf-1-18 processing for CMS. Proceed to step 36 and check the Stratified Measures for Overall Rate (SCIP-Inf-1a) for The Joint	

	Endorsed Measure #0269: Timing of prophylactic antibiotics - administering physician	**Maintenance Measure #0125**: Timing of antibiotic prophylaxis for cardiac surgery patients	**Endorsed Measure #0270:** Timing of antibiotic prophylaxis- ordering physician	**Maintenance Measure #0527**: Prophylactic antibiotic received within 1 hour prior to surgical incision SCIP-Inf-1	**Endorsed Measure #0472:** Prophylactic antibiotic received within one hour prior to surgical incision or at the time of delivery – cesarean section.
				Commission. c.If Oral Antibiotics equals Yes, continue processing and proceed to recheck Antibiotic Timing I. 33.Recheck Antibiotic Timing I a.If the Antibiotic Timing I is greater than or equal to zero minutes and less than or equal to 60 minutes for at least one antibiotic dose, the case will proceed to a Measure Category Assignment of E and will be in the Numerator Population. Stop processing for CMS. Proceed to step 36 and check the Stratified Measures for Overall Rate (SCIP-Inf-1a) for The Joint Commission. b.If the Antibiotic Timing I is less than zero minutes or greater than 60 minutes for all antibiotic doses, continue processing and recheck Antibiotic Name. 34.Recheck Antibiotic Name a.If the Antibiotic Name is on Table 3.8 or Table 3.10	

	Endorsed Measure #0269: Timing of prophylactic antibiotics - administering physician	**Maintenance Measure #0125**: Timing of antibiotic prophylaxis for cardiac surgery patients	**Endorsed Measure #0270:** Timing of antibiotic prophylaxis- ordering physician	**Maintenance Measure #0527**: Prophylactic antibiotic received within 1 hour prior to surgical incision SCIP-Inf-1	**Endorsed Measure #0472:** Prophylactic antibiotic received within one hour prior to surgical incision or at the time of delivery – cesarean section.
				for at least one dose, continue processing and recheck Antibiotic Timing I. b.If the Antibiotic Name is not on Table 3.8 or Table 3.10 for any dose, the case will proceed to a Measure Category Assignment of D and will be in the Measure Population. Do not recheck Antibiotic Timing I. Stop processing for CMS. Proceed to step 36 and check the Stratified Measures for Overall Rate (SCIP-Inf-1a) for The Joint Commission. 35.Recheck Antibiotic Timing I a.If the Antibiotic Timing I is greater than 60 minutes and less than or equal to 120 minutes for at least one antibiotic dose on Table 3.8 or Table 3.10, the case will proceed to a Measure Category Assignment of E and will be in the Numerator Population. Stop processing for CMS. Proceed to Stratified	

	Endorsed Measure #0269: Timing of prophylactic antibiotics - administering physician	**Maintenance Measure #0125**: Timing of antibiotic prophylaxis for cardiac surgery patients	**Endorsed Measure #0270:** Timing of antibiotic prophylaxis- ordering physician	**Maintenance Measure #0527**: Prophylactic antibiotic received within 1 hour prior to surgical incision SCIP-Inf-1	**Endorsed Measure #0472:** Prophylactic antibiotic received within one hour prior to surgical incision or at the time of delivery – cesarean section.
				Measures for Overall Rate (SCIP-Inf-1a) for The Joint Commission. b.If the Antibiotic Timing I is less than zero minutes or greater than 120 minutes for all antibiotic doses on Table 3.8 or Table 3.10, the case will proceed to a Measure Category Assignment of D and will be in the Measure Population. Stop processing for CMS. Proceed to Stratified Measures for Overall Rate (SCIP-Inf-1a) for The Joint Commission. 36.For The Joint Commission Only, continue processing for the Stratified Measures. Note: Initialize the Measure Category Assignment for each strata measure (b-g) to equal B, not in the Measure Population. Do not change the Measure Category Assignment that was already calculated for the overall rate (SCIP-Inf-1a). The rest of the algorithm	

	Endorsed Measure #0269: Timing of prophylactic antibiotics - administering physician	**Maintenance Measure #0125**: Timing of antibiotic prophylaxis for cardiac surgery patients	**Endorsed Measure #0270:** Timing of antibiotic prophylaxis- ordering physician	**Maintenance Measure #0527**: Prophylactic antibiotic received within 1 hour prior to surgical incision SCIP-Inf-1	**Endorsed Measure #0472:** Prophylactic antibiotic received within one hour prior to surgical incision or at the time of delivery – cesarean section.
				will reset the appropriate Measure Category Assignment to be equal to the overall rate´s (SCIP-Inf-1a) Measure Category Assignment. 37.Check Overall Rate Category Assignment a.If the Overall Rate Category Assignment is equal to B or X, set the Measure Category Assignment for the strata measures (SCIP-Inf-1b through SCIP-Inf-1h) to equal B, not in the Measure Population. Stop processing. b.If the Overall Rate Category Assignment is equal to D or E, continue processing and check the ICD-9-CM Principal Procedure Code. 38.Check ICD-9-CM Principal Procedure Code a.If the ICD-9-CM Principal Procedure Code is on Table 5.01, for Stratified Measure SCIP-Inf-1b, set the Measure Category Assignment for measure SCIP-Inf-1b to	

	Endorsed Measure #0269: Timing of prophylactic antibiotics - administering physician	**Maintenance Measure #0125**: Timing of antibiotic prophylaxis for cardiac surgery patients	**Endorsed Measure #0270:** Timing of antibiotic prophylaxis- ordering physician	**Maintenance Measure #0527**: Prophylactic antibiotic received within 1 hour prior to surgical incision SCIP-Inf-1	**Endorsed Measure #0472:** Prophylactic antibiotic received within one hour prior to surgical incision or at the time of delivery – cesarean section.
				equal the Measure Category Assignment for measure SCIP-Inf-1a. Stop processing. b.If the ICD-9-CM Principal Procedure Code is on Table 5.02 or 5.03 or 5.04 or 5.05 or 5.06 or 5.07 or 5.08, continue processing and recheck the ICD-9-CM Principal Procedure Code. 39.Recheck ICD-9-CM Principal Procedure Code a.If the ICD-9-CM Principal Procedure Code is on Table 5.02, for Stratified Measure SCIP-Inf-1c, set the Measure Category Assignment for measure SCIP-Inf-1c to equal the Measure Category Assignment for measure SCIP-Inf-1a. Stop processing. b.If the ICD-9-CM Principal Procedure Code is on Table 5.03 or 5.04 or 5.05 or 5.06 or 5.07 or 5.08, continue processing and recheck the ICD-9-CM Principal Procedure Code. 40.Recheck ICD-9-CM	

	Endorsed Measure #0269: Timing of prophylactic antibiotics - administering physician	**Maintenance Measure #0125**: Timing of antibiotic prophylaxis for cardiac surgery patients	**Endorsed Measure #0270:** Timing of antibiotic prophylaxis- ordering physician	**Maintenance Measure #0527**: Prophylactic antibiotic received within 1 hour prior to surgical incision SCIP-Inf-1	**Endorsed Measure #0472:** Prophylactic antibiotic received within one hour prior to surgical incision or at the time of delivery – cesarean section.
				Principal Procedure Code a.If the ICD-9-CM Principal Procedure Code is on Table 5.04, for Stratified Measure SCIP-Inf-1d, set the Measure Category Assignment for measure SCIP-Inf-1d to equal the Measure Category Assignment for measure SCIP-Inf-1a. Stop processing. b.If the ICD-9-CM Principal Procedure Code is on Table 5.03 or 5.05 or 5.06 or 5.07 or 5.08, continue processing and recheck the ICD-9-CM Principal Procedure Code. 41.Recheck ICD-9-CM Principal Procedure Code a.If the ICD-9-CM Principal Procedure Code is on Table 5.05, for Stratified Measure SCIP-Inf-1e, set the Measure Category Assignment for measure SCIP-Inf-1e to equal the Measure Category Assignment for measure SCIP-Inf-1a. Stop processing.	

	Endorsed Measure #0269: Timing of prophylactic antibiotics - administering physician	**Maintenance Measure #0125**: Timing of antibiotic prophylaxis for cardiac surgery patients	**Endorsed Measure #0270:** Timing of antibiotic prophylaxis- ordering physician	**Maintenance Measure #0527**: Prophylactic antibiotic received within 1 hour prior to surgical incision SCIP-Inf-1	**Endorsed Measure #0472:** Prophylactic antibiotic received within one hour prior to surgical incision or at the time of delivery – cesarean section.
				b.If the ICD-9-CM Principal Procedure Code is on Table 5.03 or 5.06 or 5.07 or 5.08, continue processing and recheck the ICD-9-CM Principal Procedure Code. 42.Recheck ICD-9-CM Principal Procedure Code a.If the ICD-9-CM Principal Procedure Code is on Table 5.03, for Stratified Measure SCIP-Inf-1f, set the Measure Category Assignment for measure SCIP-Inf-1f to equal the Measure Category Assignment for measure SCIP-Inf-1a. Stop processing. b.If the ICD-9-CM Principal Procedure Code is on Table 5.06 or 5.07 or 5.08, continue processing and recheck the ICD-9-CM Principal Procedure Code. 43.Recheck ICD-9-CM Principal Procedure Code a.If the ICD-9-CM Principal Procedure Code is on Table 5.06 or 5.07, for Stratified Measure SCIP-Inf-1g, set the Measure	

	Endorsed Measure #0269: Timing of prophylactic antibiotics - administering physician	**Maintenance Measure #0125**: Timing of antibiotic prophylaxis for cardiac surgery patients	**Endorsed Measure #0270:** Timing of antibiotic prophylaxis- ordering physician	**Maintenance Measure #0527**: Prophylactic antibiotic received within 1 hour prior to surgical incision SCIP-Inf-1	**Endorsed Measure #0472:** Prophylactic antibiotic received within one hour prior to surgical incision or at the time of delivery – cesarean section.
				Category Assignment for measure SCIP-Inf-1g to equal the Measure Category Assignment for measure SCIP-Inf-1a. Stop processing. b.If the ICD-9-CM Principal Procedure Code is on Table 5.08, for Stratified Measure SCIP-Inf-1h, set the Measure Category Assignment for measure SCIP-Inf-1h to equal the Measure Category Assignment for measure SCIP-Inf-1a. Stop processing.	
Data Source	Electronic administrative data/claims	Registry data	Electronic administrative data/claims, lab data, paper medical record/flow-sheet	Electronic administrative data/claims, paper medical record/flow-sheet	Lab data, paper medical record/flow-sheet, survey: patient
Level of Measurement /Analysis	Clinicians: individual	Clinicians: Group; Facility/agency; Population: National, regional/network, states, counties or cities	Clinicians: Individual, group	Facility/agency	Facility/agency
Care Settings	Hospital, Ambulatory care: Ambulatory surgery center	Hospital	Hospital, Ambulatory care: Ambulatory surgery center	Hospital	Hospital

Statin Medication

	Maintenance Measure #0118: Anti-lipid treatment discharge	**New Candidate Measure #1519:** Statin therapy at discharge after lower extremity bypass (LEB)
Status	Currently undergoing maintenance review	Currently undergoing review
Steward	Society of Thoracic Surgeons	Society of Vascular Surgery
Description	Percent of patients aged 18 years and older undergoing isolated CABG who were discharged on a statin or other lipid-lowering regimen.	Percentage of patients aged 18 years and older undergoing infrainguinal lower extremity bypass who are prescribed a statin medication at discharge. This measure is proposed for both hospitals and individual providers.
Type of Measure	Process	Process
Numerator	Number of patients undergoing isolated CABG who were discharged on a statin or other lipid-lowering regimen. Time window:	Patients undergoing infrainguinal lower extremity bypass who are prescribed a statin medication at discharge. Time window: Lifetime for provider reporting, annual for hospital reporting.
Numerator Details	Number of isolated CABG procedures in which discharge lipid lowering medication [DCLipid (STS Adult Cardiac Surgery Database Version 2.73)] is marked "yes"	A registry that includes anatomic details or CPT procedure codes is required to identify patients for numerator inclusion. The Society for Vascular Surgery Vascular Quality Initiative (SVS VQI) and the Vascular Study Group of New England (VSGNE)registries capture detailed anatomic information. Infrainguinal lower extremity bypass is defined as a bypass beginning at or below the external iliac artery and extending into the ipsilateral leg. It includes procedures with CPT codes 35656, 35556, 35583, 35666, 35566, 35585, 35671, 35571, 35587. The numerator is calculated as the number of patients age 18 and over undergoing such a procedure who are prescribed a statin medication at the time of discharge, which is also captured in the above registries.
Denominator	All patients undergoing isolated CABG.	All patients aged 18 years and older undergoing lower extremity bypass as defined above who are discharged alive, excluding those patients who are

	Maintenance Measure #0118: Anti-lipid treatment discharge	**New Candidate Measure #1519:** Statin therapy at discharge after lower extremity bypass (LEB)
	Time window: 12 months	intolerant to statins. Time window: Lifetime for provider reporting, annual for hospital reporting.
Denominator Categories	Female, Male; 18 yrs and older	Female, Male; 18 years or older
Denominator Details	Number of isolated CABG procedures excluding cases with in-hospital mortality or cases for which discharge anti-lipid treatment use was contraindicated. Isolated CABG is determined as a procedure for which all of the following apply: - OpCAB is marked "Yes" - (VADProc is marked "No" or "Missing") or (VADProc is marked "Yes, Implanted" and UnplVAD is marked "yes") - OCarASDTy is marked "PFO" or "missing" - OCarAFibAProc is marked "primarily epicardial" or "missing" and - OpValve, VSAV, VSAVPr, ResectSubA, VSMV, VSMVPr, OpTricus, OpPulm, OpONCard, OCarLVA, OCarVSD, OCarSVR, OCarCong, OCarTrma, OCarCrTx, OCAoProcType, EndoProc, OCTumor, OCPulThromDis, OCarOthr are all marked "no" or "missing"	A registry that includes anatomic details or CPT procedure codes is required to identify patients for denominator inclusion. The Society for Vascular Surgery Vascular Quality Initiative and the Vascular Study Group of New England registries capture detailed anatomic information. Infrainguinal lower extremity bypass is defined as a bypass beginning at or below the external iliac artery and extending into the ipsilateral leg. It includes procedures with CPT codes 35656, 35556, 35583, 35666, 35566, 35585, 35671, 35571, 35587. Only patients who are discharged alive are included in the denominator, and patients who are intolerant to statins are excluded, as described below.
Exclusions	Cases are removed from the denominator if there was an in-hospital mortality or if discharge anti-lipid treatment was contraindicated.	Chart documentation that patient was not an eligible candidate for statin therapy due to known drug intolerance, or patient died before discharge.
Exclusion Details	Mortality Discharge Status (MtDCStat), Mortality Date (MtDate), and Discharge Date (DischDt) indicate an in-hospital mortality; DCLipid is marked as "Contraindicated"	Chart documentation that patient was not an eligible candidate for statin therapy due to known drug intolerance, or patient died before discharge. These data are captured in the SVS VQI and VSGNE registries.
Risk Adjustment	No risk adjustment necessary	No risk adjustment necessary
Stratification		Not required
Type Score	Rate/proportion	Rate/proportion

	Maintenance Measure #0118: Anti-lipid treatment discharge	**New Candidate Measure #1519:** Statin therapy at discharge after lower extremity bypass (LEB)
Algorithm		All patients age 18 and older undergoing infrainguinal LEB who were prescribed statin at discharge divided by (all patients over 18 undergoing infrainguinal LEB minus those intolerant to statins minus those who died before discharge).
Data Source	Registry data	Registry data
Level of Measurement /Analysis	Clinicians: Group; Facility/agency; Population: National, regional/network, states, counties or cities	Clinicians: Individual, group; Facility/agency; Can be measured at all levels
Care Settings	Hospital	Hospital

NATIONAL QUALITY FORUM

Measure Evaluation 4.1
December 2009

This form contains the measure information submitted by stewards. Blank fields indicate no information was provided. Attachments also may have been submitted and are provided to reviewers. The subcriteria and most of the footnotes from the evaluation criteria are provided in Word comments within the form and will appear if your cursor is over the highlighted area. Hyperlinks to the evaluation criteria and ratings are provided in each section.

TAP/Workgroup (if utilized)**:** Complete all yellow highlighted areas of the form. Evaluate the extent to which each subcriterion is met. Based on your evaluation, summarize the strengths and weaknesses in each section.

Note: *If there is no TAP or workgroup, the SC also evaluates the subcriteria (yellow highlighted areas).*

Steering Committee: Complete all pink highlighted areas of the form. Review the workgroup/TAP assessment of the subcriteria, noting any areas of disagreement; then evaluate the extent to which each major criterion is met; and finally, indicate your recommendation for the endorsement. Provide the rationale for your ratings.

Evaluation ratings of the extent to which the criteria are met
C = Completely (unquestionably demonstrated to meet the criterion)
P = Partially (demonstrated to partially meet the criterion)
M = Minimally (addressed BUT demonstrated to only minimally meet the criterion)
N = Not at all (NOT addressed; OR incorrectly addressed; OR demonstrated to NOT meet the criterion)
NA = Not applicable (only an option for a few subcriteria as indicated)

(for NQF staff use) **NQF Review #:** 0134 **NQF Project:** Surgery Endorsement Maintenance 2010
MEASURE DESCRIPTIVE INFORMATION
De.1 **Measure Title:** Use of Internal Mammary Artery (IMA) in Coronary Artery Bypass Graft (CABG)
De.2 **Brief description of measure:** Percentage of patients aged 18 years and older undergoing isolated coronary artery bypass graft (CABG) who received an internal mammary artery (IMA) graft
1.1-2 **Type of Measure:** Process De.3 **If included in a composite or paired with another measure, please identify composite or paired measure** OT1-013-09 – The STS CABG Composite Score
De.4 **National Priority Partners Priority Area:** Safety De.5 **IOM Quality Domain:** Safety De.6 **Consumer Care Need:** Getting better

CONDITIONS FOR CONSIDERATION BY NQF	
Four conditions must be met before proposed measures may be considered and evaluated for suitability as voluntary consensus standards:	NQF Staff
A. The measure is in the public domain or an intellectual property (measure steward agreement) is signed. *Public domain only applies to governmental organizations. All non-government organizations must sign a measure steward agreement even if measures are made publicly and freely available.* A.1 **Do you attest that the measure steward holds intellectual property rights to the measure and the right to use aspects of the measure owned by another entity (e.g., risk model, code set)?** Yes A.2 **Indicate if Proprietary Measure** (*as defined in measure steward agreement*)**:** A.3 **Measure Steward Agreement:** Agreement will be signed and submitted prior to or at the time of measure submission A.4 **Measure Steward Agreement attached:** STS Measure Steward Agreement. Fully Executed-634267369788886638.pdf	A Y☐ N☐

B. The measure owner/steward verifies there is an identified responsible entity and process to maintain and update the measure on a schedule that is commensurate with the rate of clinical innovation, but at least every 3 years. Yes, information provided in contact section	**B** Y☐ N☐
C. The intended use of the measure includes both public reporting and quality improvement. ►**Purpose:** Public Reporting, Quality Improvement (Internal to the specific organization), Quality Improvement with Benchmarking (external benchmarking to multiple organizations)	**C** Y☐ N☐
D. The requested measure submission information is complete. Generally, measures should be fully developed and tested so that all the evaluation criteria have been addressed and information needed to evaluate the measure is provided. Measures that have not been tested are only potentially eligible for a time-limited endorsement and in that case, measure owners must verify that testing will be completed within 12 months of endorsement. D.1**Testing:** Yes, fully developed and tested D.2 **Have NQF-endorsed measures been reviewed to identify if there are similar or related measures?** Yes	**D** Y☐ N☐
(for NQF staff use) **Have all conditions for consideration been met?** **Staff Notes to Steward** (*if submission returned*)**:**	**Met** Y☐ N☐
Staff Notes to Reviewers (*issues or questions regarding any criteria*)**:**	
Staff Reviewer Name(s):	

TAP/Workgroup Reviewer Name:	
Steering Committee Reviewer Name:	
1. IMPORTANCE TO MEASURE AND REPORT	
Extent to which the specific measure focus is important to making significant gains in health care quality (safety, timeliness, effectiveness, efficiency, equity, patient-centeredness) and improving health outcomes for a specific high impact aspect of healthcare where there is variation in or overall poor performance. ***Measures must be judged to be important to measure and report*** *in order to be evaluated against the remaining criteria.* (evaluation criteria) **1a. High Impact**	**Eval Rating**
(for NQF staff use) **Specific NPP goal**:	
1a.1 **Demonstrated High Impact Aspect of Healthcare:** Affects large numbers, Frequently performed procedure, Leading cause of morbidity/mortality, High resource use, Severity of illness, Patient/societal consequences of poor quality 1a.2 1a.3 **Summary of Evidence of High Impact:** The internal mammary artery has definitively and repeatedly been shown to be the best conduit for coronary bypass grafting. It has been shown to have the highest patency rates compared to other conduits and its use substantially increases patient survival in the long term over other conduit choices. 1a.4 **Citations for Evidence of High Impact:** - Abramov D, Tamariz MG, Sever JY, Christakis GT, Bhatnagar G, Heenan AL, Goldman BS, Fremes SE. The influence of gender on the outcome of coronary artery bypass surgery. Ann Thorac Surg. 2000;70:800-806. - Arkansas Foundation for Medical Care. Coronary Artery Bypass Graft Surgery: Performance Measures and Risk Adjustment Methodology. Final Report to the Centers for Medicare and Medicaid Services; September 2002. - Ferguson TB Jr, Coombs LP, Peterson ED. Internal thoracic artery grafting in the elderly patient undergoing coronary artery bypass grafting: room for process improvement? J Thorac Cardiovasc Surg. 2002;123(5):869-880. - Leavitt B, O'Connor GT, et al. Use of the internal mammary artery graft and in-hospital mortality	**1a** C☐ P☐ M☐ N☐

and other adverse outcomes associated with coronary artery bypass surgery. Circulation. 2001;103(4):507-512.
- Morris RJ, Strong MD, et al. Internal thoracic artery for coronary artery grafting in octogenarians. Ann Thorac Surg. 1996;62:16-22.
- Loop FD, Lytle BW, Cosgrove DM, et al. Influence of the internal-mammary-artery graft on 10-year survival and other cardiac events. N Engl J Med. 1986 Jan 2;314(1):1-6.
- Lytle BW, Blackstone EH, Loop FD, et a. Two internal thoracic artery grafts are better than one. J Thorac Cardiovasc Surg. 1999 May;117(5):855-72.

1b. Opportunity for Improvement

1b.1 **Benefits (improvements in quality) envisioned by use of this measure:** Use of the internal mammary artery as coronary bypass conduit has definitively and repeatedly been shown to substantially increase patient survival in the long term. Using this measure should encourage, and potentially increase, the use of the internal mammary arteries as coronary bypass conduits.

1b.2 **Summary of data demonstrating performance gap (variation or overall poor performance) across providers:**
Please see attachment

1b.3 **Citations for data on performance gap:**
Dates: January 1, 2009-December 31, 2009

Analysis includes 615 STS Adult Cardiac Surgery Database Participants who had at least 100 eligible cases for the measure and reported data to STS for all 12 months.

1b.4 **Summary of Data on disparities by population group:**
Please see attachment

1b.5 **Citations for data on Disparities:**
Analysis includes STS Adult Cardiac Surgery Database Participants that had more than 50 eligible cases in 2008 and 2009, and reported data for at least 15 months.

228654 Patients from 891 Participants were included in the Gender = Male sub-group.
76794 Patients from 642 Participants were included in the Gender = Female sub-group.
12605 Patients from 128 Participants were included in the Race = Black sub-group.
269466 Patients from 878 Participants were included in the Race = White sub-group.
12376 Patients from 116 Participants were included in the Race = Other sub-group.
9425 Patients from 93 Participants were included in the Ethnicity = Hispanic sub-group.
298116 Patients from 899 Participants were included in the Ethnicity = Non-Hispanic sub-group.

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1c. Outcome or Evidence to Support Measure Focus

1c.1 **Relationship to Outcomes** (*For non-outcome measures, briefly describe the relationship to desired outcome. For outcomes, describe why it is relevant to the target population*)**:** The internal mammary artery has the highest patency rates of the coronary bypass conduit conduits and its use is associated with the greatest freedom from mortality benefit when compared to other conduit choices. Patients with internal mammary arteries as bypass conduit tend to live longer and have fewer cardiac events than patients with alternate conduits.

1c.2-3. **Type of Evidence:** Observational study, Randomized controlled trial, Expert opinion, Systematic synthesis of research, Other Clinical results from approximately 90% of cardiac surgery centers in the US

1c.4 **Summary of Evidence** (*as described in the criteria; for outcomes, summarize any evidence that healthcare services/care processes influence the outcome*)**:**
The superiority of internal mammary arteries over saphenous vein grafts as coronary artery bypass conduits has been known for at least 25 years. The overwhelming evidence came initially both from retrospective reviews and randomized controlled trials. The Cleveland Clinic showed in a 10 year review in 1986 that survival after coronary bypass grafting was improved if an internal mammary artery was placed to the left

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anterior descending coronary artery versus a saphenous vein graft. A randomized controlled trial, begun in 1975, with 10 year follow-up on 80 patients gave similar results. Since then, a plethora of studies, including The Society of Thoracic Surgeons Adult Cardiac database evaluation, have continued to prove that patients with internal mammary artery grafts, especially to the left anterior descending coronary artery, live longer than any other conduit combination. Most, if not all, of this benefit is derived from the improved long-term patency rates associated with internal mammary arteries over other conduits. This observation is also well documented in the literature.

1c.5 Rating of strength/quality of evidence (*also provide narrative description of the rating and by whom***):**

1c.6 Method for rating evidence:

1c.7 Summary of Controversy/Contradictory Evidence:

1c.8 Citations for Evidence (*other than guidelines***):** - Abramov D, Tamariz MG, Sever JY, Christakis GT, Bhatnagar G, Heenan AL, Goldman BS, Fremes SE. The influence of gender on the outcome of coronary artery bypass surgery. Ann Thorac Surg. 2000;70:800-806.

- Arkansas Foundation for Medical Care. Coronary Artery Bypass Graft Surgery: Performance Measures and Risk Adjustment Methodology. Final Report to the Centers for Medicare and Medicaid Services; September 2002.
- Ferguson TB Jr, Coombs LP, Peterson ED. Internal thoracic artery grafting in the elderly patient undergoing coronary artery bypass grafting: room for process improvement? J Thorac Cardiovasc Surg. 2002;123(5):869-880.
- Leavitt B, O'Connor GT, et al. Use of the internal mammary artery graft and in-hospital mortality and other adverse outcomes associated with coronary artery bypass surgery. Circulation. 2001;103(4):507-512.
- Morris RJ, Strong MD, et al. Internal thoracic artery for coronary artery grafting in octogenarians. Ann Thorac Surg. 1996;62:16-22.
- Loop FD, Lytle BW, Cosgrove DM, et al. Influence of the internal-mammary-artery graft on 10-year survival and other cardiac events. N Engl J Med. 1986 Jan 2;314(1):1-6.
- Lytle BW, Blackstone EH, Loop FD, et a. Two internal thoracic artery grafts are better than one. J Thorac Cardiovasc Surg. 1999 May;117(5):855-72.

1c.9 Quote the Specific guideline recommendation (*including guideline number and/or page number***):**

1c.10 Clinical Practice Guideline Citation:
1c.11 National Guideline Clearinghouse or other URL:

1c.12 Rating of strength of recommendation (*also provide narrative description of the rating and by whom***):**

1c.13 Method for rating strength of recommendation (*If different from USPSTF system, also describe rating and how it relates to USPSTF)***:**

1c.14 Rationale for using this guideline over others:

TAP/Workgroup: What are the strengths and weaknesses in relation to the subcriteria for *Importance to Measure and Report?*	**1**
Steering Committee: Was the threshold criterion, *Importance to Measure and Report*, met? **Rationale:**	**1** **Y☐** **N☐**

2. SCIENTIFIC ACCEPTABILITY OF MEASURE PROPERTIES	
Extent to which the measure, as specified, produces consistent (reliable) and credible (valid) results about the quality of care when implemented. (evaluation criteria)	**Eval Rating**
2a. MEASURE SPECIFICATIONS	
S.1 Do you have a web page where current detailed measure specifications can be obtained? **S.2 If yes, provide web page URL:** **2a. Precisely Specified**	
2a.1 Numerator Statement (*Brief, text description of the numerator - what is being measured about the target population, e.g. target condition, event, or outcome*): Number of patients undergoing isolated coronary artery bypass graft (CABG) who received an internal mammary artery (IMA) graft **2a.2 Numerator Time Window** (*The time period in which cases are eligible for inclusion in the numerator*): **2a.3 Numerator Details** (*All information required to collect/calculate the numerator, including all codes, logic, and definitions*): Number of isolated CABG procedures in which IMA Artery Used [IMAArtUs (STS Adult Cardiac Surgery Database Version 2.73)] is marked "Left IMA," "Right IMA," or "Both IMAs"	
2a.4 Denominator Statement (*Brief, text description of the denominator - target population being measured*): All patients undergoing isolated CABG **2a.5 Target population gender:** Female, Male **2a.6 Target population age range:** 18 and older **2a.7 Denominator Time Window** (*The time period in which cases are eligible for inclusion in the denominator*): 12 months **2a.8 Denominator Details** (*All information required to collect/calculate the denominator - the target population being measured - including all codes, logic, and definitions*): Number of isolated CABG procedures Isolated CABG is determined as a procedure for which all of the following apply: - OpCAB is marked “Yes” - (VADProc is marked “No” or “Missing”) or (VADProc is marked “Yes, Implanted” and UnplVAD is marked “yes”) - OCarASDTy is marked “PFO” or “missing” - OCarAFibAProc is marked “primarily epicardial” or “missing” and - OpValve, VSAV, VSAVPr, ResectSubA, VSMV, VSMVPr, OpTricus, OpPulm, OpONCard, OCarLVA, OCarVSD, OCarSVR, OCarCong, OCarTrma, OCarCrTx, OCAoProcType, EndoProc, OCTumor, OCPulThromDis, OCarOthr are all marked “no” or “missing”	
2a.9 Denominator Exclusions (*Brief text description of exclusions from the target population*): Cases are removed from the denominator if the patient had a previous CABG prior to the current admission or if IMA was not used and one of the following reasons was provided: - Subclavian stenosis - Previous cardiac or thoracic surgery - Previous mediastinal radiation - Emergent or salvage procedure - No LAD disease	**2a-specs** **C☐** **P☐** **M☐** **N☐**

2a.10 Denominator Exclusion Details (*All information required to collect exclusions to the denominator, including all codes, logic, and definitions***):**
Patients with previous CABG, identified where PrCAB is marked "yes"

or

IMA Artery Used (IMAArtUs) is marked "no IMA" and primary reason for no IMA (NoIMARsn) is marked as any of the following:
- Subclavian stenosis
- Previous cardiac or thoracic surgery
- Previous mediastinal radiation
- Emergent or salvage procedure
- No LAD disease

2a.11 Stratification Details/Variables (*All information required to stratify the measure including the stratification variables, all codes, logic, and definitions***):**
N/A

2a.12-13 Risk Adjustment Type: No risk adjustment necessary

2a.14 Risk Adjustment Methodology/Variables (*List risk adjustment variables and describe conceptual models, statistical models, or other aspects of model or method***):**
N/A

2a.15-17 Detailed risk model available Web page URL or attachment:

2a.18-19 Type of Score: Rate/proportion
2a.20 Interpretation of Score: Better quality = Higher score
2a.21 Calculation Algorithm (*Describe the calculation of the measure as a flowchart or series of steps***):**
N/A

2a.22 Describe the method for discriminating performance *(e.g., significance testing)***:**
Two-sided 95% binomial confidence intervals; a confidence interval is calculated for each database participant. If the overall STS database result falls within the participant's 95% binomial confidence interval, the participant's performance is considered not significantly different from the overall database result. If the overall STS database result falls to the right of the participant's 95% binomial confidence interval, then the participant's performance is considered significantly lower than the overall database results. If the overall STS database result falls to the left of the participant's 95% binomial confidence interval, then the participant's performance is considered significantly higher than the overall database results.

2a.23 Sampling (Survey) Methodology *If measure is based on a sample (or survey), provide instructions for obtaining the sample, conducting the survey and guidance on minimum sample size (response rate)*:
N/A

2a.24 Data Source (*Check the source(s) for which the measure is specified and tested)*
Electronic Clinical Data : Registry

2a.25 Data source/data collection instrument (*Identify the specific data source/data collection instrument, e.g. name of database, clinical registry, collection instrument, etc.***):**
STS Adult Cardiac Surgery Database – Version 2.73

2a.26-28 Data source/data collection instrument reference web page URL or attachment: URL Data Collection Form (an updated version will be made available on the STS Website in mid-December of 2010)--- http://www.sts.org/documents/pdf/ndb2010/STSAdultCVDataCollectionForm2_7_Annotated_20101021.pdf

2a.29-31 Data dictionary/code table web page URL or attachment: URL http://www.sts.org/documents/pdf/ndb2010/STSAdultCVDataSpecificationsV2_7_20101021.pdf -- an updated version will be made available on the STS Website in mid-December of 2010

2a.32-35 Level of Measurement/Analysis (*Check the level(s) for which the measure is specified and*

tested)
Clinician : Group/Practice, Clinician : Individual, Clinician : Team, Facility, Population : County or City, Population : National, Population : Regional, Population : State

2a.36-37 **Care Settings (***Check the setting(s) for which the measure is specified and tested)*
Hospital/Acute Care Facility

2a.38-41 **Clinical Services** (*Healthcare services being measured, check all that apply*)
Clinicians: Physicians (MD/DO)

TESTING/ANALYSIS

2b. Reliability testing

2b.1 **Data/sample** *(description of data/sample and size)*: STS Adult Cardiac Surgery Database - Compared results between two proximate time periods: January 2008-December 2008 and January 2009-December 2009.

2b.2 **Analytic Method** *(type of reliability & rationale, method for testing)*:
Compared results between two proximate time periods: January 2008-December 2008 and January 2009-December 2009. Excluded from analysis are participants that did not submit results for both time periods. As database participants can change their underlying care processes at any time, we would not expect perfect correlation between two sets of results from even proximate time periods.

2b.3 **Testing Results** *(reliability statistics, assessment of adequacy in the context of norms for the test conducted)*:
Please see attachment

2b
C☐
P☐
M☐
N☐

2c. Validity testing

2c.1 **Data/sample** *(description of data/sample and size)*: STS Adult Cardiac Surgery Database

Audits conducted in 2010, all cases performed in 2009; N = 40 randomly selected sites participating in the STS Adult Cardiac Surgery Database

2c.2 **Analytic Method** *(type of validity & rationale, method for testing)*:
Participating sites are randomly selected for participation in STS Adult Cardiac Surgery Database Audit, which is designed to evaluate the accuracy, consistency, and comprehensiveness of data collection and ultimately validate the integrity of the data contained in the database. The Iowa Foundation for Medical Care (IFMC), the quality improvement organization for Iowa and Illinois, has conducted audits on behalf of STS since 2006.

Each year, the IFMC conducts audits at randomly selected sites throughout the country and tracks the individual agreement rates by variable and by year. More specifically, for each site, agreement rates are calculated for 73 individual elements. In addition, aggregate agreement rates for each element, variable category (e.g., pre-operative risk factors, previous interventions, etc), and overall for all categories are calculated for all sites. While this is not region specific, it is data point specific and comparison agreement rates confirm the improvement over time as well as the consistency.

2c.3 **Testing Results** *(statistical results, assessment of adequacy in the context of norms for the test conducted)*:
IMA Used as Grafts: 99.6% agreement rate

2c
C☐
P☐
M☐
N☐

2d. Exclusions Justified

2d.1 **Summary of Evidence supporting exclusion(s):**

2d.2 **Citations for Evidence:**

2d
C☐
P☐
M☐
N☐
NA☐

2d.3 Data/sample *(description of data/sample and size)*: Dates: January 1, 2009-December 31, 2009; 640 STS Adult Cardiac Surgery Database Participants who had at least 100 eligible cases for the measure and reported data to STS for all 12 months. Patients with prior CABG operations are excluded from this NQF measure. **2d.4 Analytic Method** *(type analysis & rationale)*: **2d.5 Testing Results** *(e.g., frequency, variability, sensitivity analyses)*: Please see attachment	
2e. Risk Adjustment for Outcomes/ Resource Use Measures **2e.1 Data/sample** *(description of data/sample and size)*: **2e.2 Analytic Method** *(type of risk adjustment, analysis, & rationale)*: **2e.3 Testing Results** *(risk model performance metrics)*: **2e.4 If outcome or resource use measure is not risk adjusted, provide rationale:**	**2e** C☐ P☐ M☐ N☐ NA☐
2f. Identification of Meaningful Differences in Performance **2f.1 Data/sample from Testing or Current Use** *(description of data/sample and size)*: 615 STS Adult Cardiac Surgery Database Participants who had at least 100 eligible cases for the measure and reported data to STS for all 12 months; January 1, 2009-December 31, 2009 **2f.2 Methods to identify statistically significant and practically/meaningfully differences in performance** *(type of analysis & rationale)*: Two-sided 95% binomial confidence intervals; a confidence interval is calculated for each database participant. If the overall STS database result falls within the participant's 95% binomial confidence interval, the participant's performance is considered not significantly different from the overall database result. If the overall STS database result falls to the right of the participant's 95% binomial confidence interval, then the participant's performance is considered significantly lower than the overall database results. If the overall STS database result falls to the left of the participant's 95% binomial confidence interval, then the participant's performance is considered significantly higher than the overall database results. **2f.3 Provide Measure Scores from Testing or Current Use** *(description of scores, e.g., distribution by quartile, mean, median, SD, etc.; identification of statistically significant and meaningfully differences in performance)*: Please see attachment	**2f** C☐ P☐ M☐ N☐
2g. Comparability of Multiple Data Sources/Methods **2g.1 Data/sample** *(description of data/sample and size)*: **2g.2 Analytic Method** *(type of analysis & rationale)*: **2g.3 Testing Results** *(e.g., correlation statistics, comparison of rankings)*:	**2g** C☐ P☐ M☐ N☐ NA☐
2h. Disparities in Care **2h.1 If measure is stratified, provide stratified results** *(scores by stratified categories/cohorts)*:	**2h** C☐ P☐ M☐

2h.2 **If disparities have been reported/identified, but measure is not specified to detect disparities, provide follow-up plans:**	N☐ NA☐
TAP/Workgroup: What are the strengths and weaknesses in relation to the subcriteria for *Scientific Acceptability of Measure Properties?*	**2**
Steering Committee: Overall, to what extent was the criterion, *Scientific Acceptability of Measure Properties*, met? **Rationale:**	***2*** **C☐** **P☐** **M☐** **N☐**
3. USABILITY	
Extent to which intended audiences (e.g., consumers, purchasers, providers, policy makers) can understand the results of the measure and are likely to find them useful for decision making. (evaluation criteria)	**Eval Rating**
3a. Meaningful, Understandable, and Useful Information 3a.1 **Current Use:** In use 3a.2 **Use in a public reporting initiative (disclosure of performance results to the public at large)** (*If used in a public reporting initiative, provide name of initiative(s), locations, Web page URL(s). If not publicly reported, state the plans to achieve public reporting within 3 years*)**:** This measure is one of eleven component measures of the STS CABG Composite Score. Composite star ratings are presented on the STS website, www.sts.org/publicreporting and in the health section of the Consumers Union website, www.ConsumerReportsHealth.org. There are approximately 330 STS Adult Cardiac Surgery Database Participants who voluntarily participate in the Consumer's Union public reporting initiative. In addition, approximately 352 STS Adult Cardiac Surgery Database Participants voluntarily take part in STS Public Reporting Online. 3a.3 **If used in other programs/initiatives (***If used in quality improvement or other programs/initiatives, name of initiative(s), locations, Web page URL(s). If not used for QI, state the plans to achieve use for QI within 3 years***):** CMS Physician Quality Reporting Initiative (PQRI), www.cms.hhs.gov/pqri **Testing of Interpretability** (*Testing that demonstrates the results are understood by the potential users for public reporting and quality improvement*) 3a.4 **Data/sample** *(description of data/sample and size)***:** See 3a.6 below 3a.5 **Methods** *(e.g., focus group, survey, QI project)***:** 3a.6 **Results** *(qualitative and/or quantitative results and conclusions)***:** Please see attachment	**3a** **C☐** **P☐** **M☐** **N☐**
3b/3c. Relation to other NQF-endorsed measures 3b.1 **NQF # and Title of similar or related measures:** OT1-013-09 – The STS CABG Composite Score; Component measures: 0114 Risk-Adjusted Post-Operative Renal Failure, 0115 Risk-Adjusted Surgical Re-exploration, 0116 Anti-Platelet Medication at Discharge, 0117 Beta Blockade at Discharge, 0118 Anti-Lipid Treatment at Discharge, 0119 Risk-Adjusted Operative Mortality for CABG, 0127 Pre-Operative Beta Blockade, 0129 Risk-Adjusted Prolonged Intubation (ventilation), 0130 Risk-Adjusted Deep Sternal Wound Infection Rate, 0131 Risk-Adjusted Stroke/Cerebrovascular Accident, 0134 Use of Internal Mammary Artery (IMA) in Coronary Artery Bypass Graft (CABG)	
(for NQF staff use) **Notes on similar/related endorsed or submitted measures:**	
3b. Harmonization If this measure is related to measure(s) already endorsed by NQF (e.g., same topic, but different target population/setting/data source or different topic but same target population):	**3b** **C☐** **P☐**

3b.2 Are the measure specifications harmonized? If not, why? N/A; however, data definitions and key elements have been established by a multi-societal writing committee called the "ACCF/AHA Writing Committee to Develop Acute Coronary Syndromes and Coronary Artery Disease Clinical Data Standards" with representatives from each of the following organizations: Agency for Healthcare Research and Quality American College of Cardiology American College of Chest Physicians American College of Emergency Physicians American College of Physicians American College of Preventative Medicine American Heart Association American Medical Association Centers for Disease Control and Prevention Emergency Nurses Association Food and Drug Administration Joint Commission on Accreditation of Healthcare Organizations National Association of Emergency Medical Technicians National Association of EMS Physicians National Heart, Lung, and Blood Institute Preventive Cardiovascular Nurses Association Society for Academic Emergency Medicine Society of Chest Pain Centers and Providers Society of General Internal Medicine Society of Thoracic Surgeons	M☐ N☐ NA☐
3c. Distinctive or Additive Value **3c.1 Describe the distinctive, improved, or additive value this measure provides to existing NQF-endorsed measures:** **5.1 If this measure is similar to measure(s) already endorsed by NQF (i.e., on the same topic and the same target population), Describe why it is a more valid or efficient way to measure quality:**	**3c** C☐ P☐ M☐ N☐ NA☐
TAP/Workgroup: What are the strengths and weaknesses in relation to the subcriteria for *Usability?*	**3**
Steering Committee: Overall, to what extent was the criterion, *Usability*, met? **Rationale:**	**3** C☐ P☐ M☐ N☐
4. FEASIBILITY	
Extent to which the required data are readily available, retrievable without undue burden, and can be implemented for performance measurement. (evaluation criteria)	**Eval Rating**
4a. Data Generated as a Byproduct of Care Processes **4a.1-2 How are the data elements that are needed to compute measure scores generated?** Data generated as byproduct of care processes during care delivery (Data are generated and used by healthcare personnel during the provision of care, e.g., blood pressure, lab value, medical condition), Coding/abstraction performed by someone other than person obtaining original information (E.g., DRG, ICD-9 codes on claims, chart abstraction for quality measure or registry)	**4a** C☐ P☐ M☐ N☐
4b. Electronic Sources **4b.1 Are all the data elements available electronically?** (*elements that are needed to compute measure scores are in defined, computer-readable fields, e.g., electronic health record, electronic claims*) Yes	**4b** C☐ P☐ M☐ N☐

4b.2 If not, specify the near-term path to achieve electronic capture by most providers.	
4c. Exclusions **4c.1 Do the specified exclusions require additional data sources beyond what is required for the numerator and denominator specifications?** No **4c.2 If yes, provide justification.**	**4c** C☐ P☐ M☐ N☐ NA☐
4d. Susceptibility to Inaccuracies, Errors, or Unintended Consequences **4d.1 Identify susceptibility to inaccuracies, errors, or unintended consequences of the measure and describe how these potential problems could be audited. If audited, provide results.** This measure may be susceptible to human error (i.e., recording the measure inaccurately or not at all). When data collection on this measure is done through participation in the STS Adult Cardiac Surgery Database, an auditing strategy is in place. Both STS and the Duke Clinical Research Institute have a list of database participants making participation in the STS Adult Cardiac Surgery Database easy to track. Each participant is responsible for the quality and accuracy of the data they submit to the database. The participant agrees to the following quality control measures in the participation agreement: i) Participant hereby warrants that all data submitted for inclusion in the STS National Database will be accurate and complete, and acknowledges that such data may be subject to independent audit. Participant will use its best efforts to address any data or related deficiencies identified by the independent data warehouse service provider and agrees to cooperate with and assist STS and its designees in connection with the performance of any independent audit. ii) Participant warrants that it will take all reasonable steps to avoid the submission of duplicative data for inclusion in the STS National Database, including but not limited to apprising the Director of the STS National Database and the independent data warehouse service provider about any other Participation Agreements in which an individual cardiothoracic surgeon named above or on Schedule A attached hereto (as amended from time to time) is also named. STS audited for these potential problems during testing. Please see IFMC audit results.	**4d** C☐ P☐ M☐ N☐
4e. Data Collection Strategy/Implementation **4e.1 Describe what you have learned/modified as a result of testing and/or operational use of the measure regarding data collection, availability of data/missing data, timing/frequency of data collection, patient confidentiality, time/cost of data collection, other feasibility/ implementation issues:** **4e.2 Costs to implement the measure** (*costs of data collection, fees associated with proprietary measures*)**:** Data Collection: There are no direct costs to collect the data for this measure. Costs to develop the measure included volunteer cardiothoracic surgeon time, STS staff time, and DCRI statistician and project management time. Other fees: STS Adult Cardiac Surgery Database participants (single cardiothoracic surgeons or a group of surgeons) pay annual participant fees of $2,950 or $3,700, depending on whether participants are STS members (or whether the majority of surgeons in a group are STS members). As a benefit of STS membership, STS members are charged the lesser of the two fees.	**4e** C☐ P☐ M☐ N☐

4e.3 Evidence for costs: **4e.4 Business case documentation:**	
TAP/Workgroup: What are the strengths and weaknesses in relation to the subcriteria for *Feasibility?*	**4**
Steering Committee: Overall, to what extent was the criterion, *Feasibility*, met? **Rationale:**	**4** **C☐** **P☐** **M☐** **N☐**
RECOMMENDATION	
(for NQF staff use) **Check if measure is untested and only eligible for time-limited endorsement.**	**Time-limited ☐**
Steering Committee: Do you recommend for endorsement? **Comments:**	**Y☐** **N☐** **A☐**

CONTACT INFORMATION

Co.1 Measure Steward (Intellectual Property Owner)
Co.1 Organization
The Society of Thoracic Surgeons, 633 N. Saint Clair Street, Suite 2320, Chicago, Illinois, 60611

Co.2 Point of Contact
Jane, Han, MSW, jhan@sts.org, 312-202-5856-

Measure Developer If different from Measure Steward
Co.3 Organization
The Society of Thoracic Surgeons, 633 N. Saint Clair Street, Suite 2320, Chicago, Illinois, 60611

Co.4 Point of Contact
Jane, Han, MSW, jhan@sts.org, 312-202-5856-

Co.5 Submitter If different from Measure Steward POC
Jane, Han, MSW, jhan@sts.org, 312-202-5856-, The Society of Thoracic Surgeons

Co.6 Additional organizations that sponsored/participated in measure development

ADDITIONAL INFORMATION

Workgroup/Expert Panel involved in measure development
Ad.1 Provide a list of sponsoring organizations and workgroup/panel members' names and organizations. Describe the members' role in measure development.
Members of the STS Task Force on Quality Initiatives provide clinical expertise as needed. The STS Workforce on National Databases meets at the STS Annual Meeting and reviews the measures on a yearly basis. Changes or updates to the measure will be at the recommendation of the Workforce.

Ad.2 If adapted, provide name of original measure:
Ad.3-5 If adapted, provide original specifications URL or attachment

Measure Developer/Steward Updates and Ongoing Maintenance
Ad.6 Year the measure was first released: 2004
Ad.7 Month and Year of most recent revision: 12, 2010
Ad.8 What is your frequency for review/update of this measure? annually
Ad.9 When is the next scheduled review/update for this measure? 2011

Ad.10 Copyright statement/disclaimers:
Ad.11 -13 Additional Information web page URL or attachment: Attachment 0134 Sections 1b.2, 1b.4, 2b.3, 2d.5, 2f.3, 3a.6.pdf
Date of Submission (*MM*/*DD*/*YY*)**:** 06/13/2011

NATIONAL QUALITY FORUM

Measure Evaluation 4.1
December 2009

This form contains the measure information submitted by stewards. Blank fields indicate no information was provided. Attachments also may have been submitted and are provided to reviewers. The subcriteria and most of the footnotes from the evaluation criteria are provided in Word comments within the form and will appear if your cursor is over the highlighted area. Hyperlinks to the evaluation criteria and ratings are provided in each section.

TAP/Workgroup (if utilized)**:** Complete all yellow highlighted areas of the form. Evaluate the extent to which each subcriterion is met. Based on your evaluation, summarize the strengths and weaknesses in each section.

Note: *If there is no TAP or workgroup, the SC also evaluates the subcriteria (yellow highlighted areas).*

Steering Committee: Complete all pink highlighted areas of the form. Review the workgroup/TAP assessment of the subcriteria, noting any areas of disagreement; then evaluate the extent to which each major criterion is met; and finally, indicate your recommendation for the endorsement. Provide the rationale for your ratings.

Evaluation ratings of the extent to which the criteria are met
C = Completely (unquestionably demonstrated to meet the criterion)
P = Partially (demonstrated to partially meet the criterion)
M = Minimally (addressed BUT demonstrated to only minimally meet the criterion)
N = Not at all (NOT addressed; OR incorrectly addressed; OR demonstrated to NOT meet the criterion)
NA = Not applicable (only an option for a few subcriteria as indicated)

(for NQF staff use) **NQF Review #:** 0300 **NQF Project:** Surgery Endorsement Maintenance 2010
MEASURE DESCRIPTIVE INFORMATION
De.1 **Measure Title:** Cardiac Surgery Patients With Controlled Postoperative Blood Glucose
De.2 **Brief description of measure:** Cardiac surgery patients with controlled postoperative blood glucose (less than or equal to 180mg/dL) in the timeframe of 18 to 24 hours after Anesthesia End Time.
1.1-2 **Type of Measure:** Process De.3 **If included in a composite or paired with another measure, please identify composite or paired measure** N/A
De.4 **National Priority Partners Priority Area:** Population health De.5 **IOM Quality Domain**: Safety De.6 **Consumer Care Need:** Getting better

CONDITIONS FOR CONSIDERATION BY NQF	
Four conditions must be met before proposed measures may be considered and evaluated for suitability as voluntary consensus standards:	**NQF Staff**
A. The measure is in the public domain or an intellectual property (measure steward agreement) is signed. *Public domain only applies to governmental organizations. All non-government organizations must sign a measure steward agreement even if measures are made publicly and freely available.* A.1 **Do you attest that the measure steward holds intellectual property rights to the measure and the right to use aspects of the measure owned by another entity (e.g., risk model, code set)?** Yes A.2 **Indicate if Proprietary Measure** (*as defined in measure steward agreement*)**:** A.3 **Measure Steward Agreement:** Government entity and in the public domain - no agreement necessary A.4 **Measure Steward Agreement attached:**	**A** Y☐ N☐
B. The measure owner/steward verifies there is an identified responsible entity and process to maintain and update the measure on a schedule that is commensurate with the rate of clinical innovation, but at least	**B** Y☐

every 3 years. Yes, information provided in contact section	N☐
C. The intended use of the measure includes both public reporting and quality improvement. ►**Purpose:** Payment Program, Regulatory and Accreditation Programs	C Y☐ N☐
D. The requested measure submission information is complete. Generally, measures should be fully developed and tested so that all the evaluation criteria have been addressed and information needed to evaluate the measure is provided. Measures that have not been tested are only potentially eligible for a time-limited endorsement and in that case, measure owners must verify that testing will be completed within 12 months of endorsement. D.1**Testing:** Yes, fully developed and tested D.2 **Have NQF-endorsed measures been reviewed to identify if there are similar or related measures?** Yes	D Y☐ N☐
(for NQF staff use) **Have all conditions for consideration been met?** **Staff Notes to Steward** (*if submission returned*)**:**	Met Y☐ N☐
Staff Notes to Reviewers (*issues or questions regarding any criteria*)**:**	
Staff Reviewer Name(s):	

TAP/Workgroup Reviewer Name:	
Steering Committee Reviewer Name:	
1. IMPORTANCE TO MEASURE AND REPORT	
Extent to which the specific measure focus is important to making significant gains in health care quality (safety, timeliness, effectiveness, efficiency, equity, patient-centeredness) and improving health outcomes for a specific high impact aspect of healthcare where there is variation in or overall poor performance. ***Measures must be judged to be important to measure and report*** *in order to be evaluated against the remaining criteria.* (evaluation criteria) **1a. High Impact**	Eval Rating
(for NQF staff use) **Specific NPP goal**:	
1a.1 **Demonstrated High Impact Aspect of Healthcare:** Affects large numbers, Frequently performed procedure, Patient/societal consequences of poor quality 1a.2 1a.3 **Summary of Evidence of High Impact:** Hyperglycemia has been associated with increased in-hospital morbidity and mortality for multiple medical and surgical conditions. In a study by Zerr, et al (1997), the risk of infection was significantly higher for patients undergoing coronary artery bypass graft (CABG) if blood glucose levels were elevated. Furthermore, Zerr, et al (2001), demonstrated that the incidence of deep wound infections in diabetic patients undergoing cardiac surgery was reduced by controlling mean blood glucose levels below 200mg/dL in the immediate postoperative period. Latham, et al (2001), found that hyperglycemia in the immediate postoperative phase increases the risk of infection in both diabetic and nondiabetic patients and the higher the level of hyperglycemia, the higher the potential for infection in both patient populations. A study conducted in Leuven, Belgium (Van den Berghe, 2001), demonstrated that intensive insulin therapy not only reduced overall in-hospital mortality but also decreased blood stream infections, acute renal failure, red cell transfusions, ventilator support, and intensive care. Hyperglycemia is a risk factor that, once identified, could minimize adverse outcomes for cardiac surgical patients. 1a.4 **Citations for Evidence of High Impact:** Gordon SM, Serkey JM, Barr C, et al. The relationship between glycosylated hemoglobin (HgA1c) levels and postoperative infections in patients undergoing primary coronary artery bypass surgery (CABG.) Infect Control Hosp Epidemiol. 1997;18(No.5, Part 2):29(58.) PMID: 00000. ? Furnary AP, Zerr KJ, Grunkemeier GL, et al. Continuous intravenous insulin infusion reduces the incidence of deep sternal wound infection in diabetic patients after cardiac surgical procedures. Ann Thorac Surg.	1a C☐ P☐ M☐ N☐

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Golden SH, Peart-Vigilance C, Kao WH, et al. Perioperative glycemic control and the risk of infectious complications in a cohort of adults with diabetes. Diabetes Care. 1999 Sep;22(9):1408-1414. PMID: 10480501.
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Trick WE, Scheckler WE, Tokars JI, et al. Modifiable risk factors associated with deep sternal site infection after coronary artery bypass grafting. J Thorac Cardiovasc Surg. 2000 Jan;119(1):108-114. PMID: 10612768.
?
Trick WE, Scheckler WE, Tokars JI, et al. Risk factors for radial artery harvest site infection following coronary artery bypass graft surgery. Clin Infect Dis. 2000 Feb;30(2):270-275.PMID: 10671327.
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Menzin J, Langly-Hawthron C, Friedman M, et al. Potential short-term economic benefits of improved glycemic control: a managed care prospective. Diabetes Care. 2001 Jan;24(1):51-55. PMID: 11194241.
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Dellinger E. Preventing Surgical-Site Infections: The importance of timing and glucose control. Infect Control Hosp Epidemiol. 2001;22(10):604-606. PMID: 11776344.
?
Latham R, Lancaster AD, Covington JF, etal. The association of diabetes and glucose control with surgical-site infections among cardiothoracic surgery
Specifications Manual for National Hospital Inpatient Quality Measures
Discharges 10-01-10 (4Q10) through 03-31-11 (1Q11) SCIP-Inf-4-3
patients. Infect Control Hosp Epidemiol. 2001 Oct;22(10):607-612. PMID: 11776345.
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McAlister FA, Man J, Bistritz L, et al. Diabetes and coronary artery bypass surgery: an examination of perioperative glycemic control and outcomes. Diabetes Care. 2003 May;26(5):1518-1524. PMID: 12716815.
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Estrada CA, Young JA, Nifong LW, et al. Outcomes and perioperative hyperglycemia in patients with or without diabetes mellitus undergoing coronary artery bypass grafting. Ann Thorac Surg. 2003 May;75(5):1392-1399. PMID: 12735552.
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Terranova A. The effects of diabetes mellitus on wound healing. Plast Surg Nurs. 1991:11(1):20-25. PMID: 2034714.
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Woodruff RE, Lewis SB, McLeskey CH, et al. Avoidance of surgical hyperglycemia in diabetic patients. JAMA. 1980 Jul 1;244(2):166-168. PMID: 6991732.
?
Dellinger EP, Gross PA, Barrett TL, et al: Quality standard for antimicrobial prophylaxis in surgical procedures. Infectious Diseases Society of America. Clin Infect Dis. 1994;18: 422-427. PMID: 8207176.
?
Zerr KJ, Furnary AP, Grunkemeier GL, et al. Glucose control lowers the risk of wound infection in diabetics after open heart operations. Ann Thorac Surg. 1997 Feb;63(2):356-361. PMID: 9033300.
?
Pomposelli JJ, Baxter JK 3rd, Babineau TJ, et al. Early postoperative glucose control predicts nosocomial infection rate in diabetic patients. J Parenter Enteral Nutr. 1998 Mar-Apr;22(2):77-81. PMID: 9527963.
?
Van den Berghe G, Wouters P, Weekers F, et al. Intensive insulin therapy in the critically ill patients. N Engl J Med. 2001 Nov 8;345(19):1359-1367. PMID: 11794168.

1b. Opportunity for Improvement

1b.1 Benefits (improvements in quality) envisioned by use of this measure: Controlling hyperglycemia can result in a decrease in infection rates in those undergoing cardiac surgery. Infections increase cost to the patient and to the facility. Monitoring glucose on POD 1 and POD 2 may increase the likelihood of additional monitoring being performed, thus reducing the adverse effects of hyperglycemia in this population.

1b.2 Summary of data demonstrating performance gap (variation or overall poor performance) across providers:
In a national sample of 19,497 Medicare patients undergoing surgery in US hospitals during the first quarter of 2005, the rate of performance for this measure was 80%. In the most recent quarter of data, the national

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rate was 93.4%.

1b.3 Citations for data on performance gap:
This data is collected on a nation-wide basis, with almost 4000 hospitals reporting data. For first quarter 2010 (most recent data available): In 1,177 facilities with 44,304 eligible cases, the rate was 93.4 %.

1b.4 Summary of Data on disparities by population group:
There are disparities reports for the inpatient core measures that are being reviewed by CMS.

1b.5 Citations for data on Disparities:
This is probably supposed to be the data/sample for 1b.4.

1c. Outcome or Evidence to Support Measure Focus

1c.1 Relationship to Outcomes (*For non-outcome measures, briefly describe the relationship to desired outcome. For outcomes, describe why it is relevant to the target population*)**:** Hyperglycemia is a risk factor that, once identified, could minimize adverse outcomes for cardiac surgical patients.Controlled blood glucose on POD 1 and POD 2 can contribute to lower infection rates.

1c.2-3. Type of Evidence: Cohort study, Randomized controlled trial, Expert opinion, Systematic synthesis of research

1c.4 Summary of Evidence (*as described in the criteria; for outcomes, summarize any evidence that healthcare services/care processes influence the outcome*)**:**
Postoperative hyperglycemia and previously undiagnosed diabetes are associated with development of SSIs among cardiothoracic surgery patients. Screening for diabetes and hyperglycemia among patients having cardiothoracic surgery may be warranted to prevent postoperative and chronic complications of this metabolic abnormality.

The incidence of deep wound infection in diabetic patients was reduced after implementation of a protocol to maintain mean blood glucose level less than 200 mg/dL in the immediate postoperative period.

Intensive insulin therapy to maintain blood glucose at or below 110 mg per deciliter reduces morbidity and mortality among critically ill patients in the surgical intensive care unit.

1c.5 Rating of strength/quality of evidence (*also provide narrative description of the rating and by whom***):**

1c.6 Method for rating evidence: Classification System: Class I, II, IIA, IIB, III. Level of evidence- A, B and C.

1c.7 Summary of Controversy/Contradictory Evidence: There has not been controversy or contradictory evidence for this measure.

1c.8 Citations for Evidence (*other than guidelines***):** Latham R, Lancaster AD, Covington JF, etal. The association of diabetes and glucose control with surgical-site infections among cardiothoracic surgery patients. Infect Control Hosp Epidemiol. 2001 Oct;22(10):607-612. PMID: 11776345.

Zerr KJ, Furnary AP, Grunkemeier GL, et al. Glucose control lowers the risk of wound infection in diabetics after open heart operations. Ann Thorac Surg. 1997 Feb;63(2):356-361. PMID: 9033300

Van den Berghe G, Wouters P, Weekers F, et al. Intensive insulin therapy in the critically ill patients. N Engl J Med. 2001 Nov 8;345(19):1359-1367. PMID: 11794168.

1c.9 Quote the Specific guideline recommendation (*including guideline number and/or page number***):**
Patients with and without diabetes with persistently elevated serum glucose (> 180 mg/dL) should receive IV insulin infusions to maintain serum glucose < 180 mg/dL for the duration of their ICU care (Level of evidence = A)

1c.10 Clinical Practice Guideline Citation: Lazar HL, McDonnell M, Chipkin SR, Furnary AP, Engelman RM,

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Sadhu AR, Bridge CR, Haan CK, Svedjeholm R, Taegtmeyer H, Shemin RJ. The Society of Thoracic Surgeons practice guideline series: Blood glucose management during adult cardiac surgery. Ann Thorac Surg 2009; 87: 663-9. **1c.11 National Guideline Clearinghouse or other URL:** https://www.sts.org/sites/default/files/documents/pdf/guidelines/BloodGlucoseGuidelines.pdf **1c.12 Rating of strength of recommendation (***also provide narrative description of the rating and by whom***):** **1c.13 Method for rating strength of recommendation** (*If different from USPSTF system, also describe rating and how it relates to USPSTF)*: Table 1. Classification System Used for Evidence Based Recommendations ? Class I: Conditions for which there is evidence for and/or general agreement that the procedure or treatment is beneficial, useful, and effective ? Class II: Conditions for which there is conflicting evidence and/or a divergence of opinion about the usefulness/efficacy of a procedure or treatment ? Class IIA: Weight of evidence/opinion is in favor of usefulness/efficacy ? Class IIB: Usefulness/efficacy is less well-established by evidence/opinion. ? Class III: Conditions for which there is evidence or general agreement that the procedure/treatment is not useful/effective, or both, and in some cases may be harmful ? Level of Evidence—A: Data derived from multiple randomized clinical trials ? Level of Evidence—B: Data derived from a single randomized trial or nonrandomized studies ? Level of evidence—C: Only consensus opinion of experts, case studies, or standard-of-care **1c.14 Rationale for using this guideline over others:** This measure collects information on cardiac surgery patients only, so this guideline is pertinent.	
TAP/Workgroup: What are the strengths and weaknesses in relation to the subcriteria for *Importance to Measure and Report?*	**1**
Steering Committee: Was the threshold criterion, *Importance to Measure and Report*, met? **Rationale:**	**1** **Y☐** **N☐**
2. SCIENTIFIC ACCEPTABILITY OF MEASURE PROPERTIES	
Extent to which the measure, as specified, produces consistent (reliable) and credible (valid) results about the quality of care when implemented. (evaluation criteria)	**Eval Rating**
2a. MEASURE SPECIFICATIONS	
S.1 Do you have a web page where current detailed measure specifications can be obtained? **S.2 If yes, provide web page URL:** **2a. Precisely Specified**	**2a-specs** **C☐** **P☐** **M☐** **N☐**
2a.1 Numerator Statement (*Brief, text description of the numerator - what is being measured about the target population, e.g. target condition, event, or outcome*)**:** Cardiac surgery patients with controlled postoperative blood glucose (less than or equal to ?180mg/dL) in the	

timeframe of 18 to 24 hours after Anesthesia End Time.

2a.2 Numerator Time Window (*The time period in which cases are eligible for inclusion in the numerator***):**
18-24 hours after Anesthesia End Time. If no blood glucose levels are documented for that time, the timeframe of 12-18 hours after Anesthesia End Time will be evaluated.

2a.3 Numerator Details (*All information required to collect/calculate the numerator, including all codes, logic, and definitions***):**
Required data elements: Glucose
Allowable values:
1 All values collected between 18 and 24 hours after Anesthesia End Time were = 180 mg/dL. (passes)
2 A single value collected between 18 and 24 hours after Anesthesia End Time was > 180 mg/dL but all other values after the higher value were = 180 mg/dL prior to the end point of 24 hours after Anesthesia End Time. (passes)
3 A single value collected between 18 and 24 hours after Anesthesia End Time was > 180 mg/dL and NO other values after the higher value were = 180 mg/dL prior to the end point of 24 hours after Anesthesia End Time. (fails)
4 No values collected between 18 and 24 hours after Anesthesia End Time were = 180 mg/dL or unable to determine from medical record documentation. (fails)
5 The patient discharged prior to 24 hours after Anesthesia End Time.

2a.4 Denominator Statement (*Brief, text description of the denominator - target population being measured***):**
Cardiac surgery patients with no evidence of prior infection

Include patients with an ICD-9-CM Principle Procedure code or ICD-9-CM Other Procedure codes of selected surgeries
AND
an ICD-9-CM for ICD-9-CM codes Principle Procedure code or ICD-9-CM Other Procedure codes of selected surgeries

2a.5 Target population gender: Female, Male
2a.6 Target population age range: >/= 18 years of age

2a.7 Denominator Time Window (*The time period in which cases are eligible for inclusion in the denominator***):**
Inpatient admission to discharge

2a.8 Denominator Details (*All information required to collect/calculate the denominator - the target population being measured - including all codes, logic, and definitions***):**
Data elements:
- Anesthesia Start Date
- Admission Date
- Birthdate
- Clinical Trial
- ICD-9-CM Principal Diagnosis Code
- ICD-9-CM Principal Procedure Code
- Infection Prior to Anesthesia

2a.9 Denominator Exclusions (*Brief text description of exclusions from the target population***):** Excluded Populations
- Patients less than 18 years of age
- Patients who have a length of Stay greater than 120 days
- Patients who had a principal diagnosis suggestive of preoperative infectious diseases (as defined in Appendix A, Table 5.09 for ICD-9-CM codes)
- Burn and transplant patients (as defined in Appendix A, Tables 5.14 and 5.15 for ICD-9-CM codes)
- Patients enrolled in clinical trials
- Patients whose ICD-9-CM principal procedure occurred prior to the date of admission
- Patients with physician/advanced practice nurse/physician assistant (physician/APN/PA) documented

infection prior to surgical procedure of interest
- Patients who discharged prior to 24 hours after Anesthesia End Time.

2a.10 Denominator Exclusion Details (*All information required to collect exclusions to the denominator, including all codes, logic, and definitions***):**
Data Elements:
- Anesthesia Start Date
- Admission Date
- Birthdate
- Clinical Trial
- ICD-9-CM Principal Diagnosis Code
- ICD-9-CM Principal Procedure Code
- Infection Prior to Anesthesia
-

2a.11 Stratification Details/Variables (*All information required to stratify the measure including the stratification variables, all codes, logic, and definitions***):**
No stratification

2a.12-13 Risk Adjustment Type: No risk adjustment necessary

2a.14 Risk Adjustment Methodology/Variables (*List risk adjustment variables and describe conceptual models, statistical models, or other aspects of model or method***):**
N/A

2a.15-17 Detailed risk model available Web page URL or attachment:

2a.18-19 Type of Score: Rate/proportion
2a.20 Interpretation of Score: Better quality = Higher score
2a.21 Calculation Algorithm (*Describe the calculation of the measure as a flowchart or series of steps***):**
The PDF of the draft Measure Information Form is attached, with the algorithm at 2a.29.

2a.22 Describe the method for discriminating performance *(e.g., significance testing)***:**
Method for discriminating performance: Benchmarks are established using the ABC methodology, based on the actual performance of the top facilities. ABC benchmarks identify superior performance and encourage poorer performers to improve. It is data-driven, peer-group performance feedback used to positively affect outcomes.

2a.23 Sampling (Survey) Methodology *If measure is based on a sample (or survey), provide instructions for obtaining the sample, conducting the survey and guidance on minimum sample size (response rate)*:
The SCIP Topic Population (common to all SCIP measures) is defined as patients admitted to the hospital for inpatient acute care with an ICD-9-CM Principal Procedure Code for SCIP as defined in Appendix A, Table 5.10 and a Length of Stay (Discharge Date - Admission Date) <= 120 days. There are eight distinct strata or sub-populations within the SCIP Topic Population, each identified by a specific group of procedure codes. The patients in each stratum are counted in the Initial Patient Population of multiple measures.

The following sample size tables for each option automatically build in the number of cases needed to obtain the required sample sizes.

Quarterly Sampling
For hospitals selecting sample cases for SCIP, a modified sampling procedure is required. Hospitals selecting sample cases for this set must ensure that each individual stratum's population and quarterly sample size meets the following conditions:
- Select within each of the seven individual measure stratum (e.g., colorectal surgery, hip arthroplasty, etc.) and the 8th SCIP stratum (Table 5.25 in Appendix A).

Quarterly Sample Size
Based on Initial Patient Population Size for the SCIP Measure Set

Hospital's Measure
Average Quarterly

Stratum Initial Patient Population Size
"N" Minimum Required
Stratum Sample Size
"n"
? 481 49
171-480 10% of Initial Patient Population size
17-170 17
< 17 No sampling; 100% Initial Patient Population required

Monthly Sampling
For hospitals selecting sample cases for SCIP, a modified sampling procedure is required. Hospitals selecting sample cases for this set must ensure that each individual strata population and monthly sample size meets the following conditions:
• Select within each of the seven individual measure stratum (e.g., colorectal surgery, hip arthroplasty, etc.) and the 8th SCIP stratum (Table 5.25 in Appendix A).

Monthly Sample Size
Based on Initial Patient Population Size for the SCIP Measure Set

Hospital's Measure
Average Monthly
Stratum Initial Patient Population Size
"N" Minimum Required
Stratum Sample Size
"n"
? 151 16
61-150 10% of Initial Patient Population size
6-60 6
<6 No sampling; 100% Initial Patient Population required

All of the SCIP measures´ specific exclusion criteria are used to filter out cases that do not belong in the measure denominator. Using SCIP-Inf-4 as an example, include cases covering all sampled strata, although the measure-specific exclusion criteria would only allow cases in the cardiac surgery stratum to be included in the denominator.

2a.24 Data Source (*Check the source(s) for which the measure is specified and tested)*
Administrative claims, Paper Records

2a.25 Data source/data collection instrument (*Identify the specific data source/data collection instrument, e.g. name of database, clinical registry, collection instrument, etc.***):**
Vendor tools or CART (both electronic). CART is available for download free at http://www.qualitynet.org/dcs/ContentServer?c=Page&pagename=QnetPublic%2FPage%2FQnetTier2&cid=1138900279093

2a.26-28 Data source/data collection instrument reference web page URL or attachment: URL
http://www.qualitynet.org/dcs/ContentServer?c=Page&pagename=QnetPublic%2FPage%2FQnetTier2&cid=1138900279093

2a.29-31 Data dictionary/code table web page URL or attachment: Attachment Inf-4 MIF with draft algorithm 6 8 2011.pdf

2a.32-35 Level of Measurement/Analysis (*Check the level(s) for which the measure is specified and tested)*
Facility, Population : National, Population : Regional

2a.36-37 Care Settings (*Check the setting(s) for which the measure is specified and tested)*
Hospital/Acute Care Facility

2a.38-41 Clinical Services (*Healthcare services being measured, check all that apply*)

TESTING/ANALYSIS

2b. Reliability testing

2b.1 Data/sample *(description of data/sample and size)*: Measure has been in use since 2001 and has been continually collected nationally for the RHQDAPU program since Jan 2007. Feedback from the hospital abstractors and the independent validation team is collected and incorporated. Reports on mismatches between national abstractors and the independent abstraction/validation contractor are reviewed quarterly. Revisions to data elements are made accordingly.

2b.2 Analytic Method *(type of reliability & rationale, method for testing)*:
Analysts review quarterly benchmarks and trends to identify differences in performance scores and investigate the possible causes. If measure specifications (algorithms, data elements) are causing the difference in performance, they are reviewed for possible updates.

2b.3 Testing Results *(reliability statistics, assessment of adequacy in the context of norms for the test conducted)*:
Specifications are reviewed and updated bi-annually, if issues are identified.
Minimal changes have been made to this measure.

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2c. Validity testing

2c.1 Data/sample *(description of data/sample and size)*: Validity testing was performed in a 3-state pilot. After analysis, specifications were updated. Because the measure specifications are reviewed and updated bi-annually based on clinician and abstractor feedback, validity is performed on an ongoing basis.

2c.2 Analytic Method *(type of validity & rationale, method for testing)*:
Measure specification updates are vetted through a Technical Expert Panel, to ensure that the measure is assessing the intended process.

2c.3 Testing Results *(statistical results, assessment of adequacy in the context of norms for the test conducted)*:
Specifications are reviewed and updated bi-annually, if issues are identified.

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2d. Exclusions Justified

2d.1 Summary of Evidence supporting exclusion(s):
All of the SCIP measures´ specific exclusion criteria are used to filter out cases that do not belong in the measure denominator. Patients with infections and those with burns are excluded from this measure as blood glucose may be elevated already. Transplant patients are excluded because of the other immunosuppressive processes that may be in place. Many of the exclusions are applied across multiple topics.

2d.2 Citations for Evidence:
N/A

2d.3 Data/sample *(description of data/sample and size)*: Each specific exclusion is vetted through a Technical Expert Panel unless they are non-clinical exclusions such as age and length of stay crossing reporting quarters. The Technical Expert Panel reviews the exclusions to ensure that the measure assesses the intended process.

2d.4 Analytic Method *(type analysis & rationale)*:
Analysts review quarterly benchmarks and trends to identify differences in performance scores and investigate the possible causes. If measure exclusions are causing performance variability, they are reviewed for validity and necessity.

2d.5 Testing Results *(e.g., frequency, variability, sensitivity analyses)*:
Specifications are reviewed and updated bi-annually, if issues are identified.

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NA
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2e. Risk Adjustment for Outcomes/ Resource Use Measures **2e.1 Data/sample** *(description of data/sample and size)*: N/A **2e.2 Analytic Method** *(type of risk adjustment, analysis, & rationale)*: **2e.3 Testing Results** *(risk model performance metrics)*: **2e.4 If outcome or resource use measure is not risk adjusted, provide rationale:**	**2e** C☐ P☐ M☐ N☐ NA ☐
2f. Identification of Meaningful Differences in Performance **2f.1 Data/sample from Testing or Current Use** *(description of data/sample and size)*: Each quarter of reported data is evaluated to identify meaningful differences in performance. **2f.2 Methods to identify statistically significant and practically/meaningfully differences in performance** *(type of analysis & rationale)*: Analysts review quarterly benchmarks and trends to identify differences in performance scores and investigate the possible causes. All specification updates are reviewed if performance variability is identified. **2f.3 Provide Measure Scores from Testing or Current Use** *(description of scores, e.g., distribution by quartile, mean, median, SD, etc.; identification of statistically significant and meaningfully differences in performance)*: The most recent 5 quarters of data are provided below. Q1-09 Q2-09 Q3-09 Q4-09 Q1-10 91.9 92.3 92.9 92.9 93.4	**2f** C☐ P☐ M☐ N☐
2g. Comparability of Multiple Data Sources/Methods **2g.1 Data/sample** *(description of data/sample and size)*: At this time, medical records (paper or electronically scanned) are used as data sources. Abstractors review the medical record and collect the data. Data is then transmitted electronically to a clinical data warehouse. **2g.2 Analytic Method** *(type of analysis & rationale)*: **2g.3 Testing Results** *(e.g., correlation statistics, comparison of rankings)*:	**2g** C☐ P☐ M☐ N☐ NA ☐
2h. Disparities in Care **2h.1 If measure is stratified, provide stratified results** *(scores by stratified categories/cohorts)*: Measure is not stratified. **2h.2 If disparities have been reported/identified, but measure is not specified to detect disparities, provide follow-up plans:**	**2h** C☐ P☐ M☐ N☐ NA ☐
TAP/Workgroup: What are the strengths and weaknesses in relation to the subcriteria for *Scientific Acceptability of Measure Properties?*	**2**
Steering Committee: Overall, to what extent was the criterion, *Scientific Acceptability of Measure Properties*, met? **Rationale:**	***2*** C☐ P☐ M☐ N☐
3. USABILITY	
Extent to which intended audiences (e.g., consumers, purchasers, providers, policy makers) can understand	Eval

the results of the measure and are likely to find them useful for decision making. (evaluation criteria)	Rating
3a. Meaningful, Understandable, and Useful Information **3a.1 Current Use:** In use **3a.2 Use in a public reporting initiative (disclosure of performance results to the public at large)** (*If used in a public reporting initiative, provide name of initiative(s), locations, Web page URL(s). If not publicly reported, state the plans to achieve public reporting within 3 years*)**:** Measure is used in the Hospital Inpatient Quality Reporting Program for CMS. **3a.3 If used in other programs/initiatives (***If used in quality improvement or other programs/initiatives, name of initiative(s), locations, Web page URL(s). If not used for QI, state the plans to achieve use for QI within 3 years***):** Measure is used in the accreditation process for the Joint Commission. **Testing of Interpretability** (*Testing that demonstrates the results are understood by the potential users for public reporting and quality improvement*) **3a.4 Data/sample** *(description of data/sample and size)***:** Measure has been in use since 2001 and has been continually collected nationally for the RHQDAPU program since Jan 2007. Feedback from the hospital abstractors and the independent validation team is collected and incorporated. Reports on mismatches between national abstractors and the independent abstraction/validation contractor are reviewed quarterly. Revisions to data elements are made accordingly. **3a.5 Methods** *(e.g., focus group, survey, QI project)***:** Nation-wide collection **3a.6 Results** *(qualitative and/or quantitative results and conclusions)***:** Measures are updated bi-annually if abstraction or interpretability issues are identified. Information produced by the measure is meaningful, understandable and useful to the intended audience.	**3a** C☐ P☐ M☐ N☐
3b/3c. Relation to other NQF-endorsed measures **3b.1 NQF # and Title of similar or related measures:**	
(for NQF staff use) **Notes on similar/related endorsed or submitted measures:**	
3b. Harmonization If this measure is related to measure(s) already endorsed by NQF (e.g., same topic, but different target population/setting/data source or different topic but same target population): **3b.2 Are the measure specifications harmonized? If not, why?**	**3b** C☐ P☐ M☐ N☐ NA ☐
3c. Distinctive or Additive Value **3c.1 Describe the distinctive, improved, or additive value this measure provides to existing NQF-endorsed measures:** **5.1 If this measure is similar to measure(s) already endorsed by NQF (i.e., on the same topic and the same target population), Describe why it is a more valid or efficient way to measure quality:**	**3c** C☐ P☐ M☐ N☐ NA ☐
TAP/Workgroup: What are the strengths and weaknesses in relation to the subcriteria for *Usability?*	**3**
Steering Committee: Overall, to what extent was the criterion, *Usability*, met? **Rationale:**	**3** C☐ P☐ M☐

	N☐
4. FEASIBILITY	
Extent to which the required data are readily available, retrievable without undue burden, and can be implemented for performance measurement. (evaluation criteria)	Eval Rating
4a. Data Generated as a Byproduct of Care Processes 4a.1-2 **How are the data elements that are needed to compute measure scores generated?** Data generated as byproduct of care processes during care delivery (Data are generated and used by healthcare personnel during the provision of care, e.g., blood pressure, lab value, medical condition), Coding/abstraction performed by someone other than person obtaining original information (E.g., DRG, ICD-9 codes on claims, chart abstraction for quality measure or registry)	4a C☐ P☐ M☐ N☐
4b. Electronic Sources 4b.1 **Are all the data elements available electronically?** (*elements that are needed to compute measure scores are in defined, computer-readable fields, e.g., electronic health record, electronic claims*) No 4b.2 **If not, specify the near-term path to achieve electronic capture by most providers.** Measure will be re-tooled for EHR use in near future, possibly 2011 or 2012.	4b C☐ P☐ M☐ N☐
4c. Exclusions 4c.1 **Do the specified exclusions require additional data sources beyond what is required for the numerator and denominator specifications?** No 4c.2 **If yes, provide justification.**	4c C☐ P☐ M☐ N☐ NA ☐
4d. Susceptibility to Inaccuracies, Errors, or Unintended Consequences 4d.1 **Identify susceptibility to inaccuracies, errors, or unintended consequences of the measure and describe how these potential problems could be audited. If audited, provide results.** Susceptibility to inaccuracies, errors or unintended consequences have not been identified.	4d C☐ P☐ M☐ N☐
4e. Data Collection Strategy/Implementation 4e.1 **Describe what you have learned/modified as a result of testing and/or operational use of the measure regarding data collection, availability of data/missing data, timing/frequency of data collection, patient confidentiality, time/cost of data collection, other feasibility/ implementation issues:** According to feedback, data collection is not labor-intensive and data is available in the medical record. 4e.2 **Costs to implement the measure** (*costs of data collection, fees associated with proprietary measures*)**:** Costs to implement the measure have not been assessed by the measure steward. 4e.3 **Evidence for costs:** 4e.4 **Business case documentation:** Several studies have been performed to evaluate costs associated with healthcare-associated infections. No current studies have been performed in relation to this measure.	4e C☐ P☐ M☐ N☐
TAP/Workgroup: What are the strengths and weaknesses in relation to the subcriteria for *Feasibility?*	4
Steering Committee: Overall, to what extent was the criterion, *Feasibility*, met? **Rationale:**	4 C☐ P☐ M☐

	N☐
RECOMMENDATION	
(for NQF staff use) **Check if measure is untested and only eligible for time-limited endorsement.**	**Time-limited** ☐
Steering Committee: Do you recommend for endorsement? **Comments:**	**Y**☐ **N**☐ **A**☐

CONTACT INFORMATION

Co.1 Measure Steward (Intellectual Property Owner)
Co.1 Organization
Centers for Medicare & Medicaid Services, 7500 Security Blvd., Baltimore, Maryland, 21244

Co.2 Point of Contact
Kristie, Baus, RN, MS, kristie.baus@cms.hhs.gov, 410-786-8161-

Measure Developer If different from Measure Steward
Co.3 Organization
Oklahoma Foundation for Medical Quality, 14000 Quail Springs Parkway, Suite 400, Oklahoma City, Oklahoma, 73134

Co.4 Point of Contact
Kristie, Baus, RN, MS, kristie.baus@cms.hhs.gov, 410-786-8161-

Co.5 Submitter If different from Measure Steward POC
Wanda, Johnson, wjohnson@ofmq.com, 405-840-2891-, Oklahoma Foundation for Medical Quality

Co.6 Additional organizations that sponsored/participated in measure development
The Joint Commission participates in ongoing maintenance of this measure.

ADDITIONAL INFORMATION

Workgroup/Expert Panel involved in measure development
Ad.1 Provide a list of sponsoring organizations and workgroup/panel members' names and organizations. Describe the members' role in measure development.
The panel members names are available upon request.

Ad.2 If adapted, provide name of original measure:
Ad.3-5 If adapted, provide original specifications URL or attachment

Measure Developer/Steward Updates and Ongoing Maintenance
Ad.6 Year the measure was first released: 2006
Ad.7 Month and Year of most recent revision: 10, 2010
Ad.8 What is your frequency for review/update of this measure? bi-annually
Ad.9 When is the next scheduled review/update for this measure? 04, 2011

Ad.10 Copyright statement/disclaimers: N/A

Ad.11 -13 Additional Information web page URL or attachment:

Date of Submission (*MM/DD/YY*)**:** 06/08/2011

NQF-ENDORSED VOLUNTARY CONSENSUS STANDARDS FOR HOSPITAL CARE

Measure Information Form

Measure Set: Surgical Care Improvement Project (SCIP)

Set Measure ID #: SCIP-Inf-4

Performance Measure Name: Cardiac Surgery Patients With Controlled Postoperative Blood Glucose

Description: Cardiac surgery patients with controlled postoperative blood glucose (less than or equal to 180mg/dL) in the timeframe of 18 to 24 hours after *Anesthesia End Time.*

Rationale: Hyperglycemia has been associated with increased in-hospital morbidity and mortality for multiple medical and surgical conditions. In a study by Zerr, et al. (1997), the risk of infection was significantly higher for patients undergoing coronary artery bypass graft (CABG) if blood glucose levels were elevated. The Society of Thoracic Surgeons Workforce guidelines (Lazar, 2009) recommend that patients who have had cardiac surgery with and without diabetes should maintain a serum glucose of < 180 mg/dL. Latham, et al (2001), found that hyperglycemia in the immediate postoperative phase increases the risk of infection in both diabetic and nondiabetic patients and the higher the level of hyperglycemia, the higher the potential for infection in both patient populations. A study conducted in Leuven, Belgium (Van den Berghe, 2001), demonstrated that intensive insulin therapy not only reduced overall in-hospital mortality but also decreased blood stream infections, acute renal failure, red cell transfusions, ventilator support, and intensive care. Hyperglycemia is a risk factor that, once identified, could minimize adverse outcomes for cardiac surgical patients.

Type of Measure: Process

Improvement Noted As: An increase in the percentage.

Numerator Statement: Cardiac surgery patients with controlled postoperative blood glucose (less than or equal to180 mg/dL) in the timeframe of 18 to 24 hours after *Anesthesia End Time.*

Included populations: Not applicable

Excluded Populations: None

Data Elements:

- *Glucose*

Denominator Statement: Cardiac surgery patients with no evidence of prior infection.

Included Populations:

- An *ICD-9-CM Principal Procedure Code* of selected surgeries (as defined in Appendix A, Table 5.10 for ICD-9-CM codes)

AND

- An *ICD-9-CM Principal Procedure Code* of selected surgeries (as defined in Appendix A, Table 5.11 for ICD-9-CM codes)

Excluded Populations:

- Patients less than 18 years of age
- Patients who have a length of stay greater than 120 days
- Patients who had a principal diagnosis suggestive of preoperative infectious diseases (as defined in Appendix A, Table 5.09 for ICD-9-CM codes)
- Burn and transplant patients (as defined in Appendix A, Tables 5.14 and 5.15 for ICD-9-CM codes)
- Patients enrolled in clinical trials
- Patients whose ICD-9-CM principal procedure occurred prior to the date of admission
- Patients with physician/advanced practice nurse/physician assistant (physician/APN/PA) documented infection prior to surgical procedure of interest
- Patients who discharge prior to 24 hours after *Anesthesia End Time.*

Data Elements:

- *Admission Date*
- *Anesthesia Start Date*
- *Birthdate*
- *Clinical Trial*
- *ICD-9-CM Principal Diagnosis Code*
- *ICD-9-CM Principal Procedure Code*
- *Infection Prior to Anesthesia*

Risk Adjustment: No

Data Collection Approach: Retrospective data sources for required data elements include administrative data and medical records.

Data Accuracy: Variation may exist in the assignment of ICD-9-CM codes; therefore, coding practices may require evaluation to ensure consistency.

Measure Analysis Suggestions: It is important that blood glucose levels be maintained and documented throughout the entire postoperative period. In the course of quality improvement efforts, hospitals may find it useful to drill down to the responses for the data element *Glucose*. Further insight may be gained by examining the consistency and values of blood glucose diagnostics and documentation within the organization.

Sampling: Yes, please refer to the measure set sampling requirements and for additional information see the Population and Sampling Specifications Section.

Data Reported As: Aggregate rate generated from count data reported as a proportion.

Selected References:

- Gordon SM, Serkey JM, Barr C, et al. The relationship between glycosylated hemoglobin (HgA1c) levels and postoperative infections in patients undergoing primary coronary artery bypass surgery (CABG.) *Infect Control Hosp Epidemiol.* 1997;18(No.5, Part 2):29(58.) PMID: 00000.
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- Trick WE, Scheckler WE, Tokars JI, et al. Modifiable risk factors associated with deep sternal site infection after coronary artery bypass grafting. *J Thorac Cardiovasc Surg.* 2000 Jan;119(1):108-114. PMID: 10612768.
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- McAlister FA, Man J, Bistritz L, et al. Diabetes and coronary artery bypass surgery: an examination of perioperative glycemic control and outcomes. *Diabetes Care.* 2003 May;26(5):1518-1524. PMID: 12716815.
- Estrada CA, Young JA, Nifong LW, et al. Outcomes and perioperative hyperglycemia in patients with or without diabetes mellitus undergoing coronary

artery bypass grafting. *Ann Thorac Surg.* 2003 May;75(5):1392-1399. PMID: 12735552.

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- Woodruff RE, Lewis SB, McLeskey CH, et al. Avoidance of surgical hyperglycemia in diabetic patients. *JAMA.* 1980 Jul 1;244(2):166-168. PMID: 6991732.
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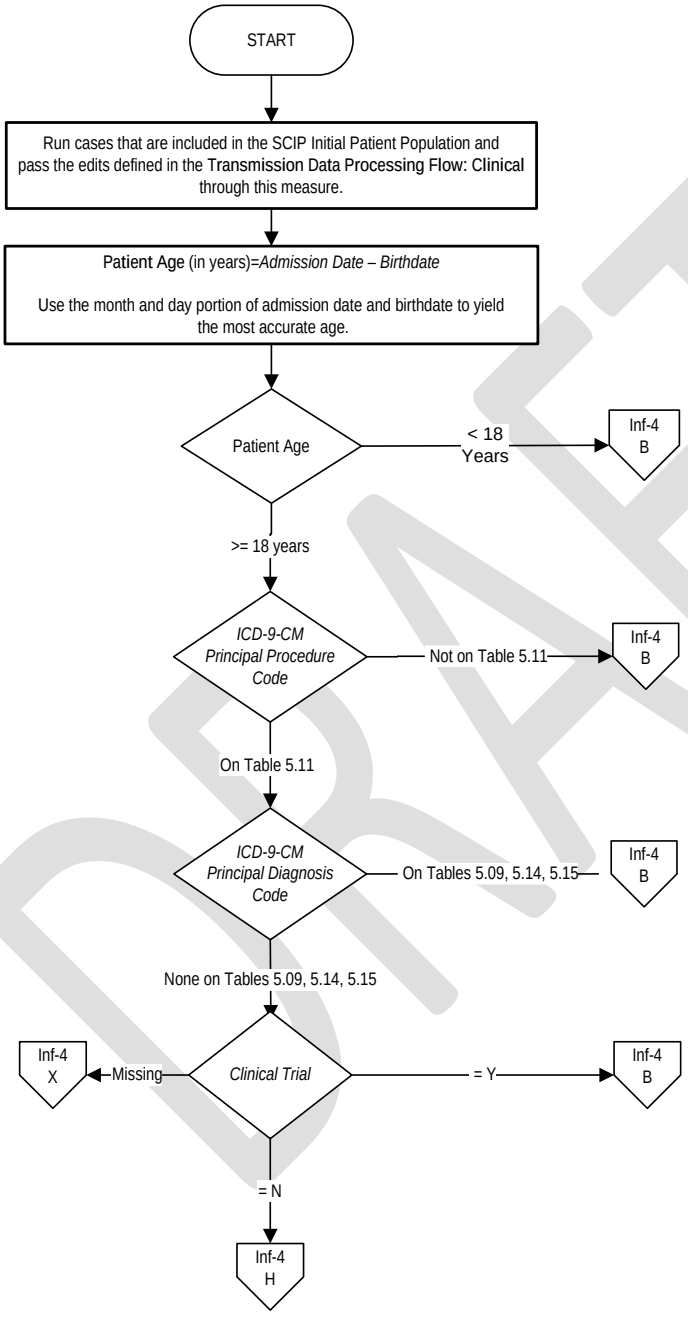
- Zerr KJ, Furnary AP, Grunkemeier GL, et al. Glucose control lowers the risk of wound infection in diabetics after open heart operations. *Ann Thorac Surg*. 1997 Feb;63(2):356-361. PMID: 9033300.
- Pomposelli JJ, Baxter JK 3rd, Babineau TJ, et al. Early postoperative glucose control predicts nosocomial infection rate in diabetic patients. *J Parenter Enteral Nutr.* 1998 Mar-Apr;22(2):77-81. PMID: 9527963.
- Van den Berghe G, Wouters P, Weekers F, et al. Intensive insulin therapy in the critically ill patients. *N Engl J Med*. 2001 Nov 8;345(19):1359-1367. PMID: 11794168.
- Lazar H, McDonnell M, Chipkin S, Furnary A, Engelman R, Sadhu A, Bridges C, Haan C, Svedjeholm R, Taegtmeyer H, Shemin R. The Society of Thoracic Surgeons practice guideline series: Blood glucose management during adult cardiac surgery. *Ann Thorac Surg* 2009;87:663-669.

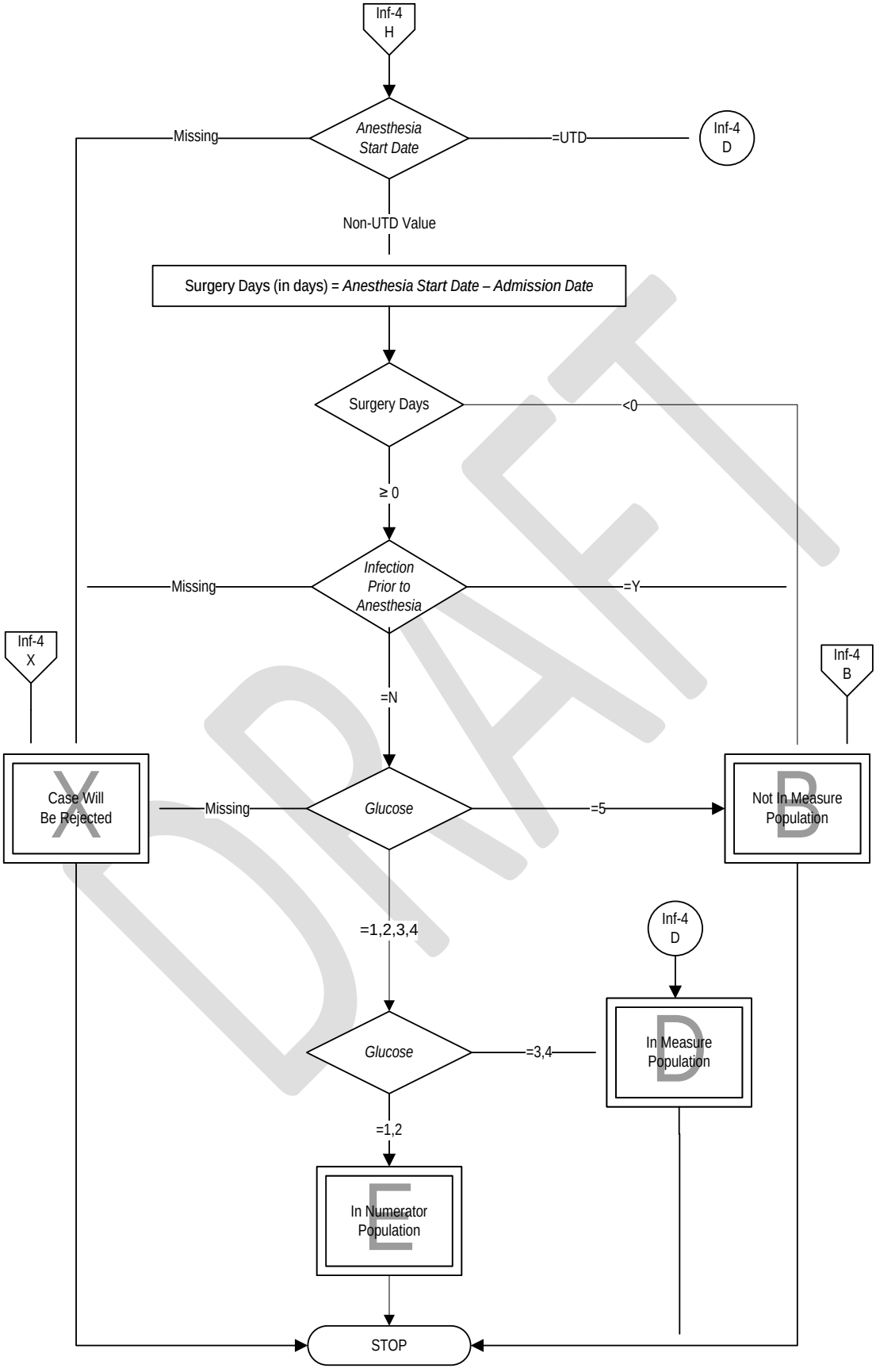
SCIP-Inf-4: Cardiac Surgery Patients With Controlled Postoperative Blood Glucose

Numerator: Cardiac surgery patients with controlled postoperative blood glucose (less than orequal to180 mg/dL) in the timeframe of 18 to 24 hours after Anesthesia End Time.

Denominator: Cardiac surgery patients with no evidence of prior Infection.



Variable Key:
Patient Age
Surgery Days


Inf-4 H
Anesthesia Start Date
Missing
=UTD
Inf-4 D
Non-UTD Value
Surgery Days (in days) = Anesthesia Start Date – Admission Date
Surgery Days
<0
≥ 0
Infection Prior to Anesthesia
Missing
=Y
Inf-4 X
=N
Inf-4 B
X
Case Will Be Rejected
Missing
Glucose
=5
B
Not In Measure Population
=1,2,3,4
Inf-4 D
Glucose
=3,4
D
In Measure Population
=1,2
E
In Numerator Population
STOP

NATIONAL QUALITY FORUM

Measure Evaluation 4.1
December 2009

This form contains the measure information submitted by stewards. Blank fields indicate no information was provided. Attachments also may have been submitted and are provided to reviewers. The subcriteria and most of the footnotes from the evaluation criteria are provided in Word comments within the form and will appear if your cursor is over the highlighted area. Hyperlinks to the evaluation criteria and ratings are provided in each section.

TAP/Workgroup (if utilized)**:** Complete all yellow highlighted areas of the form. Evaluate the extent to which each subcriterion is met. Based on your evaluation, summarize the strengths and weaknesses in each section.

Note: *If there is no TAP or workgroup, the SC also evaluates the subcriteria (yellow highlighted areas).*

Steering Committee: Complete all pink highlighted areas of the form. Review the workgroup/TAP assessment of the subcriteria, noting any areas of disagreement; then evaluate the extent to which each major criterion is met; and finally, indicate your recommendation for the endorsement. Provide the rationale for your ratings.

Evaluation ratings of the extent to which the criteria are met
C = Completely (unquestionably demonstrated to meet the criterion)
P = Partially (demonstrated to partially meet the criterion)
M = Minimally (addressed BUT demonstrated to only minimally meet the criterion)
N = Not at all (NOT addressed; OR incorrectly addressed; OR demonstrated to NOT meet the criterion)
NA = Not applicable (only an option for a few subcriteria as indicated)

(for NQF staff use) **NQF Review #:** 0284 **NQF Project:** Surgery Endorsement Maintenance 2010
MEASURE DESCRIPTIVE INFORMATION
De.1 **Measure Title:** Surgery patients on beta blocker therapy prior to admission who received a beta blocker during the perioperative period
De.2 **Brief description of measure***:* Percentage of patients on beta blocker therapy prior to admission who received a beta blocker during the perioperative period. To be in the denominator, the patient must be on a beta-blocker prior to arrival. The case is excluded if the patient is not on a beta-blocker prior to arrival, as described below in 2a4.
1.1-2 **Type of Measure:** Process De.3 **If included in a composite or paired with another measure, please identify composite or paired measure** NA
De.4 **National Priority Partners Priority Area:** Safety De.5 **IOM Quality Domain**: Safety De.6 **Consumer Care Need:** Staying healthy

CONDITIONS FOR CONSIDERATION BY NQF	
Four conditions must be met before proposed measures may be considered and evaluated for suitability as voluntary consensus standards:	NQF Staff
A. The measure is in the public domain or an intellectual property (measure steward agreement) is signed. *Public domain only applies to governmental organizations. All non-government organizations must sign a measure steward agreement even if measures are made publicly and freely available.* A.1 **Do you attest that the measure steward holds intellectual property rights to the measure and the right to use aspects of the measure owned by another entity (e.g., risk model, code set)?** Yes A.2 **Indicate if Proprietary Measure** (*as defined in measure steward agreement*)**:** A.3 **Measure Steward Agreement:** Government entity and in the public domain - no agreement necessary A.4 **Measure Steward Agreement attached:**	**A** Y☐ N☐

B. The measure owner/steward verifies there is an identified responsible entity and process to maintain and update the measure on a schedule that is commensurate with the rate of clinical innovation, but at least every 3 years. Yes, information provided in contact section	**B** Y☐ N☐
C. The intended use of the measure includes both public reporting and quality improvement. ►**Purpose:** Payment Program, Regulatory and Accreditation Programs	**C** Y☐ N☐
D. The requested measure submission information is complete. Generally, measures should be fully developed and tested so that all the evaluation criteria have been addressed and information needed to evaluate the measure is provided. Measures that have not been tested are only potentially eligible for a time-limited endorsement and in that case, measure owners must verify that testing will be completed within 12 months of endorsement. D.1**Testing:** Yes, fully developed and tested D.2 **Have NQF-endorsed measures been reviewed to identify if there are similar or related measures?** Yes	**D** Y☐ N☐
(for NQF staff use) **Have all conditions for consideration been met?** **Staff Notes to Steward** (*if submission returned*)**:**	**Met** Y☐ N☐
Staff Notes to Reviewers (*issues or questions regarding any criteria*)**:**	
Staff Reviewer Name(s):	

TAP/Workgroup Reviewer Name:	
Steering Committee Reviewer Name:	
1. IMPORTANCE TO MEASURE AND REPORT	
Extent to which the specific measure focus is important to making significant gains in health care quality (safety, timeliness, effectiveness, efficiency, equity, patient-centeredness) and improving health outcomes for a specific high impact aspect of healthcare where there is variation in or overall poor performance. ***Measures must be judged to be important to measure and report*** *in order to be evaluated against the remaining criteria.* (evaluation criteria) **1a. High Impact**	**Eval Rating**
(for NQF staff use) **Specific NPP goal**:	
1a.1 **Demonstrated High Impact Aspect of Healthcare:** Affects large numbers 1a.2 1a.3 **Summary of Evidence of High Impact:** Concerns regarding the discontinuation of beta-blocker therapy in the perioperative period have existed for several decades. Shammash and colleagues studied a total of 140 patients who received beta-blockers preoperatively. Mortality in the 8 patients who had beta-blockers discontinued postoperatively (50%) was significantly greater than in the 132 patients in whom beta-blockers were continued. Hoeks and colleagues studied 711 consecutive peripheral vascular surgery patients. After adjustment for potential confounders and the propensity of its use, continuous beta-blocker use remained significantly associated with a lower 1-year mortality than among nonusers. In contrast, beta-blocker withdrawal was associated with an increased risk of 1-year mortality compared with nonusers. 1a.4 **Citations for Evidence of High Impact:** -Hoeks SE, Scholte Op Reimer WJ, van Urk H, et al. Increase of 1-year mortality after perioperative beta-blocker withdrawal in endovascular and vascular surgery patients. Eur J Vasc Endovasc Surg 2007;33:13-9. -Shammash JB, Trost JC, Gold JM, et al. Perioperative beta-blocker withdrawal and mortality in vascular surgical patients. Am Heart J. 2001;141:148-153. PMID: 11136500.	**1a** C☐ P☐ M☐ N☐
1b. Opportunity for Improvement 1b.1 **Benefits (improvements in quality) envisioned by use of this measure:** Mortality in patients who have their routine beta-blockers discontinued postoperatively is greater than in patients in whom beta-blockers	**1b** C☐ P☐ M☐

are continued. Beta-blocker withdrawal has been associated with an increased risk of mortality compared with nonusers. **1b.2 Summary of data demonstrating performance gap (variation or overall poor performance) across providers:** Measure is reported as a rate. Measure has been collected since Q1 2009 with rates as followed: 1Q09- 89.2% 2Q09- 90.5% 3Q09- 91.5% 4Q09- 92.5% 1Q10- 93.1% **1b.3 Citations for data on performance gap:** 1Q2010 data, from 3252 reporting hospitals: Numerator: 106,625 Denominator: 114,496 **1b.4 Summary of Data on disparities by population group:** A disparities report is attached to this submission. **1b.5 Citations for data on Disparities:** The attached disparities report uses 2009 data from the clinical data warehouse.	**N**☐
1c. Outcome or Evidence to Support Measure Focus **1c.1 Relationship to Outcomes** (*For non-outcome measures, briefly describe the relationship to desired outcome. For outcomes, describe why it is relevant to the target population*)**:** Monitoring whether routine beta-blocker are continued postoperatively can affect adverse cardiac events. **1c.2-3. Type of Evidence:** Randomized controlled trial, Expert opinion, Systematic synthesis of research, Meta-analysis **1c.4 Summary of Evidence** (*as described in the criteria; for outcomes, summarize any evidence that healthcare services/care processes influence the outcome*)**:** The American College of Cardiology/American Heart Association site continuation of beta-blocker therapy in the perioperative period as a class I indication, and accumulating evidence suggests that titration to maintain tight heart rate control should be the goal. **1c.5 Rating of strength/quality of evidence (***also provide narrative description of the rating and by whom***):** Level c **1c.6 Method for rating evidence:** Rating is based upon the estimate of certainty (Precision) of treatment effect *Data available from clinical trials or registries about the usefulness/efficacy in different subpopulations, such as gender, age, history of diabetes, history of prior myocardial infarction, history of heart failure, and prior aspirin use. A recommendation with Level of Evidence B or C does not imply that the recommendation is weak. Many important clinical questions addressed in the guidelines do not lend themselves to clinical trials. Even though randomized trials are not available, there may be a very clear clinical consensus that a particular test or therapy is useful or effective **1c.7 Summary of Controversy/Contradictory Evidence:** No contradictory evidence. **1c.8 Citations for Evidence (***other than guidelines***):** Selected References: -Manual of Medical Therapeutics. Department of Medicine Washington University, School of Medicine, St. Louis, MO, GA Ewald and CR McKenzie editors. 28th Edition, 1995. PMID: 0000000. -Belzberg H, Rivkind AI. Preoperative cardiac preparation. Chest. 1999;115:82S-95S. PMID: 10331339. Poldermans D, Boersma E, Bax JJ, et al, for the DECREASE Study Group. The effect of bisoprolol on perioperative mortality and myocardial infarction in high-risk patients undergoing vascular surgery. N Engl J	**1c** **C**☐ **P**☐ **M**☐ **N**☐

Med. 1999;24:1789-1794. PMID: 10588963.

Shammash JB, Trost JC, Gold JM, et al. Perioperative beta-blocker withdrawal and mortality in vascular surgical patients. Am Heart J. 2001;141:148-153. PMID: 11136500.

Boersma E, Poldermans D, Bax JJ, et al, for the Dutch Echocardiographic Cardiac Risk Evaluation Applying Stress Echocardiography (DECREASE) Study Group. Predictors of cardiac events after major vascular surgery: role of clinical characteristics, dobutamine echocardiography.JAMA 2001 Apr 11;285(14):1865-73. PMID:11308400.

Pasternack PF, Imparato AM, Baumann FG, et al. The hemodynamics of beta-blockade in patients undergoing abdominal aortic aneurysm repair. Circulation. 1987;76(suppl 3, pt 2):III-1-7. PMID:3621532.

Yaeger RA, Moneta GL, Edwards JM, et al. Reducing perioperative myocardial infarction following vascular surgery. The potential role of beta-blockade. Arch Surg 1995;130(8):869. PMID:7632148.

Yusuf S, Peto R, Lewis J, Collins R, et al. Beta Blockade during and after myocardial infarction: an overview of the randomized trials. Prog Cardiovasc Dis 1985; 27: 335-371. PMID: 2858114.

McGory ML, Maggard MA, Ko CY. A meta-analysis of perioperative beta blockade: What is the actual risk reduction? Surgery. 2005 Aug;138(2):171-179. PMID: 16153424.

Goldman L. Noncardiac surgery in patients receiving propranolol. Case reports and recommended approach. Arch Intern Med 1981;141:193-6.

Hoeks SE, Scholte Op Reimer WJ, van Urk H, et al. Increase of 1-year mortality after perioperative beta-blocker withdrawal in endovascular and vascular surgery patients. Eur J Vasc Endovasc Surg 2007;33:13-9.

Lindenauer PK, Pekow P, Wang K, Mamidi DK, Gutierrez B, Benjamin EM. Perioperative beta-blocker therapy and mortality after major noncardiac surgery. N Engl J Med 2005; 353:349-361.

1c.9 Quote the Specific guideline recommendation (*including guideline number and/or page number***):**
Beta blockers should be continued in patients undergoing surgery who are receiving beta blockers to treat angina, symptomatic arrhythmias, hypertension, or other ACC/AHA Class I guideline indications. (Level of Evidence: C)

1c.10 Clinical Practice Guideline Citation: Fleisher LA, Beckman JA, Brown KA, Calkins H, et al. ACC/AHA 2007
Specifications Manual for National Hospital Inpatient Quality Measures
Discharges 10-01-10 (4Q10) through 03-31-11 (1Q11) SCIP-Card-2-3
Guidelines on perioperative cardiovascular evaluation and care for noncardiac surgery: a report of the American College of Cardiology/American Heart Association Task Force on Practice Guidelines (Writing Committee to Revise the 2002 Guidelines on Perioperative Cardiovascular Evaluation for Noncardiac Surgery). J Am Coll Cardiol 2007; 50: e159-241.
1c.11 National Guideline Clearinghouse or other URL: http://www.guideline.gov/content.aspx?id=11510

1c.12 Rating of strength of recommendation (*also provide narrative description of the rating and by whom***):**
Class I

1c.13 Method for rating strength of recommendation (*If different from USPSTF system, also describe rating and how it relates to USPSTF)*:
CLASS I

Benefit >>> Risk
Procedure/Treatment SHOULD be performed/ administered
CLASS IIa
Benefit >> Risk

Additional studies with focused objectives needed IT IS REASONABLE to perform procedure/ administer treatment CLASS IIb Benefit > Risk Additional studies with broad objectives needed; additional registry data would be helpful Procedure/Treatment MAY BE CONSIDERED CLASS III Risk > Benefit No additional studies needed Procedure/Treatment should NOT be performed/ administered SINCE IT IS NOT HELPFUL AND MAY BE HARMFUL The American College of Cardiology/American Heart Association (ACC/AHA) classification of the recommendations for patient evaluation and treatment (classes I-III) and the levels of evidence (A-C) are defined 1c.14 **Rationale for using this guideline over others:** Experts in the subject under consideration have been selected from the American College of Cardiology (ACC) Foundation and the American Heart Association (AHA) to examine subject-specific data and write guidelines. The process includes additional representatives from other medical practitioner and specialty groups when appropriate. Writing groups are specifically charged to perform a formal literature review, weigh the strength of evidence for or against a particular treatment or procedure, and include estimates of expected health outcomes where data exist. Patient-specific modifiers, comorbidities, and issues of patient preference that may influence the choice of particular tests or therapies are considered, as well as frequency of follow-up and cost-effectiveness.	
TAP/Workgroup: What are the strengths and weaknesses in relation to the subcriteria for *Importance to Measure and Report?*	**1**
Steering Committee: Was the threshold criterion, *Importance to Measure and Report*, met? **Rationale:**	**1** **Y☐** **N☐**
2. SCIENTIFIC ACCEPTABILITY OF MEASURE PROPERTIES	
Extent to which the measure, as specified, produces consistent (reliable) and credible (valid) results about the quality of care when implemented. (evaluation criteria)	**Eval Rating**
2a. MEASURE SPECIFICATIONS	
S.1 **Do you have a web page where current detailed measure specifications can be obtained?** S.2 **If yes, provide web page URL:** **2a. Precisely Specified**	
2a.1 **Numerator Statement (***Brief, text description of the numerator - what is being measured about the target population, e.g. target condition, event, or outcome***):** Surgery patients on beta blocker therapy prior to admission who receive a beta blocker during the perioperative period 2a.2 **Numerator Time Window (***The time period in which cases are eligible for inclusion in the numerator***):** The perioperative period for the currently endorsed measure has been expanded. NOTE: After input from the TEP, there are changes proposed to this measure. The perioperative timeframe will be expanded and the hourly parameters removed. The perioperative period for the SCIP Cardiac measures is defined as the day prior to surgery through postoperative day two (POD 2) with day of surgery being day zero. If the postoperative length of stay = 2 days, the measure evaluates the administration of more than one dose of a beta-blocker: the day prior to or the day of surgery and on postoperative day one (POD 1) or postoperative day two (POD 2) unless reasons for not administering the medication were documented. If the	**2a-specs** **C☐** **P☐** **M☐** **N☐**

postoperative length of stay was < 2 days, the measure will evaluate the administration of the beta-blocker on the day prior to or the day of surgery only, unless reasons for not administering the medication were documented.

2a.3 Numerator Details (*All information required to collect/calculate the numerator, including all codes, logic, and definitions***):**
Data element:
Beta-Blocker Perioperative

2a.4 Denominator Statement (*Brief, text description of the denominator - target population being measured***):**
All surgery patients on beta blocker therapy prior to arrival
NOTE: To be in the denominator, the patient must be on a beta-blocker prior to arrival. The case is excluded if the patient is not on a beta-blocker prior to arrival.
Data Element Data Collection Question: Is there documentation that the patient was on a daily beta-blocker therapy prior to arrival? Yes/No
Notes for Abstraction:
• If there is documentation that the beta-blocker was taken daily at "home" or is a "current" medication, select "Yes".
• If a beta-blocker is listed as a home medication without designation of how often or when it is taken, select "Yes".
• If there is documentation that the beta-blocker is a home/current medication and additional documentation indicates the beta-blocker was not taken daily, e.g., the medication reconciliation form lists a beta-blocker as a home/current medication, but documentation in the nurses notes state "patient denies taking beta-blocker every day", select "No".
• If there is documentation that the beta-blocker is on a schedule other than daily, select "No".
• If there is documentation that the beta-blocker was given on a "prn" basis for cardiac or non-cardiac reasons, select "No".

2a.5 Target population gender: Female, Male
2a.6 Target population age range: Patients >/= 18 years of age

2a.7 Denominator Time Window (*The time period in which cases are eligible for inclusion in the denominator***):**
Entire inpatient acute admission

2a.8 Denominator Details (*All information required to collect/calculate the denominator - the target population being measured - including all codes, logic, and definitions***):**
Data Elements:
Admission Date
Anesthesia Start Date
Beta-Blocker Current Medication
Beta-Blocker During Pregnancy
Birthdate
Clinical Trial
Discharge Date
ICD-9-CM Principal Procedure Code
Laparoscope
Perioperative Death
Reason for Not Administering Beta-Blocker-Perioperative
Sex

2a.9 Denominator Exclusions (*Brief text description of exclusions from the target population***):**
- Patients less than 18 years of age
- Patients who have a Length of Stay greater than 120 days
- Patients enrolled in clinical trials
- Patients whose ICD-9-CM principal procedure occurred prior to the date of admission
- Patients who expired during the perioperative period
- Pregnant patients taking a beta-blocker prior to arrival

- Patients with a documented Reason for Not Administering Beta-Blocker-Perioperative
- Patients with Ventriular Assist Devices or Heart Transplantation

2a.10 Denominator Exclusion Details (*All information required to collect exclusions to the denominator, including all codes, logic, and definitions***):**
Data Elements:
Beta-Blocker During Pregnancy
Clinical Trial

Perioperative Death
Reason for Not Administering Beta-Blocker-Perioperative

2a.11 Stratification Details/Variables (*All information required to stratify the measure including the stratification variables, all codes, logic, and definitions***):**
No stratification

2a.12-13 Risk Adjustment Type: No risk adjustment necessary

2a.14 Risk Adjustment Methodology/Variables (*List risk adjustment variables and describe conceptual models, statistical models, or other aspects of model or method***):**

2a.15-17 Detailed risk model available Web page URL or attachment:

2a.18-19 Type of Score: Rate/proportion
2a.20 Interpretation of Score: Better quality = Higher score
2a.21 Calculation Algorithm (*Describe the calculation of the measure as a flowchart or series of steps***):**
Variable Key: Patient Age, Surgery Days
1.Start processing. Run cases that are included in the Surgical Care Improvement Project (SCIP) Initial Patient Population and pass the edits defined in the Transmission Data Processing Flow: Clinical through this measure.
2.Calculate Patient Age. The Patient Age, in years, is equal to the Admission Date minus the Birthdate. Use the month and day portion of admission date and birthdate to yield the most accurate age.
3.Check Patient Age
a.If Patient Age is less than 18 years, the case will proceed to a Measure Category Assignment of B and will not be in the Measure Population. Stop processing.
b.If Patient Age is greater than or equal to 18 years, continue processing and proceed to Laparoscope.
4.Check Laparoscope
a.If Laparoscope is missing, the case will proceed to a Measure Category Assignment of X and will be rejected. Stop processing.
b.If Laparoscope equals 1 or 3, the case will proceed to a Measure Category Assignment of B and will not be in the Measure Population. Stop processing.
c.If Laparoscope equals 2, continue processing and proceed to Clinical Trial.
5.Check Clinical Trial
a.If Clinical Trial is missing, the case will proceed to a Measure Category Assignment of X and will be rejected. Stop processing.
b.If Clinical Trial equals Yes, the case will proceed to a Measure Category Assignment of B and will not be in the Measure Population. Stop processing.
c.If Clinical Trial equals No, continue processing and proceed to Anesthesia Start Date.
6.Check Anesthesia Start Date
a.If the Anesthesia Start Date is missing, the case will proceed to a Measure Category Assignment of X and will be rejected. Stop processing.
b.If the Anesthesia Start Date equals Unable To Determine, the case will proceed to a Measure Category Assignment of D and will be in the Measure Population. Stop processing.
c.If Anesthesia Start Date equals a Non Unable To Determine Value, continue processing and proceed to the Surgery Days calculation.
7.Calculate Surgery Days. Surgery Days, in days, is equal to the Anesthesia Start Date minus the Admission Date.
8.Check Surgery Days
a.If the Surgery Days is less than zero, the case will proceed to a Measure Category Assignment of B and will

not be in the Measure Population. Stop processing.
b.If the Surgery Days is greater than or equal to zero, continue processing and proceed to Perioperative Death.
9.Check Perioperative Death
a.If Perioperative Death is missing, the case will proceed to a Measure Category Assignment of X and will be rejected. Stop processing.
b.If Perioperative Death equals Yes, the case will proceed to a Measure Category Assignment of B and will not be in the Measure Population. Stop processing.
c.If Perioperative Death equals No, continue processing and proceed to Beta-Blocker Current Medication.
10.Check Beta-Blocker Current Medication
a.If the Beta-Blocker Current Medication is missing, the case will proceed to a Measure Category Assignment of X and will be rejected. Stop processing.
b.If the Beta-Blocker Current Medication equals No, the case will proceed to a Measure Category Assignment of B and will not be in the Measure Population. Stop processing.
c.If the Beta-Blocker Current Medication equals Yes, continue processing and proceed to Sex.
11.Check Sex
a.If Sex is missing, the case will proceed to a Measure Category Assignment of X and will be rejected. Stop processing.
b.If Sex equals Female, continue processing and check Beta-Blocker During Pregnancy.
1.If Beta-Blocker During Pregnancy is missing, the case will proceed to a Measure Category Assignment of X and will be rejected. Stop processing.
2.If Beta-Blocker During Pregnancy equals 1 or 3, the case will proceed to a Measure Category Assignment of B and will not be in the Measure Population. Stop processing.
3.If Beta-Blocker During Pregnancy equals 2, continue processing and proceed to Beta-Blocker Preoperative.
c.If Sex equals Male or Unknown, continue processing and proceed to Beta-Blocker Perioperative.
12.Check Beta-Blocker Perioperative
a.If Beta-Blocker Perioperative is missing, the case will proceed to a Measure Category Assignment of X and will be rejected. Stop processing.
b.If Beta-Blocker Perioperative equals Yes, the case will proceed to a Measure Category Assignment of E and will be in the Numerator Population. Stop processing.
c.If Beta-Blocker Perioperative equals No, continue processing and check Reason for Not Administering Beta-Blocker Perioperative.
13.Check Reason for Not Administering Beta-Blocker Perioperative
a.If Reason for Not Administering Beta-Blocker Perioperative is missing, the case will proceed to a Measure Category Assignment of X and will be rejected. Stop processing.
b.If Reason for Not Administering Beta-Blocker Perioperative equals Yes, the case will proceed to a Measure Category Assignment of B and will not be in the Measure Population. Stop processing.
c.If Reason for Not Administering Beta-Blocker Perioperative equals No, the case will proceed to a Measure Category Assignment of D and will be in the Measure Population. Stop processing.

2a.22 Describe the method for discriminating performance *(e.g., significance testing)*:
Benchmarks are established using the ABC methodology, based on the actual performance of the top facilities. ABC benchmarks identify superior performance and encourage poorer performers to improve. It is data-driven, peer-group performance feedback.
Achievable Benchmarks of Care TM: developed at the University of Alabama at Birmingham for AHRQ. This methodology identifies benchmark care levels already achieved by “best-in-class” care givers. Development of benchmarks that are realistic and achievable may help to motivate providers that are having difficulty improving care. The benchmarks represent a measureable level of excellence that always exceeds average performance. It ensures that all superior providers contribute to the benchmark but also ensures that providers with high performance but very low numbers of cases do not unduly influence benchmark levels. Additional information can be found at http://main.uab.edu/show.asp?durki=14527

2a.23 Sampling (Survey) Methodology *If measure is based on a sample (or survey), provide instructions for obtaining the sample, conducting the survey and guidance on minimum sample size (response rate)*:
The SCIP Topic Population (common to all SCIP measures) is defined as patients admitted to the hospital for inpatient acute care with an ICD-9-CM Principal Procedure Code for SCIP as defined in Appendix A, Table 5.10 and a Length of Stay (Discharge Date - Admission Date) <= 120 days. There are eight distinct strata or sub-populations within the SCIP Topic Population, each identified by a specific group of procedure codes. The patients in each stratum are counted in the Initial Patient Population of multiple measures.

The following sample size tables for each option automatically build in the number of cases needed to obtain the required sample sizes.

Quarterly Sampling
For hospitals selecting sample cases for SCIP, a modified sampling procedure is required. Hospitals selecting sample cases for this set must ensure that each individual stratum's population and quarterly sample size meets the following conditions:

- Select within each of the seven individual measure stratum (e.g., colorectal surgery, hip arthroplasty, etc.) and the 8th SCIP stratum (Table 5.25 in Appendix A).

Quarterly Sample Size
Based on Initial Patient Population Size for the SCIP Measure Set

Hospital's Measure Average Quarterly Stratum Initial Patient Population Size "N"	Minimum Required Stratum Sample Size "n"
>/= 481	49
171-480	10% of Initial Patient Population size
17-170	17
< 17	No sampling; 100% Initial Patient Population required

Monthly Sampling
For hospitals selecting sample cases for SCIP, a modified sampling procedure is required. Hospitals selecting sample cases for this set must ensure that each individual strata population and monthly sample size meets the following conditions:

- Select within each of the seven individual measure stratum (e.g., colorectal surgery, hip arthroplasty, etc.) and the 8th SCIP stratum (Table 5.25 in Appendix A).

Monthly Sample Size
Based on Initial Patient Population Size for the SCIP Measure Set

Hospital's Measure Average Monthly Stratum Initial Patient Population Size "N"	Minimum Required Stratum Sample Size "n"
>/= 151	16
61-150	10% of Initial Patient Population size
6-60	6
<6	No sampling; 100% Initial Patient Population required

All of the SCIP measures´ specific exclusion criteria are used to filter out cases that do not belong in the measure denominator. Using SCIP-Inf-4 as an example, include cases covering all sampled strata, although the measure-specific exclusion criteria would only allow cases in the cardiac surgery stratum to be included in the denominator.

2a.24 Data Source (*Check the source(s) for which the measure is specified and tested)*
Administrative claims, Paper Records

2a.25 Data source/data collection instrument (*Identify the specific data source/data collection instrument, e.g. name of database, clinical registry, collection instrument, etc.*)**:**
Vendor tools (electronic) or CART. CART is available for download free at http://www.qualitynet.org/dcs/ContentServer?c=Page&pagename=QnetPublic%2FPage%2FQnetTier2&cid=11

38900279093

2a.26-28 **Data source/data collection instrument reference web page URL or attachment:** URL
http://www.qualitynet.org/dcs/ContentServer?c=Page&pagename=QnetPublic%2FPage%2FQnetTier2&cid=1138900279093

2a.29-31 **Data dictionary/code table web page URL or attachment:** URL
http://www.qualitynet.org/dcs/ContentServer?c=Page&pagename=QnetPublic%2FPage%2FQnetTier4&cid=1228754600169

2a.32-35 **Level of Measurement/Analysis** (*Check the level(s) for which the measure is specified and tested)*
Facility, Population : National, Population : Regional

2a.36-37 **Care Settings** (*Check the setting(s) for which the measure is specified and tested)*
Hospital/Acute Care Facility

2a.38-41 **Clinical Services** (*Healthcare services being measured, check all that apply*)

TESTING/ANALYSIS

2b. Reliability testing

2b.1 **Data/sample** *(description of data/sample and size)*: Pilot tested during 3-state Pilot in 2004-2005. Also collected as an optional SIP data element since 2001. Pilot QIOs performed interrater reliability testing on a minimum of 5% of the cases collected for each of the 4 quarters.OH/OK:The overall percentage of agreement for the # charts was 87.49%. Ohio had an 84.61% agreement rate for 60 charts and Oklahoma had a 89.94% agreement for 51charts. KY: The average validation rate for the first period was 90%, and the third period was 95%. Our overall IRR validation rate for all hospitals combined is 93%
Has been continuously collected for the pay-for-reporting program for CMS since first quarter 2009 and is independently tested for IRR with the CDAC contractor.

2b.2 **Analytic Method** *(type of reliability & rationale, method for testing)*:
Reports on mismatches between national abstractors and the independent abstraction/validation contractor are reviewed quarterly. Because this is use in the pay for reporting program, those rates are monitored by the CMS contractor responsible for validation.

2b.3 **Testing Results** *(reliability statistics, assessment of adequacy in the context of norms for the test conducted)*:
Feedback from the hospital abstractors and the independent validation contractor is collected and incorporated.

2b C☐ P☐ M☐ N☐

2c. Validity testing

2c.1 **Data/sample** *(description of data/sample and size)*: The measure is reviewed by a Technical Expert Panel quarterly for validity. Specifications (including codes and data elements) are modified every six months according to feedback provided by clinicians and hospital staff collecting data for the measure. National performance of the measure is monitored by the measure steward with quarterly benchmarks of hospital submitted data developed for distribuation by QIOs.

2c.2 **Analytic Method** *(type of validity & rationale, method for testing)*:
Face validity is systematically assessed by the Technical Expert Panels and the measure is judged to assess the provision of appropriate care for the target population.

2c.3 **Testing Results** *(statistical results, assessment of adequacy in the context of norms for the test conducted)*:
NA

2c C☐ P☐ M☐ N☐

2d. Exclusions Justified

2d C☐

2d.1 Summary of Evidence supporting exclusion(s): The exclusions to this measure were suggested by the TEP or are routine exclusions used by the SCIP measure set. **2d.2 Citations for Evidence:** NA **2d.3 Data/sample** *(description of data/sample and size)*: NA **2d.4 Analytic Method** *(type analysis & rationale)*: NA **2d.5 Testing Results** *(e.g., frequency, variability, sensitivity analyses)*: NA	**P☐ M☐ N☐ NA ☐**
2e. Risk Adjustment for Outcomes/ Resource Use Measures **2e.1 Data/sample** *(description of data/sample and size)*: No risk adjustment performed. **2e.2 Analytic Method** *(type of risk adjustment, analysis, & rationale)*: NA **2e.3 Testing Results** *(risk model performance metrics)*: NA **2e.4 If outcome or resource use measure is not risk adjusted, provide rationale:** NA	**2e** **C☐ P☐ M☐ N☐ NA ☐**
2f. Identification of Meaningful Differences in Performance **2f.1 Data/sample from Testing or Current Use** *(description of data/sample and size)*: All submitted data to the clinical warehouse is reviewed each quarter. **2f.2 Methods to identify statistically significant and practically/meaningfully differences in performance** *(type of analysis & rationale)*: Analysts review quarterly benchmarks and trends to identify differences in performance scores and investigate the possible causes. If measure specifications (algorithms, data elements) are causing the variation in performance, they are reviewed for possible updates. **2f.3 Provide Measure Scores from Testing or Current Use** *(description of scores, e.g., distribution by quartile, mean, median, SD, etc.; identification of statistically significant and meaningfully differences in performance)*: Current measure rate is 93.1%. The benchmark is 99.8%.	**2f** **C☐ P☐ M☐ N☐**
2g. Comparability of Multiple Data Sources/Methods **2g.1 Data/sample** *(description of data/sample and size)*: At this time, the data source is the inpatient medical record only. **2g.2 Analytic Method** *(type of analysis & rationale)*: NA **2g.3 Testing Results** *(e.g., correlation statistics, comparison of rankings)*: NA	**2g** **C☐ P☐ M☐ N☐ NA ☐**
2h. Disparities in Care **2h.1 If measure is stratified, provide stratified results** *(scores by stratified categories/cohorts)*: An updated disparities report has been submitted to NQF for review. Data on the range of performance values by decile for the hospital process measures was provided also.	**2h** **C☐ P☐ M☐ N☐ NA**

2h.2 **If disparities have been reported/identified, but measure is not specified to detect disparities, provide follow-up plans:** All of the inpatient quality reporting measures collect this information: Birthdate, Hispanic Ethnicity, Payment Source, Race and Sex. Additional analysis was performed to determine disparities in US region and urban vs rural.	☐
TAP/Workgroup: What are the strengths and weaknesses in relation to the subcriteria for *Scientific Acceptability of Measure Properties?*	**2**
Steering Committee: Overall, to what extent was the criterion, *Scientific Acceptability of Measure Properties*, met? **Rationale:**	**2** **C**☐ **P**☐ **M**☐ **N**☐
3. USABILITY	
Extent to which intended audiences (e.g., consumers, purchasers, providers, policy makers) can understand the results of the measure and are likely to find them useful for decision making. (evaluation criteria)	**Eval Rating**
3a. Meaningful, Understandable, and Useful Information 3a.1 **Current Use:** In use 3a.2 **Use in a public reporting initiative (disclosure of performance results to the public at large)** (*If used in a public reporting initiative, provide name of initiative(s), locations, Web page URL(s). If not publicly reported, state the plans to achieve public reporting within 3 years*)**:** Measure is used in Hospital Inpatient Quality Reporting Program (formerly RHQDAPU) 3a.3 **If used in other programs/initiatives (***If used in quality improvement or other programs/initiatives, name of initiative(s), locations, Web page URL(s). If not used for QI, state the plans to achieve use for QI within 3 years***):** Measure is also used for accreditation by the Joint Commission. **Testing of Interpretability** (*Testing that demonstrates the results are understood by the potential users for public reporting and quality improvement*) 3a.4 **Data/sample** *(description of data/sample and size)***:** Measure is reported on a public website (Hospital Compare). Feedback on this website is collected through another contractor. 3a.5 **Methods** *(e.g., focus group, survey, QI project)***:** NA 3a.6 **Results** *(qualitative and/or quantitative results and conclusions)***:** NA	**3a** **C**☐ **P**☐ **M**☐ **N**☐
3b/3c. Relation to other NQF-endorsed measures 3b.1 **NQF # and Title of similar or related measures:**	
(for NQF staff use) **Notes on similar/related endorsed or submitted measures:**	
3b. Harmonization If this measure is related to measure(s) already endorsed by NQF (e.g., same topic, but different target population/setting/data source or different topic but same target population): 3b.2 **Are the measure specifications harmonized? If not, why?**	**3b** **C**☐ **P**☐ **M**☐ **N**☐ **NA** ☐
3c. Distinctive or Additive Value 3c.1 **Describe the distinctive, improved, or additive value this measure provides to existing NQF-endorsed measures:**	**3c** **C**☐ **P**☐

5.1 If this measure is similar to measure(s) already endorsed by NQF (i.e., on the same topic and the same target population), Describe why it is a more valid or efficient way to measure quality: There are measures on the same topic: beta-blocker administration, but not to continue beta-blocker after surgery.	**M☐ N☐ NA ☐**
TAP/Workgroup: What are the strengths and weaknesses in relation to the subcriteria for *Usability?*	**3**
Steering Committee: Overall, to what extent was the criterion, *Usability*, met? **Rationale:**	**3 C☐ P☐ M☐ N☐**
4. FEASIBILITY	
Extent to which the required data are readily available, retrievable without undue burden, and can be implemented for performance measurement. (evaluation criteria)	**Eval Rating**
4a. Data Generated as a Byproduct of Care Processes **4a.1-2 How are the data elements that are needed to compute measure scores generated?** Coding/abstraction performed by someone other than person obtaining original information (E.g., DRG, ICD-9 codes on claims, chart abstraction for quality measure or registry)	**4a C☐ P☐ M☐ N☐**
4b. Electronic Sources **4b.1 Are all the data elements available electronically?** (*elements that are needed to compute measure scores are in defined, computer-readable fields, e.g., electronic health record, electronic claims*) No **4b.2 If not, specify the near-term path to achieve electronic capture by most providers.** There are several inpatient measures being retooled for EHR use. This measure is not included in that list for near future retooling.	**4b C☐ P☐ M☐ N☐**
4c. Exclusions **4c.1 Do the specified exclusions require additional data sources beyond what is required for the numerator and denominator specifications?** No **4c.2 If yes, provide justification.**	**4c C☐ P☐ M☐ N☐ NA ☐**
4d. Susceptibility to Inaccuracies, Errors, or Unintended Consequences **4d.1 Identify susceptibility to inaccuracies, errors, or unintended consequences of the measure and describe how these potential problems could be audited. If audited, provide results.** No unintended consequences reported with this measure.	**4d C☐ P☐ M☐ N☐**
4e. Data Collection Strategy/Implementation **4e.1 Describe what you have learned/modified as a result of testing and/or operational use of the measure regarding data collection, availability of data/missing data, timing/frequency of data collection, patient confidentiality, time/cost of data collection, other feasibility/ implementation issues:** There have been no implementation issues identified. **4e.2 Costs to implement the measure** (*costs of data collection, fees associated with proprietary measures*)**:** No information has been collected or reported related to costs to implement the measure. **4e.3 Evidence for costs:**	**4e C☐ P☐ M☐ N☐**

Data abstraction is usually performed by nurses in the Quality Improvement department of the facility. 4e.4 **Business case documentation:** There have been no additions to the business case to support this measure since its implementation.	
TAP/Workgroup: What are the strengths and weaknesses in relation to the subcriteria for *Feasibility?*	**4**
Steering Committee: Overall, to what extent was the criterion, *Feasibility*, met? **Rationale:**	**4** **C☐** **P☐** **M☐** **N☐**
RECOMMENDATION	
(for NQF staff use) **Check if measure is untested and only eligible for time-limited endorsement.**	**Time-limited ☐**
Steering Committee: Do you recommend for endorsement? **Comments:**	**Y☐** **N☐** **A☐**

CONTACT INFORMATION

Co.1 **Measure Steward (Intellectual Property Owner)**
Co.1 **Organization**
Centers for Medicare & Medicaid Services, 7500 Security Boulevard , Mail Stop S3-01-02, Baltimore, Maryland, 21244-1850

Co.2 **Point of Contact**
Kristie, Baus, RN, MSN, kristie.baus@cms.hhs.gov, 410-786-8161-

Measure Developer If different from Measure Steward
Co.3 **Organization**
Centers for Medicare & Medicaid Services, 7500 Security Boulevard, Mail Stop S3-01-02, Baltimore, Maryland, 21244-1850

Co.4 **Point of Contact**
Kristie, Baus, RN, MSN, kristie.baus@cms.hhs.gov, 410-786-8161-

Co.5 **Submitter If different from Measure Steward POC**
Wanda, Johnson, RN, wjohnson@ofmq.com, 405-840-2891-278, Centers for Medicare & Medicaid Services

Co.6 **Additional organizations that sponsored/participated in measure development**
The measure was developed by Oklahoma Foundation for Medical Quality under contract to the Centers for Medicare & Medicaid Services.

ADDITIONAL INFORMATION

Workgroup/Expert Panel involved in measure development
Ad.1 **Provide a list of sponsoring organizations and workgroup/panel members' names and organizations. Describe the members' role in measure development.**
The Surgical Care Improvement Project´s TEP is facilitated by OFMQ for CMS and a list is available. The leading guideline author (Lee Fleisher, MD) from the ACC/AHA was instrumental in the development and maintenance of this measure.

Ad.2 **If adapted, provide name of original measure:** Revisions have been suggested by the TEP. The timeframe for evaluating the administration of the beta-blocker in the perioperative period is being updated. The link to the original specifications was provided under Specifications. NOTE: The modified specifications are attached below. The original specifications are posted on QualityNet, but the revisions have not been posted to the QualityNet website.

This is the change proposed:
Surgery patients on beta-blocker therapy prior to arrival who received a beta-blocker during the perioperative period. The perioperative period for the SCIP Cardiac measures is defined as the day prior to surgery through postoperative day two (POD 2) with day of surgery being day zero.

If the postoperative length of stay = 2 days, the measure evaluates the administration of more than one dose of a beta-blocker: the day prior to or the day of surgery and on postoperative day one (POD 1) or postoperative day two (POD 2) unless reasons for not administering the medication were documented. If the postoperative length of stay was < 2 days, the measure will evaluate the administration of the beta-blocker on the day prior to or the day of surgery only, unless reasons for not administering the medication were documented.
Ad.3-5 If adapted, provide original specifications URL or attachment Attachment SCIP Card2_MIFplusDEs 12.13.10-634279208250341226.doc

Measure Developer/Steward Updates and Ongoing Maintenance
Ad.6 Year the measure was first released: 2006
Ad.7 Month and Year of most recent revision: 10, 2010
Ad.8 What is your frequency for review/update of this measure? Every 6 months
Ad.9 When is the next scheduled review/update for this measure? 04, 2011

Ad.10 Copyright statement/disclaimers: Trend Report (BM= Benchmark, rate = national score)
Q209
BM: 99.7 Rate: 90.5
Q309
BM: 99.7 Rate 91.5
Q409
BM: 99.8 Rate 92.5
Q110
BM: 99.8 Rate 93.1
Q210
BM: 99.7 Rate 93.8

Ad.11 -13 Additional Information web page URL or attachment: Attachment IP Measures Disp_2009-634369262845786441.xls

Date of Submission (*MM/DD/YY*)**:** 06/08/2011

NATIONAL QUALITY FORUM

Measure Evaluation 4.1
December 2009

This form contains the measure information submitted by stewards. Blank fields indicate no information was provided. Attachments also may have been submitted and are provided to reviewers. The subcriteria and most of the footnotes from the evaluation criteria are provided in Word comments within the form and will appear if your cursor is over the highlighted area. Hyperlinks to the evaluation criteria and ratings are provided in each section.

TAP/Workgroup (if utilized)**:** Complete all yellow highlighted areas of the form. Evaluate the extent to which each subcriterion is met. Based on your evaluation, summarize the strengths and weaknesses in each section.

Note: *If there is no TAP or workgroup, the SC also evaluates the subcriteria (yellow highlighted areas).*

Steering Committee: Complete all pink highlighted areas of the form. Review the workgroup/TAP assessment of the subcriteria, noting any areas of disagreement; then evaluate the extent to which each major criterion is met; and finally, indicate your recommendation for the endorsement. Provide the rationale for your ratings.

Evaluation ratings of the extent to which the criteria are met
C = Completely (unquestionably demonstrated to meet the criterion)
P = Partially (demonstrated to partially meet the criterion)
M = Minimally (addressed BUT demonstrated to only minimally meet the criterion)
N = Not at all (NOT addressed; OR incorrectly addressed; OR demonstrated to NOT meet the criterion)
NA = Not applicable (only an option for a few subcriteria as indicated)

(for NQF staff use) **NQF Review #:** 0365 **NQF Project:** Surgery Endorsement Maintenance 2010
MEASURE DESCRIPTIVE INFORMATION
De.1 **Measure Title:** Pancreatic Resection Mortality Rate (IQI 9)
De.2 **Brief description of measure:** Percentage of discharges with procedure code of pancreatic resection with an in-hospital death.
1.1-2 **Type of Measure:** Outcome De.3 **If included in a composite or paired with another measure, please identify composite or paired measure** Pancreatic Resection Volume (IQI 2) (NQF #0366) and Mortality for Selected Procedures composite
De.4 **National Priority Partners Priority Area:** Population health, Safety De.5 **IOM Quality Domain**: Effectiveness De.6 **Consumer Care Need:** Getting better

CONDITIONS FOR CONSIDERATION BY NQF	
Four conditions must be met before proposed measures may be considered and evaluated for suitability as voluntary consensus standards:	NQF Staff
A. The measure is in the public domain or an intellectual property (measure steward agreement) is signed. *Public domain only applies to governmental organizations. All non-government organizations must sign a measure steward agreement even if measures are made publicly and freely available.* A.1 **Do you attest that the measure steward holds intellectual property rights to the measure and the right to use aspects of the measure owned by another entity (e.g., risk model, code set)?** Yes A.2 **Indicate if Proprietary Measure** (*as defined in measure steward agreement*)**:** A.3 **Measure Steward Agreement:** Government entity and in the public domain - no agreement necessary A.4 **Measure Steward Agreement attached:**	**A** Y☐ N☐
B. The measure owner/steward verifies there is an identified responsible entity and process to maintain and update the measure on a schedule that is commensurate with the rate of clinical innovation, but at least	**B** Y☐

every 3 years. Yes, information provided in contact section	N☐
C. The intended use of the measure includes both public reporting and quality improvement. ►**Purpose:** Public Reporting, Quality Improvement (Internal to the specific organization)	C Y☐ N☐
D. The requested measure submission information is complete. Generally, measures should be fully developed and tested so that all the evaluation criteria have been addressed and information needed to evaluate the measure is provided. Measures that have not been tested are only potentially eligible for a time-limited endorsement and in that case, measure owners must verify that testing will be completed within 12 months of endorsement. D.1**Testing:** Yes, fully developed and tested D.2 **Have NQF-endorsed measures been reviewed to identify if there are similar or related measures?** Yes	D Y☐ N☐
(for NQF staff use) **Have all conditions for consideration been met?** **Staff Notes to Steward** (*if submission returned*)**:**	Met Y☐ N☐
Staff Notes to Reviewers (*issues or questions regarding any criteria*)**:**	
Staff Reviewer Name(s):	

TAP/Workgroup Reviewer Name:	
Steering Committee Reviewer Name:	
1. IMPORTANCE TO MEASURE AND REPORT	
Extent to which the specific measure focus is important to making significant gains in health care quality (safety, timeliness, effectiveness, efficiency, equity, patient-centeredness) and improving health outcomes for a specific high impact aspect of healthcare where there is variation in or overall poor performance. ***Measures must be judged to be important to measure and report*** *in order to be evaluated against the remaining criteria.* (evaluation criteria) **1a. High Impact**	Eval Rating
(for NQF staff use) **Specific NPP goal**:	
1a.1 **Demonstrated High Impact Aspect of Healthcare:** Patient/societal consequences of poor quality 1a.2 1a.3 **Summary of Evidence of High Impact:** There is no evidence for the construct validity of pancreatic resection beyond the volume-outcome relationship. Ten studies examined hospital volume as compared to in-hospital mortality rates. Glasgow and Mulvihill estimated the following risk-adjusted mortality rates across hospital volume categories during the 5-year study period: 14% for 1-5 procedures, 10% for 6-10 procedures, 9% for 11-20 procedures, 7% for 21-30 procedures, 8% for 31-50 procedures, and 4% for over 50 procedures. [1] Leiberman et al. found that surgeon volume was less significantly associated with mortality (6-13% across three volume categories). [2] 1a.4 **Citations for Evidence of High Impact:** Updated citations will be presented in the May Steering Committee meeting [1] Glasgow RE, Mulvihill SJ. Hospital volume influences outcome in patients undergoing pancreatic resection for cancer. West J Med 1996;165(5):294-300. 83Lieberman MD, Kilburn H, [2] Lindsey M, et al. Relation of perioperative deaths to hospital volume among patients undergoing pancreatic resection for malignancy. Ann Surg 1995;222(5):638-45.	1a C☐ P☐ M☐ N☐
1b. Opportunity for Improvement 1b.1 **Benefits (improvements in quality) envisioned by use of this measure:** Pancreatic resection is a rare procedure that requires technical proficiency; and errors in surgical technique or management may lead to clinically significant complications, such as sepsis, anastomotic breakdown, and death. Better processes of	1b C☐ P☐ M☐ N☐

care may reduce mortality for pancreatic resection, which represents better quality care.

1b.2 Summary of data demonstrating performance gap (variation or overall poor performance) across providers:
Adjusted rates by patient and hospital characteristics, 2007

Mean	Standard error	Location	P-value: Relative to Northeast
47.761	6.121	Northeast	1.000
26.717	5.586	Midwest	0.011
34.519	3.804	South	0.066
28.151	5.436	West	0.017

1b.3 Citations for data on performance gap:
See the following report for a complete treatment of the methodology: "Methods: Applying AHRQ Quality Indicators to Healthcare Cost and Utilization Project (HCUP) Data for the National Healthcare Quality Report" [URL: http://hcupnet.ahrq.gov/QI%20Methods.pdf?JS=Y]

1b.4 Summary of Data on disparities by population group:
Adjusted per 1,000 rates by patient characteristics, 2007

Estimate	Standard error	Age: for conditions affecting any age
25.49604219	6.203	18-44
20.63896702	2.915	45-64
43.18047556	3.987	65 and over

Estimate	Standard error	Age: for conditions affecting elderly
*	*	65-69
30.91154165	7.113	70-74
56.01131066	7.673	75-79
77.51645429	13.220	80-84
148.3092157	37.401	85 and over

Estimate	Standard error	Gender
40.43211936	3.541	Male
25.18097072	3.554	Female

Estimate	Standard error	Median income of patient´s ZIP code
32.2066155	4.894	First quartile (lowest income)
50.61487453	5.663	Second quartile
34.67138371	5.002	Third quartile
23.7719501	4.527	Fourth quartile (highest income)

Estimate	Standard error	Location of patient residence (NCHS)
39.14557373	4.453	Large central metropolitan
34.65704118	5.007	Large fringe metropolitan
34.61234796	5.208	Medium metropolitan
35.87092944	10.635	Small metropolitan
*	*	Micropolitan
*	*	Not metropolitan or micropolitan

Estimate	Standard error	Expected payment source

24.43308661	4.746	Private insurance
33.50889221	3.078	Medicare
56.92297577	11.372	Medicaid
168.3490653	28.408	Other insurance
70.49679743	18.397	Uninsured / self-pay / no charge

Estimate	Standard error	Hospital Ownership/control
34.84590011	2.947	Private, not-for-profit
50.63209793	8.493	Private, for-profit
23.51722576	5.534	Public

Estimate	Standard error	Teaching status
26.71084935	3.052	Teaching
48.35344955	4.291	Nonteaching

Estimate	Standard error	Location of hospital
27.41877829	3.309	Large central metropolitan
70.90692851	8.270	Large fringe metropolitan
33.81007218	4.897	Medium metropolitan
44.21470167	9.807	Small metropolitan
*	*	Micropolitan
*	*	Not metropolitan or micropolitan

Estimate	Standard error	Bed size of hospital
*	*	Less than 100
46.62748379	5.684	100 - 299
44.13589384	4.564	300 - 499
23.4343551	3.502	500 or more

1b.5 Citations for data on Disparities:
See the following report for a complete treatment of the methodology: "Methods: Applying AHRQ Quality Indicators to Healthcare Cost and Utilization Project (HCUP) Data for the National Healthcare Quality Report" [URL: http://hcupnet.ahrq.gov/QI%20Methods.pdf?JS=Y]

1c. Outcome or Evidence to Support Measure Focus

1c.1 Relationship to Outcomes (*For non-outcome measures, briefly describe the relationship to desired outcome. For outcomes, describe why it is relevant to the target population*)**:** Pancreatic resection is a rare procedure that requires technical proficiency; and errors in surgical technique or management may lead to clinically significant complications, such as sepsis, anastomotic breakdown, and death. Better processes of care may reduce mortality for pancreatic resection, which represents better quality care.

1c.2-3. Type of Evidence: Evidence-based guideline, Expert opinion

1c.4 Summary of Evidence (*as described in the criteria; for outcomes, summarize any evidence that healthcare services/care processes influence the outcome*)**:**
There is no evidence for the construct validity of pancreatic resection beyond the volume-outcome relationship. Ten studies examined hospital volume as compared to in-hospital mortality rates. Glasgow and Mulvihill estimated the following risk-adjusted mortality rates across hospital volume categories during the 5-year study period: 14% for 1-5 procedures, 10% for 6-10 procedures, 9% for 11-20 procedures, 7% for 21-30 procedures, 8% for 31-50 procedures, and 4% for over 50 procedures. [1] Leiberman et al. found that surgeon

1c
C☐
P☐
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volume was less significantly associated with mortality (6-13% across three volume categories). [2]

[1] Glasgow RE, Mulvihill SJ. Hospital volume influences outcome in patients undergoing pancreatic resection for cancer. West J Med 1996;165(5):294-300. 83Lieberman MD, Kilburn H,

[2] Lindsey M, et al. Relation of perioperative deaths to hospital volume among patients undergoing pancreatic resection for malignancy. Ann Surg 1995;222(5):638-45.

1c.5 Rating of strength/quality of evidence (*also provide narrative description of the rating and by whom***):** 5 Smoothing recommended Testing, rating, and review were conducted by the project team. A full report on the literature review and empirical evaluation can be found in Refinement of the HCUP Quality Indicators by the UCSF-Stanford EPC, Detailed coding information for each QI is provided in the document Prevention Quality Indicators Technical Specifications. Rating of performance on empirical evaluations, ranged from 0 to 26. The scores were intended as a guide for summarizing the performance of each indicator on four empirical tests of precision (signal variance, area-level share, signal ratio, and R-squared) and five tests of minimum bias (rank correlation, top and bottom decile movement, absolute change, and change over two deciles), as described in the previous section.

1c.6 Method for rating evidence: The project team conducted extensive empirical testing of all potential indicators using the 1995-97 HCUP State Inpatient Databases (SID) and Nationwide Inpatient Sample (NIS) to determine precision, bias, and construct validity. The 1997 SID contains uniform data on inpatient stays in community hospitals for 22 States covering approximately 60% of all U.S. hospital discharges. The NIS is designed to approximate a 20% of U.S. community hospitals and includes all stays in the sampled hospitals. Each year of the NIS contains between 6 million and 7 million records from about 1,000 hospitals. The NIS combines a subset of the SID data, hospital-level variables, and hospital and discharge weights for producing national estimates. The project team conducted tests to examine three things: precision, bias, and construct validity.

Precision. The first step in the analysis involved precision tests to determine the reliability of the indicator for distinguishing real differences in provider performance. For indicators that may be used for quality improvement, it is important to know with what precision, or surety, a measure can be attributed to an actual construct rather than random variation.

For each indicator, the variance can be broken down into three components: variation within a provider (actual differences in performance due to differing patient characteristics), variation among providers (actual differences in performance among providers), and random variation. An ideal indicator would have a substantial amount of the variance explained by between-provider variance, possibly resulting from differences in quality of care, and a minimum amount of random variation. The project team performed four tests of precision to estimate the magnitude of between-provider variance on each indicator:

- Signal standard deviation was used to measure the extent to which performance of the QI varies systematically across hospitals or areas.
- Provider/area variation share was used to calculate the percentage of signal (or true) variance relative to the total variance of the QI.
- Signal-to-noise ratio was used to measure the percentage of the apparent variation in QIs across providers that is truly related to systematic differences across providers and not random variations (noise) from year to year.
- In-sample R-squared was used to identify the incremental benefit of applying multivariate signal extraction methods for identifying additional signal on top of the signal-to-noise ratio.

In general, random variation is most problematic when there are relatively few observations per provider, when adverse outcome rates are relatively low, and when providers have little control over patient outcomes or variation in important processes of care is minimal. If a large number of patient factors that are difficult to observe influence whether or not a patient has an adverse outcome, it may be difficult to separate the "quality signal" from the surrounding noise. Two signal extraction techniques were applied to improve the precision of an indicator:

- Univariate methods were used to estimate the "true" quality signal of an indicator based on information from the specific indicator and 1 year of data.
- Multivariate signal extraction (MSX) methods were used to estimate the "true" quality signal based on information from a set of indicators and multiple years of data. In most cases, MSX methods extracted additional signal, which provided much more precise estimates of true hospital or area quality.

Bias. To determine the sensitivity of potential QIs to bias from differences in patient severity, unadjusted

performance measures for specific hospitals were compared with performance measures that had been adjusted for age and gender. All of the PQIs and some of the Inpatient Quality Indicators (IQIs) could only be risk-adjusted for age and sex. The 3M™ APR-DRG System Version 12 with Severity of Illness and Risk of Mortality subclasses was used for risk adjustment of the utilization indicators and the in-hospital mortality indicators, respectively. Five empirical tests were performed to investigate the degree of bias in an indicator:
• Rank correlation coefficient of the area or hospital with (and without) risk adjustment—gives the overall impact of risk adjustment on relative provider or area performance.
• Average absolute value of change relative to mean—highlights the amount of absolute change in performance, without reference to other providers' performance.
• Percentage of highly ranked hospitals that remain in high decile—reports the percentage of hospitals or areas that are in the highest deciles without risk adjustment that remain there after risk adjustment is performed.
• Percentage of lowly ranked hospitals that remain in low decile—reports the percentage of hospitals or areas that are in the lowest deciles without risk adjustment that remain there after risk adjustment is performed.
• Percentage that change more than two deciles—identifies the percentage of hospitals whose relative rank changes by a substantial percentage (more than 20%) with and without risk adjustment.
Construct validity. Construct validity analyses provided information regarding the relatedness or independence of the indicators. If quality indicators do indeed measure quality, then two measures of the same construct would be expected to yield similar results. The team used factor analysis to reveal underlying patterns among large numbers of variables—in this case, to measure the degree of relatedness between indicators. In addition, they analyzed correlation matrices for indicators.

1c.7 Summary of Controversy/Contradictory Evidence: See the following for a complete treatment of the topic:
http://www.qualityindicators.ahrq.gov/downloads/iqi/iqi_guide_v31.pdf
Note: The Literature Review Caveats column summarizes evidence specific to each potential concern on the link between the PQIs and quality of care, as described in step 3 above. A question mark (?) indicates that the concern is theoretical or suggested, but no specific evidence was found in the literature. A check mark indicates that the concern has been demonstrated in the literature.

1c.8 Citations for Evidence (*other than guidelines*): Updated citations will be presented in the May Steering Committee meeting

http://www.qualityindicators.ahrq.gov/downloads/iqi/iqi_guide_v31.pdf

1c.9 Quote the Specific guideline recommendation (*including guideline number and/or page number*):
Not Applicable.

1c.10 Clinical Practice Guideline Citation: Not Applicable.
1c.11 National Guideline Clearinghouse or other URL: Not Applicable.

1c.12 Rating of strength of recommendation (*also provide narrative description of the rating and by whom*):
Not Applicable.

1c.13 Method for rating strength of recommendation (*If different from USPSTF system, also describe rating and how it relates to USPSTF)*:
Not Applicable.

1c.14 Rationale for using this guideline over others:
Not Applicable.

TAP/Workgroup: What are the strengths and weaknesses in relation to the subcriteria for *Importance to Measure and Report?*	**1**
Steering Committee: Was the threshold criterion, *Importance to Measure and Report*, met? **Rationale:**	**1** **Y☐** **N☐**
2. SCIENTIFIC ACCEPTABILITY OF MEASURE PROPERTIES	

Extent to which the measure, as specified, produces consistent (reliable) and credible (valid) results about the quality of care when implemented. (evaluation criteria)	Eval Rating
2a. MEASURE SPECIFICATIONS	
S.1 Do you have a web page where current detailed measure specifications can be obtained? **S.2 If yes, provide web page URL:** **2a. Precisely Specified**	
2a.1 Numerator Statement (*Brief, text description of the numerator - what is being measured about the target population, e.g. target condition, event, or outcome*)**:** Number of deaths (DISP=20) among cases meeting the inclusion and exclusion rules for the denominator. **2a.2 Numerator Time Window** (*The time period in which cases are eligible for inclusion in the numerator*)**:** Time window can be determined by user, but is generally a calendar year. **2a.3 Numerator Details** (*All information required to collect/calculate the numerator, including all codes, logic, and definitions*)**:** Number of deaths (DISP=20) among cases meeting the inclusion and exclusion rules for the denominator.	
2a.4 Denominator Statement (*Brief, text description of the denominator - target population being measured*)**:** Discharges, age 18 years and older, with ICD-9-CM pancreatic resection code procedure in any field. **2a.5 Target population gender:** Female, Male **2a.6 Target population age range:** 18 and older **2a.7 Denominator Time Window** (*The time period in which cases are eligible for inclusion in the denominator*)**:** Time window can be determined by user, but is generally a calendar year. **2a.8 Denominator Details** (*All information required to collect/calculate the denominator - the target population being measured - including all codes, logic, and definitions*)**:** Discharges, age 18 years and older, with ICD-9-CM pancreatic resection code procedure and a diagnosis code of pancreatic cancer in any field. ICD-9-CM pancreatic resection procedure codes: 526 TOTAL PANCREATECTOMY 527 RAD PANCREATICODUODENECT	
2a.9 Denominator Exclusions (*Brief text description of exclusions from the target population*)**:** Exclude cases: • missing discharge disposition (DISP=missing), gender (SEX=missing), age (AGE=missing), quarter (DQTR=missing), year (YEAR=missing) or principal diagnosis (DX1 =missing) • transferring to another short-term hospital (DISP=2) • MDC 14 (pregnancy, childbirth, and puerperium) ICD-9-CM codes: 577.0 Acute pancreatitis 577.1 Chronic pancreatitis **2a.10 Denominator Exclusion Details** (*All information required to collect exclusions to the denominator, including all codes, logic, and definitions*)**:** Exclude cases: • missing discharge disposition (DISP=missing), gender (SEX=missing), age (AGE=missing), quarter	**2a-specs** **C**☐ **P**☐ **M**☐ **N**☐

(DQTR=missing), year (YEAR=missing) or principal diagnosis (DX1 =missing)
• transferring to another short-term hospital (DISP=2)
• MDC 14 (pregnancy, childbirth, and puerperium)
ICD-9-CM codes:
577.0
Acute pancreatitis
577.1
Chronic pancreatitis

2a.11 Stratification Details/Variables (*All information required to stratify the measure including the stratification variables, all codes, logic, and definitions***):**
User has the optin to stratify by gender, age (5-year age groups), race / ethnicity, primary payer, and custom stratifiers.

2a.12-13 Risk Adjustment Type: Risk adjustment method widely or commercially available

2a.14 Risk Adjustment Methodology/Variables (*List risk adjustment variables and describe conceptual models, statistical models, or other aspects of model or method***):**
The predicted value for each case is computed using a hierarchical model (logistic regression with hospital random effect) and covariates for gender, age in years (in 5-year age groups), All Patient Refined-Diagnosis Related Group (APR-DRG) and APR-DRG risk-of-mortality subclass. The reference population used in the model is the universe of discharges for states that participate in the HCUP State Inpatient Databases (SID) for the year 2007 (updated annually), a database consisting of 43 states and approximately 30 million adult discharges. The expected rate is computed as the sum of the predicted value for each case divided by the number of cases for the unit of analysis of interest (i.e., hospital, state, and region). The risk adjusted rate is computed using indirect standardization as the observed rate divided by the expected rate, multiplied by the reference population rate.

2a.15-17 Detailed risk model available Web page URL or attachment: Attachment IQI Risk Adjustment Tables (Version 4 2).pdf

2a.18-19 Type of Score: Rate/proportion
2a.20 Interpretation of Score: Better quality = Higher score
2a.21 Calculation Algorithm (*Describe the calculation of the measure as a flowchart or series of steps***):**
Each indicator is expressed as a rate, is defined as outcome of interest / population at risk or numerator / denominator. The AHRQ Quality Indicators (AHRQ QI) software performs five steps to produce the rates. 1) Discharge-level data is used to mark inpatient records containing the outcome of interest and 2) the population at risk. For provider indicators, the population at risk is also derived from hospital discharge records; for area indicators, the population at risk is derived from U.S. Census data. 3) Calculate observed rates. Using output from steps 1 and 2, rates are calculated for user-specified combinations of stratifiers. 4) Calculate expected rates. Regression coefficients from a reference population database are applied to the discharge records and aggregated to the provider or area level. 5) Calculate risk-adjusted rate. Use the indirect standardization to account for case-mix. 6) Calculate smoothed rate. A Univariate shrinkage factor is applied to the risk-adjusted rates. The shrinkage estimate reflects a reliability adjustment unique to each indicator. Full information on calculation algorithms and specifications can be found at http://qualityindicators.ahrq.gov/IQI_download.htm

2a.22 Describe the method for discriminating performance *(e.g., significance testing)***:**
Significance testing is not prescribed by the software. Users may calculate a confidence interval for the risk-adjusted rates and a posterior probability interval for the smoothed rates at a 95% or 99% level. Users may define the relevant benchmark and the methods of discriminating performance according to their application.

2a.23 Sampling (Survey) Methodology *If measure is based on a sample (or survey), provide instructions for obtaining the sample, conducting the survey and guidance on minimum sample size (response rate)*:
Not applicable

2a.24 Data Source (*Check the source(s) for which the measure is specified and tested)*
Administrative claims

2a.25 Data source/data collection instrument (*Identify the specific data source/data collection instrument, e.g. name of database, clinical registry, collection instrument, etc.***):**

The data source is hospital discharge data such as the HCUP State Inpatient Databases (SID) or equivalent using UB-04 coding standards. The data collection instrument is public-use AHRQ QI software available in SAS or Windows versions.

2a.26-28 **Data source/data collection instrument reference web page URL or attachment:** URL None
http://www.qualityindicators.ahrq.gov/software.htm

2a.29-31 **Data dictionary/code table web page URL or attachment:** URL None
http://www.qualityindicators.ahrq.gov/downloads/winqi/AHRQ_QI_Windows_Software_Documentation_V41a.pdf

2a.32-35 **Level of Measurement/Analysis** (*Check the level(s) for which the measure is specified and tested)*
Facility

2a.36-37 **Care Settings** (*Check the setting(s) for which the measure is specified and tested)*
Hospital/Acute Care Facility

2a.38-41 **Clinical Services** (*Healthcare services being measured, check all that apply*)
Clinicians: Physicians (MD/DO)

TESTING/ANALYSIS

2b. Reliability testing

2b.1 **Data/sample** *(description of data/sample and size)*: Veterans Integrated Service Networks´ (VISNs); and VA versus non-VA (Nationwide Inpatient Sample) using VA inpatient data (2004-2007).

2b.2 **Analytic Method** *(type of reliability & rationale, method for testing)*:
VA-and VISN-level IQI observed rates, risk-adjusted rates, and observed to expected ratios (O/Es). We examined the trends in VA-and VISN-level rates using weighted linear regression, variation in VISN-level O/Es, and compared VA to non-VA trends.

2b.3 **Testing Results** *(reliability statistics, assessment of adequacy in the context of norms for the test conducted)*:
VA in-hospital mortality rates for Pancreatic Resection Mortality were unchanged over time. The IQIs are easily applied to VA administrative data. They can be useful to tracks rate trends over time, reveal variation between sites, and for trend comparisons with other healthcare systems. [1]

[1] Borzecki AM, Christiansen CL, Loveland S, Chew P, Rosen AK. Trends in the inpatient quality indicators: the Veterans Health Administration experience. Med Care. 2010 Aug;48(8):694-702.

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2c. Validity testing

2c.1 **Data/sample** *(description of data/sample and size)*: We used 100 percent national analytic files from the CMS for the calendar years 2003 through 2006. Medicare Provider Analysis and Review (MEDPAR) files, which contain hospital discharge abstracts for all fee-for-service acute care hospitalizations of all U.S. Medicare recipients, were used to create our main analytical datasets. The Medicare denominator file was used to assess patient vital status at 30 days. Using appropriate procedure codes fiom the International Classification of Diseases, version 9 (ICD-9 codes), we identified all patients aged 65-99 undergoing pancreatectomy. [1]

2c.2 **Analytic Method** *(type of validity & rationale, method for testing)*:
We first estimated risk-adjusted hospital mortality rates during 2003-2004. We defined mortality as death within 30 days of operation or before hospital discharge. We adjusted for patient age, gender, race, urgency of operation, median ZIP-code income, and coexisting medical conditions. Using logistic regression, we estimated the expected number of deaths in each hospital and then divided the observed deaths by this expected number of deaths to obtain the ratio of observed to expected mortality (O/E ratio). We then multiplied the O/E ratio by the average mortality rate to obtain a risk-adjusted mortality rate for each hospital. We next used hierarchical modeling techniques to adjust these mortality estimates for reliability.

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Using random effects logistic regression models, we generated empirical Bayes predictions of mortality for each hospital. [1]

2c.3 Testing Results *(statistical results, assessment of adequacy in the context of norms for the test conducted)*:
In assessing the ability of hospital mortality rankings to predict future performance, reliability adjustment was particularly important for pancreatic resection and AAA repair, hospital rankings based on reliability-adjusted mortality were superior at identifying hospitals likely to have the lowest future mortality. Without reliability adjustment, hospitals in the "best" quintile (2003-2004) with pancreatic resection had a mortality of 7.6 percent in 2005-2006; with reliability adjustment, the "best" hospital quintile had a mortality of 2.7 percent in 2003-2006. [1]

References
[1] Dimick, Justin B.; Staiger, Douglas O.; Birkmeyer, John D. Ranking hospitals on surgical mortality: the importance of reliability adjustment. Health Serv Res. 2010 Dec;45(6 Pt 1):1614-29. doi: 10.1111/j.1475-6773.2010.01158.x. Epub 2010 Aug 16.

2d. Exclusions Justified

2d.1 Summary of Evidence supporting exclusion(s):
Exclusions remove cases where the outcome of interest is less likely to be preventable or more likely to be preventable or with no or very low risk

2d.2 Citations for Evidence:
Updated citations will be presented in the May Steering Committee meeting

Refinement of the HCUP Quality Indicators (Technical Review), May 2001
http://qualityindicators.ahrq.gov/downloads/technical/qi_technical_review.zip

2d.3 Data/sample *(description of data/sample and size)*: AHRQ 2007 State Inpatient Databases (SID) with 4,000 hospitals and 30 million adult discharges

2d.4 Analytic Method *(type analysis & rationale)*:
Expert panel and descriptive analyses stratified by exclusion categories

2d.5 Testing Results *(e.g., frequency, variability, sensitivity analyses)*:
Refinement of the HCUP Quality Indicators (Technical Review), May 2001
http://qualityindicators.ahrq.gov/downloads/technical/qi_technical_review.zip

2d C☐ P☐ M☐ N☐ NA☐

2e. Risk Adjustment for Outcomes/ Resource Use Measures

2e.1 Data/sample *(description of data/sample and size)*: AHRQ 2007 State Inpatient Databases (SID) with 4,000 hospitals and 30 million adult discharges

2e.2 Analytic Method *(type of risk adjustment, analysis, & rationale)*:
Risk-adjustment models use a standard set of categories based on readily available classification systems for demographics, severity of illness and comorbidities. Within each category, covariates are initially selected based on a minimum of 30 cases in the outcome of interest. Then a stepwise regression process on a development sample is used to select a parsimonious set of covariates where p<.05. Model is then tested on a validation sample

2e.3 Testing Results *(risk model performance metrics)*:
c 0.766

2e.4 If outcome or resource use measure is not risk adjusted, provide rationale: Not applicable

2e C☐ P☐ M☐ N☐ NA☐

2f. Identification of Meaningful Differences in Performance

2f.1 Data/sample from Testing or Current Use *(description of data/sample and size)*: AHRQ 2007 State Inpatient Databases (SID) with 4,000 hospitals and 30 million adult discharges

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2f.2 Methods to identify statistically significant and practically/meaningfully differences in performance *(type of analysis & rationale)*: Posterior probability distribution parameterized using the Gamma distribution **2f.3 Provide Measure Scores from Testing or Current Use** *(description of scores, e.g., distribution by quartile, mean, median, SD, etc.; identification of statistically significant and meaningfully differences in performance)*: 5th 25th Median 75th 95th 0.018408 0.033661 0.048378 0.066901 0.100833	N☐
2g. Comparability of Multiple Data Sources/Methods **2g.1 Data/sample** *(description of data/sample and size)*: Not applicable **2g.2 Analytic Method** *(type of analysis & rationale)*: Not applicable **2g.3 Testing Results** *(e.g., correlation statistics, comparison of rankings)*: Not applicable	**2g** C☐ P☐ M☐ N☐ NA ☐
2h. Disparities in Care **2h.1 If measure is stratified, provide stratified results** *(scores by stratified categories/cohorts)*: Median income of patient´s ZIP code: 1) Estimate 2) Standard error 3) P-value: Relative to marked group-c 4) P-value: 2007 relative to 2006 First quartile (lowest income) 32.207 4.894 0.206 0.000 Second quartile 50.615 5.663 0.000 0.154 Third quartile 34.671 5.002 0.106 0.586 Fourth quartile (highest income)c 23.772 4.527 0.024 **2h.2 If disparities have been reported/identified, but measure is not specified to detect disparities, provide follow-up plans:** Users may stratify based on gender and race/ethnicity	**2h** C☐ P☐ M☐ N☐ NA ☐
TAP/Workgroup: What are the strengths and weaknesses in relation to the subcriteria for *Scientific Acceptability of Measure Properties?*	**2**
Steering Committee: Overall, to what extent was the criterion, *Scientific Acceptability of Measure Properties*, met? **Rationale:**	***2*** **C** ☐ **P** ☐ **M** ☐ **N** ☐
3. USABILITY	
Extent to which intended audiences (e.g., consumers, purchasers, providers, policy makers) can understand the results of the measure and are likely to find them useful for decision making. (evaluation criteria)	**Eval Rati ng**
3a. Meaningful, Understandable, and Useful Information **3a.1 Current Use:** In use **3a.2 Use in a public reporting initiative (disclosure of performance results to the public at large)** (*If used in a public reporting initiative, provide name of initiative(s), locations, Web page URL(s). If not publicly reported, state the plans to achieve public reporting within 3 years*): California (state)	**3a** C☐ P☐ M☐ N☐

Hospital Inpatient Mortality Indicators for California
http://www.oshpd.ca.gov/HID/Products/PatDischargeData/AHRQ/iqi-imi_overview.html

Florida (state)
Florida Health Finder
http://www.floridahealthfinder.gov/

Kentucky (Norton Healthcare, a hospital system)
Norton Healthcare Quality Report
http://www.nortonhealthcare.com/body.cfm?id=157

Massachusetts (state)
My HealthCare Options
http://www.mass.gov/healthcareqc

New Jersey (state)
Find and Compare Quality Care in NJ Hospitals
http://www.nj.gov/health/healthcarequality/

New York (health care coalition)
New York State Hospital Report Card
http://www.myhealthfinder.com/

Texas (state)
Reports on Hospital Performance
http://www.dshs.state.tx.us/thcic/

Vermont (state)
Dept of Banking, Insurance, Securities & Health Care Administration Comparison Report
http://www.bishca.state.vt.us/health-care/hospitals-health-care-practitioners/2009-vermont-hospital-report-card

Washington (health care coalition)
Washington State Hospital Report Card
http://www.myhealthfinder.com/wa09/index.php

Wisconsin (state hospital association)
CheckPoint
http://www.wicheckpoint.org/index.aspx

The measure is also reported on HCUPnet:
http://hcupnet.ahrq.gov/HCUPnet.jsp?Id=EB57801381F71C41&Form=MAINSEL&JS=Y&Action=%3E%3ENext%3E%3E&_MAINSEL=AHRQ%20Quality%20Indicators

This measure is used in the MONAHRQ system that is provided for public reporting and quality improvement throughout the United States: http://monahrq.ahrq.gov/

3a.3 If used in other programs/initiatives (*If used in quality improvement or other programs/initiatives, name of initiative(s), locations, Web page URL(s). If not used for QI, state the plans to achieve use for QI within 3 years***):**
University Healthcare Consortium - An alliance of 103 academic medical centers and 219 of their affiliated hospitals. Reporting the AHRQ QIs to their member hospitals. (see www.uhc.edu. Note: measure results reported to hospitals; not reported on site).

Dallas Fort Worth Hospital Council – Reporting on measure results to over 70 hospitals in Texas (see www.dfwhc.ord. Note: measure results reported to hospitals; not reported on site).

Norton Healthcare - a multi-hospital system in Kentucky (see

http://www.nortonhealthcare.com/about/Our_Performance/index.aspx)

Ministry Health Care - a multi-hospital system in Wisconsin (see http://ministryhealth.org/display/router.aspx. Note: measure results reported to hospitals; not reported on site).

Minnesota Hospital Association
http://www.mnhospitals.org/ Note: measure used in quality improvement. Not reported publicly by the association)

Premier - Premier´s "Quality Advisor" tool provides performance reports to approximately 650 hospitals for their use in monitoring and improving quality. Hospitals receive facility specific reports on this measure in Quality Advisor.

This measure is used in the MONAHRQ system that is provide for public reporting and quality improvement throughout the United States: http://monahrq.ahrq.gov/

Testing of Interpretability (*Testing that demonstrates the results are understood by the potential users for public reporting and quality improvement*)
3a.4 **Data/sample** *(description of data/sample and size)*: AHRQ 2007 State Inpatient Databases (SID) with 4,000 hospitals and 30 million adult discharges

3a.5 **Methods** *(e.g., focus group, survey, QI project)*:
A research team from the School of Public Affairs, Baruch College, under contracts with the Department of Public Health, Weill Medical College and Battelle, Inc., has developed a pair of Hospital Quality Model Reports at the request of the Agency for Healthcare Research & Quality (AHRQ). These reports are designed specifically to report comparative information on hospital performance based on the AHRQ Quality Indicators (QIs). The work was done in close collaboration with AHRQ staff and the AHRQ Quality Indicators team.
The Model Reports (discussed immediately above) are based on:
• Extensive search and analysis of the literature on hospital quality measurement and reporting, as well as public reporting on health care quality more broadly;
• Interviews with quality measurement and reporting experts, purchasers, staff of purchasing coalitions, and executives of integrated health care delivery systems who are responsible for quality in their facilities;
• Two focus groups with chief medical officers of hospitals and/or systems and two focus groups with quality managers from a broad mix of hospitals;
• Four focus groups with members of the public who had recently experienced a hospital admission; and
• Four rounds of cognitive interviews (a total of 62 interviews) to test draft versions of the two Model Reports with members of the public with recent hospital experience, basic computer literacy but widely varying levels of education.

3a.6 **Results** *(qualitative and/or quantitative results and conclusions)*:
Given the above review of the literature and original research that was conducted, a Model report was the result that could help sponsors use the best evidence on public reports so they are most likely to have the desired effects on quality

3b/3c. Relation to other NQF-endorsed measures

3b.1 **NQF # and Title of similar or related measures:**
Leapfrog survival predictor

(for NQF staff use) **Notes on similar/related endorsed or submitted measures:**

3b. Harmonization
If this measure is related to measure(s) already endorsed by NQF (e.g., same topic, but different target population/setting/data source or different topic but same target population):
3b.2 **Are the measure specifications harmonized? If not, why?**
Leapfrog measure is based on AHRQ specification, but is not risk-adjusted

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3c. Distinctive or Additive Value **3c.1 Describe the distinctive, improved, or additive value this measure provides to existing NQF-endorsed measures:** AHRQ measure is risk-adjusted, is paired with a volume measure and is part of a composite measure **5.1 If this measure is similar to measure(s) already endorsed by NQF (i.e., on the same topic and the same target population), Describe why it is a more valid or efficient way to measure quality:** Volume is, by itself, not an adequate proxy for case-mix	**3c** C☐ P☐ M☐ N☐ NA ☐
TAP/Workgroup: What are the strengths and weaknesses in relation to the subcriteria for *Usability?*	**3**
Steering Committee: Overall, to what extent was the criterion, *Usability*, met? **Rationale:**	**3** C☐ P☐ M☐ N☐
4. FEASIBILITY	
Extent to which the required data are readily available, retrievable without undue burden, and can be implemented for performance measurement. (evaluation criteria)	Eval Rating
4a. Data Generated as a Byproduct of Care Processes **4a.1-2 How are the data elements that are needed to compute measure scores generated?** Coding/abstraction performed by someone other than person obtaining original information (E.g., DRG, ICD-9 codes on claims, chart abstraction for quality measure or registry)	**4a** C☐ P☐ M☐ N☐
4b. Electronic Sources **4b.1 Are all the data elements available electronically?** (*elements that are needed to compute measure scores are in defined, computer-readable fields, e.g., electronic health record, electronic claims*) Yes **4b.2 If not, specify the near-term path to achieve electronic capture by most providers.**	**4b** C☐ P☐ M☐ N☐
4c. Exclusions **4c.1 Do the specified exclusions require additional data sources beyond what is required for the numerator and denominator specifications?** No **4c.2 If yes, provide justification.**	**4c** C☐ P☐ M☐ N☐ NA ☐
4d. Susceptibility to Inaccuracies, Errors, or Unintended Consequences **4d.1 Identify susceptibility to inaccuracies, errors, or unintended consequences of the measure and describe how these potential problems could be audited. If audited, provide results.** Coding professionals follow detail guidelines, are subject to training and credentialing requirements, peer review and audit. This procedure is performed only by a select number of hospitals, which may compromise the precision of the indicator.	**4d** C☐ P☐ M☐ N☐
4e. Data Collection Strategy/Implementation **4e.1 Describe what you have learned/modified as a result of testing and/or operational use of the measure regarding data collection, availability of data/missing data, timing/frequency of data collection, patient confidentiality, time/cost of data collection, other feasibility/ implementation issues:** Providers may wish to examine several consecutive years to potentially increase the precision of this	**4e** C☐ P☐ M☐ N☐

indicator. 4e.2 **Costs to implement the measure** (*costs of data collection, fees associated with proprietary measures*)**:** All data necessary to calculate this measure are routinely collected for hospital administrative purposes. The software for calculating the measure is available for free at: http://www.qualityindicators.ahrq.gov/software.htm 4e.3 **Evidence for costs:** All data necessary to calculate this measure are routinely collected for hospital administrative purposes. The software for calculating the measure is available for free at: http://www.qualityindicators.ahrq.gov/software.htm 4e.4 **Business case documentation:** All data necessary to calculate this measure are routinely collected for hospital administrative purposes. The software for calculating the measure is available for free at: http://www.qualityindicators.ahrq.gov/software.htm	
TAP/Workgroup: What are the strengths and weaknesses in relation to the subcriteria for *Feasibility?*	**4**
Steering Committee: Overall, to what extent was the criterion, *Feasibility*, met? **Rationale:**	**4** **C☐** **P☐** **M☐** **N☐**
RECOMMENDATION	
(for NQF staff use) **Check if measure is untested and only eligible for time-limited endorsement.**	**Time-limited ☐**
Steering Committee: Do you recommend for endorsement? **Comments:**	**Y☐** **N☐** **A☐**
CONTACT INFORMATION	
Co.1 **Measure Steward (Intellectual Property Owner)** Co.1 **Organization** Agency for Healthcare Research and Quality, 540 Gaither Road, Rockville, Maryland, 20850 Co.2 **Point of Contact** John, Bott, MSSW, MBA, John.Bott@AHRQ.hhs.gov, 301-427-1317-	
Measure Developer If different from Measure Steward Co.3 **Organization** Agency for Healthcare Research and Quality, 540 Gaither Road, Rockville, Maryland, 20850 Co.4 **Point of Contact** John, Bott, MSSW, MBA, John.Bott@AHRQ.hhs.gov, 301-427-1317-	
Co.5 **Submitter If different from Measure Steward POC** John, Bott, MSSW, MBA, John.Bott@AHRQ.hhs.gov, 301-427-1317-, Agency for Healthcare Research and Quality	
Co.6 **Additional organizations that sponsored/participated in measure development**	
ADDITIONAL INFORMATION	
Workgroup/Expert Panel involved in measure development Ad.1 **Provide a list of sponsoring organizations and workgroup/panel members' names and organizations. Describe the members' role in measure development.** UC Davis,	

Stanford University, Battelle Memorial Institute
Ad.2 If adapted, provide name of original measure: None **Ad.3-5 If adapted, provide original specifications URL or attachment**
Measure Developer/Steward Updates and Ongoing Maintenance **Ad.6 Year the measure was first released:** 2001 **Ad.7 Month and Year of most recent revision:** 10, 2010 **Ad.8 What is your frequency for review/update of this measure?** Annual **Ad.9 When is the next scheduled review/update for this measure?** 05, 2011
Ad.10 Copyright statement/disclaimers: The AHRQ QI software is publicly available; no copyright disclaimers
Ad.11 -13 Additional Information web page URL or attachment:
Date of Submission (*MM/DD/YY*)**:** 06/14/2011

NATIONAL QUALITY FORUM

Measure Evaluation 4.1
December 2009

This form contains the measure information submitted by stewards. Blank fields indicate no information was provided. Attachments also may have been submitted and are provided to reviewers. The subcriteria and most of the footnotes from the evaluation criteria are provided in Word comments within the form and will appear if your cursor is over the highlighted area. Hyperlinks to the evaluation criteria and ratings are provided in each section.

TAP/Workgroup (if utilized)**:** Complete all yellow highlighted areas of the form. Evaluate the extent to which each subcriterion is met. Based on your evaluation, summarize the strengths and weaknesses in each section.

Note: *If there is no TAP or workgroup, the SC also evaluates the subcriteria (yellow highlighted areas).*

Steering Committee: Complete all pink highlighted areas of the form. Review the workgroup/TAP assessment of the subcriteria, noting any areas of disagreement; then evaluate the extent to which each major criterion is met; and finally, indicate your recommendation for the endorsement. Provide the rationale for your ratings.

Evaluation ratings of the extent to which the criteria are met
C = Completely (unquestionably demonstrated to meet the criterion)
P = Partially (demonstrated to partially meet the criterion)
M = Minimally (addressed BUT demonstrated to only minimally meet the criterion)
N = Not at all (NOT addressed; OR incorrectly addressed; OR demonstrated to NOT meet the criterion)
NA = Not applicable (only an option for a few subcriteria as indicated)

(for NQF staff use) **NQF Review #:** 0366 **NQF Project:** Surgery Endorsement Maintenance 2010
MEASURE DESCRIPTIVE INFORMATION
De.1 **Measure Title:** Pancreatic Resection Volume (IQI 2)
De.2 **Brief description of measure:** Number of discharges with procedure for pancreatic resection.
1.1-2 **Type of Measure:** Structure De.3 **If included in a composite or paired with another measure, please identify composite or paired measure** Pancreatic Resection Mortality (IQI 9) NQF #0365
De.4 **National Priority Partners Priority Area:** Population health, Safety De.5 **IOM Quality Domain**: Effectiveness, Safety De.6 **Consumer Care Need:** Getting better

CONDITIONS FOR CONSIDERATION BY NQF	
Four conditions must be met before proposed measures may be considered and evaluated for suitability as voluntary consensus standards:	**NQF Staff**
A. The measure is in the public domain or an intellectual property (measure steward agreement) is signed. *Public domain only applies to governmental organizations. All non-government organizations must sign a measure steward agreement even if measures are made publicly and freely available.* A.1 **Do you attest that the measure steward holds intellectual property rights to the measure and the right to use aspects of the measure owned by another entity (e.g., risk model, code set)?** Yes A.2 **Indicate if Proprietary Measure** (*as defined in measure steward agreement*)**:** A.3 **Measure Steward Agreement:** Government entity and in the public domain - no agreement necessary A.4 **Measure Steward Agreement attached:**	**A** Y☐ N☐
B. The measure owner/steward verifies there is an identified responsible entity and process to maintain and update the measure on a schedule that is commensurate with the rate of clinical innovation, but at least every 3 years. Yes, information provided in contact section	**B** Y☐ N☐

C. The intended use of the measure includes both public reporting and quality improvement. ►**Purpose:** Public Reporting, Quality Improvement (Internal to the specific organization)	**C** Y☐ N☐
D. The requested measure submission information is complete. Generally, measures should be fully developed and tested so that all the evaluation criteria have been addressed and information needed to evaluate the measure is provided. Measures that have not been tested are only potentially eligible for a time-limited endorsement and in that case, measure owners must verify that testing will be completed within 12 months of endorsement. D.1**Testing:** Yes, fully developed and tested D.2 **Have NQF-endorsed measures been reviewed to identify if there are similar or related measures?** Yes	**D** Y☐ N☐
(for NQF staff use) **Have all conditions for consideration been met?** **Staff Notes to Steward** (*if submission returned*)**:**	**Met** Y☐ N☐
Staff Notes to Reviewers (*issues or questions regarding any criteria*)**:**	
Staff Reviewer Name(s):	

TAP/Workgroup Reviewer Name:	
Steering Committee Reviewer Name:	
1. IMPORTANCE TO MEASURE AND REPORT	
Extent to which the specific measure focus is important to making significant gains in health care quality (safety, timeliness, effectiveness, efficiency, equity, patient-centeredness) and improving health outcomes for a specific high impact aspect of healthcare where there is variation in or overall poor performance. ***Measures must be judged to be important to measure and report*** *in order to be evaluated against the remaining criteria.* (evaluation criteria) **1a. High Impact**	Eval Rating
(for NQF staff use) Specific NPP goal:	
1a.1 **Demonstrated High Impact Aspect of Healthcare:** Severity of illness, Patient/societal consequences of poor quality 1a.2 1a.3 **Summary of Evidence of High Impact:** Higher volumes have been repeatedly associated with better outcomes after pancreatic surgery, although these findings may be limited by inadequate risk adjustment of the outcome measure. One study used clinical data to estimate the association between hospital volume and mortality following pancreatic cancer surgery. Begg et al. analyzed retrospective data from the Surveillance, Epidemiology, and End Results (SEER)-Medicare linked database from 1984 through 1993. [1] The crude 30-day mortality rate was 12.9% at hospitals performing 1-5 pancreatic resections during the study period, versus 7.7% and 5.8% at hospitals performing 610 and 11 or more procedures, respectively. The association between volume and mortality remained highly significant (p<.001) in a multivariate model, adjusting for comorbidities, cancer stage and volume, and age. Lieberman et al. used 1984-91 hospital discharge data from New York State to analyze the association between mortality after pancreatic cancer resection and hospital volumes. [2] Adjusting for the year of surgery, age, sex, race, payer source, transfer status, and the total number of secondary diagnoses, the standardized mortality rate was 19% at minimal-volume hospitals (fewer than 10 patients during the study period); 12% at low-volume hospitals (10-50 patients); 13% at medium-volume hospitals (51-80 patients); and 6% at high-volume hospitals (more than 80 patients). Studies using data from Ontario and Medicare data have generated similar results. [3] [4] Empirical evidence shows that pancreatic resection volume—after adjusting for age, sex, and APR-DRG—is independently and negatively correlated with mortality for pancreatic resection (r=-.41, p<.001). [5]	**1a** C☐ P☐ M☐ N☐

Empirical evidence shows that a low percentage of procedures were performed at high-volume hospitals. At threshold 1, 30.3% of pancreatic resection procedures were performed at high-volume providers (and 5.1% of providers are high volume). [6] At threshold 2, 27.0% were performed at high-volume providers (and 4.2% of providers are high volume). [6] [7]

1a.4 Citations for Evidence of High Impact: Updated citations will be presented in the May Steering Committee meeting

[1] Begg CB, Cramer LD, Hoskins WJ, et al. Impact of hospital volume on operative mortality for major cancer surgery. JAMA 1998;280(20):1747-51.
[2] Lieberman MD, Kilburn H, Lindsey M, et al. Relation of perioperative deaths to hospital volume among patients undergoing pancreatic resection for malignancy. Ann Surg 1995;222(5):638-45.
[3] Simunovic M, To T, Theriault M, et al. Relation between hospital surgical volume and outcome for pancreatic resection for neoplasm in a publicly funded health care system [see comments]. Cmaj 1999;160(5):643-8.
[4] Birkmeyer JD, Finlayson SR, Tosteson AN, et al. Effect of hospital volume on in-hospital mortality with pancreaticoduodenectomy. Surgery 1999;125(3):250-6.
[5] Nationwide Inpatient Sample.
[6] Glasgow RE, Mulvihill SJ. Hospital volume influences outcome in patients undergoing pancreatic resection for cancer. West J Med 1996;165(5):294-300.
[7] Nationwide Inpatient Sample and State Inpatient Databases. Healthcare Cost and Utilization Project. Agency for Healthcare Research and Quality, Rockville, MD. http://www.ahrq.gov/data/hcup

1b. Opportunity for Improvement

1b.1 Benefits (improvements in quality) envisioned by use of this measure: Pancreatic resection is a rare procedure that requires technical proficiency; and errors in surgical technique or management may lead to clinically significant complications, such as sepsis, anastomotic breakdown, and death. Higher volumes have been associated with better outcomes, which represent better quality.

1b.2 Summary of data demonstrating performance gap (variation or overall poor performance) across providers:
Comparative Data for the IQI based on the 2008 Nationwide Inpatient Sample (NIS):

	Sex
1,109	Males
1,117	Females
	Age
134	18 to 39
960	40 to 64
673	65 to 74
459	75+
1,049	Medicare
129	Medicaid
1,034	Other

1b.3 Citations for data on performance gap:
See the following report for a complete treatment of the methodology: “Methods: Applying AHRQ Quality Indicators to Healthcare Cost and Utilization Project (HCUP) Data for the National Healthcare Quality Report” [URL: http://hcupnet.ahrq.gov/QI%20Methods.pdf?JS=Y]

1b.4 Summary of Data on disparities by population group:
Comparative Data for the IQI based on the 2008 Nationwide Inpatient Sample (NIS)

	Sex
1,109	Males
1,117	Females

1b
C☐
P☐
M☐
N☐

Age 134 18 to 39 960 40 to 64 673 65 to 74 459 75+ 1,049 Medicare 129 Medicaid 1,034 Other **1b.5 Citations for data on Disparities:** See the following report for a complete treatment of the methodology: "Methods: Applying AHRQ Quality Indicators to Healthcare Cost and Utilization Project (HCUP) Data for the National Healthcare Quality Report" [URL: http://hcupnet.ahrq.gov/QI%20Methods.pdf?JS=Y]	
1c. Outcome or Evidence to Support Measure Focus **1c.1 Relationship to Outcomes** (*For non-outcome measures, briefly describe the relationship to desired outcome. For outcomes, describe why it is relevant to the target population*)**:** Pancreatic resection is a rare procedure that requires technical proficiency; and errors in surgical technique or management may lead to clinically significant complications, such as sepsis, anastomotic breakdown, and death. Higher volumes have been associated with better outcomes, which represent better quality. **1c.2-3. Type of Evidence:** Expert opinion, Systematic synthesis of research **1c.4 Summary of Evidence** (*as described in the criteria; for outcomes, summarize any evidence that healthcare services/care processes influence the outcome*)**:** Higher volumes have been repeatedly associated with better outcomes after pancreatic surgery, although these findings may be limited by inadequate risk adjustment of the outcome measure. One study used clinical data to estimate the association between hospital volume and mortality following pancreatic cancer surgery. Begg et al. analyzed retrospective data from the Surveillance, Epidemiology, and End Results (SEER)-Medicare linked database from 1984 through 1993. [1] The crude 30-day mortality rate was 12.9% at hospitals performing 1-5 pancreatic resections during the study period, versus 7.7% and 5.8% at hospitals performing 610 and 11 or more procedures, respectively. The association between volume and mortality remained highly significant (p<.001) in a multivariate model, adjusting for comorbidities, cancer stage and volume, and age. Lieberman et al. used 1984-91 hospital discharge data from New York State to analyze the association between mortality after pancreatic cancer resection and hospital volumes. [2] Adjusting for the year of surgery, age, sex, race, payer source, transfer status, and the total number of secondary diagnoses, the standardized mortality rate was 19% at minimal-volume hospitals (fewer than 10 patients during the study period); 12% at low-volume hospitals (10-50 patients); 13% at medium-volume hospitals (51-80 patients); and 6% at high-volume hospitals (more than 80 patients). Studies using data from Ontario and Medicare data have generated similar results. [3] [4] Empirical evidence shows that pancreatic resection volume—after adjusting for age, sex, and APR-DRG—is independently and negatively correlated with mortality for pancreatic resection (r=-.41, p<.001). [5] Empirical evidence shows that a low percentage of procedures were performed at high-volume hospitals. At threshold 1, 30.3% of pancreatic resection procedures were performed at high-volume providers (and 5.1% of providers are high volume). [6] At threshold 2, 27.0% were performed at high-volume providers (and 4.2% of providers are high volume). [6] [7] [1] Begg CB, Cramer LD, Hoskins WJ, et al. Impact of hospital volume on operative mortality for major cancer surgery. JAMA 1998;280(20):1747-51. [2] Lieberman MD, Kilburn H, Lindsey M, et al. Relation of perioperative deaths to hospital volume among patients undergoing pancreatic resection for malignancy. Ann Surg 1995;222(5):638-45. [3] Simunovic M, To T, Theriault M, et al. Relation between hospital surgical volume and outcome for	**1c** C☐ P☐ M☐ N☐

pancreatic resection for neoplasm in a publicly funded health care system [see comments]. Cmaj 1999;160(5):643-8.
[4] Birkmeyer JD, Finlayson SR, Tosteson AN, et al. Effect of hospital volume on in-hospital mortality with pancreaticoduodenectomy. Surgery 1999;125(3):250-6.
[5] Nationwide Inpatient Sample.
[6] Glasgow RE, Mulvihill SJ. Hospital volume influences outcome in patients undergoing pancreatic resection for cancer. West J Med 1996;165(5):294-300.
[7] Nationwide Inpatient Sample and State Inpatient Databases. Healthcare Cost and Utilization Project. Agency for Healthcare Research and Quality, Rockville, MD. http://www.ahrq.gov/data/hcup

1c.5 **Rating of strength/quality of evidence (***also provide narrative description of the rating and by whom***):** Not Applicable. Testing, rating, and review were conducted by the project team. A full report on the literature review and empirical evaluation can be found in Refinement of the HCUP Quality Indicators by the UCSF-Stanford EPC, Detailed coding information for each QI is provided in the document Prevention Quality Indicators Technical Specifications. Rating of performance on empirical evaluations, ranged from 0 to 26. The scores were intended as a guide for summarizing the performance of each indicator on four empirical tests of precision (signal variance, area-level share, signal ratio, and R-squared) and five tests of minimum bias (rank correlation, top and bottom decile movement, absolute change, and change over two deciles), as described in the previous section.

1c.6 **Method for rating evidence:** The project team conducted extensive empirical testing of all potential indicators using the 1995-97 HCUP State Inpatient Databases (SID) and Nationwide Inpatient Sample (NIS) to determine precision, bias, and construct validity. The 1997 SID contains uniform data on inpatient stays in community hospitals for 22 States covering approximately 60% of all U.S. hospital discharges. The NIS is designed to approximate a 20% of U.S. community hospitals and includes all stays in the sampled hospitals. Each year of the NIS contains between 6 million and 7 million records from about 1,000 hospitals. The NIS combines a subset of the SID data, hospital-level variables, and hospital and discharge weights for producing national estimates. The project team conducted tests to examine three things: precision, bias, and construct validity.
Precision. The first step in the analysis involved precision tests to determine the reliability of the indicator for distinguishing real differences in provider performance. For indicators that may be used for quality improvement, it is important to know with what precision, or surety, a measure can be attributed to an actual construct rather than random variation.
For each indicator, the variance can be broken down into three components: variation within a provider (actual differences in performance due to differing patient characteristics), variation among providers (actual differences in performance among providers), and random variation. An ideal indicator would have a substantial amount of the variance explained by between-provider variance, possibly resulting from differences in quality of care, and a minimum amount of random variation. The project team performed four tests of precision to estimate the magnitude of between-provider variance on each indicator:
• Signal standard deviation was used to measure the extent to which performance of the QI varies systematically across hospitals or areas.
• Provider/area variation share was used to calculate the percentage of signal (or true) variance relative to the total variance of the QI.
• Signal-to-noise ratio was used to measure the percentage of the apparent variation in QIs across providers that is truly related to systematic differences across providers and not random variations (noise) from year to year.
• In-sample R-squared was used to identify the incremental benefit of applying multivariate signal extraction methods for identifying additional signal on top of the signal-to-noise ratio.
In general, random variation is most problematic when there are relatively few observations per provider, when adverse outcome rates are relatively low, and when providers have little control over patient outcomes or variation in important processes of care is minimal. If a large number of patient factors that are difficult to observe influence whether or not a patient has an adverse outcome, it may be difficult to separate the "quality signal" from the surrounding noise. Two signal extraction techniques were applied to improve the precision of an indicator:
• Univariate methods were used to estimate the "true" quality signal of an indicator based on information from the specific indicator and 1 year of data.
• Multivariate signal extraction (MSX) methods were used to estimate the "true" quality signal based on information from a set of indicators and multiple years of data. In most cases, MSX methods extracted

additional signal, which provided much more precise estimates of true hospital or area quality.
Bias. To determine the sensitivity of potential QIs to bias from differences in patient severity, unadjusted performance measures for specific hospitals were compared with performance measures that had been adjusted for age and gender. All of the PQIs and some of the Inpatient Quality Indicators (IQIs) could only be risk-adjusted for age and sex. The 3M™ APR-DRG System Version 12 with Severity of Illness and Risk of Mortality subclasses was used for risk adjustment of the utilization indicators and the in-hospital mortality indicators, respectively. Five empirical tests were performed to investigate the degree of bias in an indicator:
• Rank correlation coefficient of the area or hospital with (and without) risk adjustment—gives the overall impact of risk adjustment on relative provider or area performance.
• Average absolute value of change relative to mean—highlights the amount of absolute change in performance, without reference to other providers' performance.
• Percentage of highly ranked hospitals that remain in high decile—reports the percentage of hospitals or areas that are in the highest deciles without risk adjustment that remain there after risk adjustment is performed.
• Percentage of lowly ranked hospitals that remain in low decile—reports the percentage of hospitals or areas that are in the lowest deciles without risk adjustment that remain there after risk adjustment is performed.
• Percentage that change more than two deciles—identifies the percentage of hospitals whose relative rank changes by a substantial percentage (more than 20%) with and without risk adjustment.
Construct validity. Construct validity analyses provided information regarding the relatedness or independence of the indicators. If quality indicators do indeed measure quality, then two measures of the same construct would be expected to yield similar results. The team used factor analysis to reveal underlying patterns among large numbers of variables—in this case, to measure the degree of relatedness between indicators. In addition, they analyzed correlation matrices for indicators.

1c.7 Summary of Controversy/Contradictory Evidence: See the following for a complete treatment of the topic:
http://www.qualityindicators.ahrq.gov/downloads/iqi/iqi_guide_v31.pdf
Note: The Literature Review Caveats column summarizes evidence specific to each potential concern on the link between the PQIs and quality of care, as described in step 3 above. A question mark (?) indicates that the concern is theoretical or suggested, but no specific evidence was found in the literature. A check mark indicates that the concern has been demonstrated in the literature.

1c.8 Citations for Evidence (*other than guidelines*): Updated citations will be presented in the May Steering Committee meeting

http://www.qualityindicators.ahrq.gov/downloads/iqi/iqi_guide_v31.pdf

1c.9 Quote the Specific guideline recommendation (*including guideline number and/or page number*):
Not Applicable.

1c.10 Clinical Practice Guideline Citation: Not Applicable.
1c.11 National Guideline Clearinghouse or other URL: Not Applicable.

1c.12 Rating of strength of recommendation (*also provide narrative description of the rating and by whom*):
Not Applicable.

1c.13 Method for rating strength of recommendation (*If different from USPSTF system, also describe rating and how it relates to USPSTF*):
Not Applicable.

1c.14 Rationale for using this guideline over others:
Not Applicable.

TAP/Workgroup: What are the strengths and weaknesses in relation to the subcriteria for *Importance to Measure and Report?*	**1**
Steering Committee: Was the threshold criterion, *Importance to Measure and Report*, met? **Rationale:**	**1** **Y☐** **N☐**

2. SCIENTIFIC ACCEPTABILITY OF MEASURE PROPERTIES	
Extent to which the measure, as specified, produces consistent (reliable) and credible (valid) results about the quality of care when implemented. (evaluation criteria)	Eval Rating
2a. MEASURE SPECIFICATIONS	
S.1 Do you have a web page where current detailed measure specifications can be obtained? **S.2 If yes, provide web page URL:** **2a. Precisely Specified**	
2a.1 Numerator Statement (*Brief, text description of the numerator - what is being measured about the target population, e.g. target condition, event, or outcome*)**:** Discharges, age 18 years and older, with ICD-9-CM codes for pancreatic resection procedure. **2a.2 Numerator Time Window** (*The time period in which cases are eligible for inclusion in the numerator*)**:** Time window can be determined by user, but is generally a calendar year. **2a.3 Numerator Details** (*All information required to collect/calculate the numerator, including all codes, logic, and definitions*)**:** Discharges, age 18 years and older, with ICD-9-CM codes for pancreatic resection procedure. ICD-9-CM pancreatic resection procedure codes: 526 TOTAL PANCREATECTOMY 527 RAD PANCREATICODUODENECT 52.5 Partial pancreatectomy 52.51 Proximal pancreatectomy 52.52 Distal pancreatectomy 52.53 Radical subtotal pancreatectomy 52.59 Other partial pancreatectomy Exclude cases: • MDC 14 (pregnancy, childbirth, and puerperium)	
2a.4 Denominator Statement (*Brief, text description of the denominator - target population being measured*)**:** not applicable **2a.5 Target population gender:** Female, Male **2a.6 Target population age range:** 18 and older **2a.7 Denominator Time Window** (*The time period in which cases are eligible for inclusion in the denominator*)**:** Not applicable **2a.8 Denominator Details** (*All information required to collect/calculate the denominator - the target population being measured - including all codes, logic, and definitions*)**:** Not applicable	**2a-specs** C☐ P☐ M☐ N☐
2a.9 Denominator Exclusions (*Brief text description of exclusions from the target population*)**:** Not	

applicable

2a.10 Denominator Exclusion Details (*All information required to collect exclusions to the denominator, including all codes, logic, and definitions***):**
Not applicable

2a.11 Stratification Details/Variables (*All information required to stratify the measure including the stratification variables, all codes, logic, and definitions***):**
Not applicable

2a.12-13 Risk Adjustment Type: No risk adjustment necessary

2a.14 Risk Adjustment Methodology/Variables (*List risk adjustment variables and describe conceptual models, statistical models, or other aspects of model or method***):**
Not applicable

2a.15-17 Detailed risk model available Web page URL or attachment:

2a.18-19 Type of Score: Count
2a.20 Interpretation of Score: Better quality = Higher score
2a.21 Calculation Algorithm (*Describe the calculation of the measure as a flowchart or series of steps***):**
The volume is the number of discharges with a procedure for pancreatic resection.

2a.22 Describe the method for discriminating performance *(e.g., significance testing)***:**
Performance discrimination is based on pre-defined thresholds derived from the literature. Threshold 1: 10 or more procedures per year Threshold 2: 11 or more procedures per year

2a.23 Sampling (Survey) Methodology *If measure is based on a sample (or survey), provide instructions for obtaining the sample, conducting the survey and guidance on minimum sample size (response rate)*:
Not applicable

2a.24 Data Source (*Check the source(s) for which the measure is specified and tested)*
Administrative claims

2a.25 Data source/data collection instrument (*Identify the specific data source/data collection instrument, e.g. name of database, clinical registry, collection instrument, etc.***):**
Hospital administrative discharge data. See data requirements in the AHRQ QI Windows Application Documentation: http://www.qualityindicators.ahrq.gov/software.htm

2a.26-28 Data source/data collection instrument reference web page URL or attachment: URL
http://www.qualityindicators.ahrq.gov/software.htm

2a.29-31 Data dictionary/code table web page URL or attachment: URL
http://www.qualityindicators.ahrq.gov/downloads/winqi/AHRQ_QI_Windows_Software_Documentation_V41a.pdf

2a.32-35 Level of Measurement/Analysis (*Check the level(s) for which the measure is specified and tested)*
Facility

2a.36-37 Care Settings (*Check the setting(s) for which the measure is specified and tested)*
Hospital/Acute Care Facility

2a.38-41 Clinical Services (*Healthcare services being measured, check all that apply*)
Clinicians: Physicians (MD/DO)

TESTING/ANALYSIS

2b. Reliability testing — **2b** C☐ P☐ M☐

2b.1 Data/sample *(description of data/sample and size)***:** AHRQ 2007 State Inpatient Databases (SID) with 4,000 hospitals and 30 million adult discharges

2b.2 Analytic Method *(type of reliability & rationale, method for testing)*: Expert panels and empirical analysis **2b.3 Testing Results** *(reliability statistics, assessment of adequacy in the context of norms for the test conducted)*: Pancreatic Resection is measured accurately with discharge data. Most facilities perform 10 or fewer esophagectomies for cancer during a 5 year period	**N** ☐
2c. Validity testing **2c.1 Data/sample** *(description of data/sample and size)*: AHRQ 2007 State Inpatient Databases (SID) with 4,000 hospitals and 30 million adult discharges **2c.2 Analytic Method** *(type of validity & rationale, method for testing)*: Expert panels and empirical analysis **2c.3 Testing Results** *(statistical results, assessment of adequacy in the context of norms for the test conducted)*: Pancreatic resection volume was found to be modestly negatively correlated with resection mortality, although these findings may be limited by inadequate risk adjustment of the outcome measure. Only one study used clinical data to estimate the association between hospital volume and mortality following esophageal cancer surgery. Begg et al. analyzed retrospective data from the Surveillance, Epidemiology, and End Results (SEER)-Medicare linked database from 1984 through 1993.22 The crude 30-day mortality rate was 17.3% at hospitals that performed 1-5 esophagectomies on Medicare patients during the study period, versus 3.9% and 3.4% at hospitals that performed 6-10 and 11 or more esophagectomies, respectively. The association between volume and mortality remained highly significant (p<.001) in a multivariate model, adjusting for the number of comorbidities, cancer stage and volume, and age. Studies based on California and Maryland data found that the risk-adjusted mortality rates at low-volume hospitals were around 3.0 times those at high-volume hospitals.23 24 Empirical evidence shows that esophageal resection volume—after adjusting for age, sex, and APR-DRG—is moderately and negatively correlated with mortality for esophageal resection (r=-.29, p<.05), as well as mortality after other cancer resection procedures.25	**2c** **C** ☐ **P** ☐ **M** ☐ **N** ☐
2d. Exclusions Justified **2d.1 Summary of Evidence supporting exclusion(s):** Not applicable **2d.2 Citations for Evidence:** Not applicable **2d.3 Data/sample** *(description of data/sample and size)*: Not applicable **2d.4 Analytic Method** *(type analysis & rationale)*: Not applicable **2d.5 Testing Results** *(e.g., frequency, variability, sensitivity analyses)*: Not applicable	**2d** **C** ☐ **P** ☐ **M** ☐ **N** ☐ **NA** ☐
2e. Risk Adjustment for Outcomes/ Resource Use Measures **2e.1 Data/sample** *(description of data/sample and size)*: Not applicable **2e.2 Analytic Method** *(type of risk adjustment, analysis, & rationale)*: Not applicable **2e.3 Testing Results** *(risk model performance metrics)*:	**2e** **C** ☐ **P** ☐ **M** ☐ **N** ☐ **NA** ☐

Not applicable **2e.4 If outcome or resource use measure is not risk adjusted, provide rationale:** Not applicable	
2f. Identification of Meaningful Differences in Performance **2f.1 Data/sample from Testing or Current Use** *(description of data/sample and size)*: AHRQ 2007 State Inpatient Databases (SID) with 4,000 hospitals and 30 million adult discharges **2f.2 Methods to identify statistically significant and practically/meaningfully differences in performance** *(type of analysis & rationale)*: Emprical analysis **2f.3 Provide Measure Scores from Testing or Current Use** *(description of scores, e.g., distribution by quartile, mean, median, SD, etc.; identification of statistically significant and meaningfully differences in performance)*: Hospitals Q1 Q2 Q3 Q4 857 1.1 1.8 3.1 12.7	**2f** C☐ P☐ M☐ N☐
2g. Comparability of Multiple Data Sources/Methods **2g.1 Data/sample** *(description of data/sample and size)*: Not applicable **2g.2 Analytic Method** *(type of analysis & rationale)*: Not applicable **2g.3 Testing Results** *(e.g., correlation statistics, comparison of rankings)*: Not applicable	**2g** C☐ P☐ M☐ N☐ NA ☐
2h. Disparities in Care **2h.1 If measure is stratified, provide stratified results** *(scores by stratified categories/cohorts)*: Not applicable **2h.2 If disparities have been reported/identified, but measure is not specified to detect disparities, provide follow-up plans:** Not applicable	**2h** C☐ P☐ M☐ N☐ NA ☐
TAP/Workgroup: What are the strengths and weaknesses in relation to the subcriteria for *Scientific Acceptability of Measure Properties?*	**2**
Steering Committee: Overall, to what extent was the criterion, *Scientific Acceptability of Measure Properties*, met? **Rationale:**	**2** **C** ☐ **P** ☐ **M** ☐ **N** ☐
3. USABILITY	
Extent to which intended audiences (e.g., consumers, purchasers, providers, policy makers) can understand the results of the measure and are likely to find them useful for decision making. (evaluation criteria)	Eval Rating
3a. Meaningful, Understandable, and Useful Information **3a.1 Current Use:** In use **3a.2 Use in a public reporting initiative (disclosure of performance results to the public at large)** (*If used in a public reporting initiative, provide name of initiative(s), locations, Web page URL(s). If not publicly*	**3a** C☐ P☐ M☐ N☐

reported, state the plans to achieve public reporting within 3 years):
California (state)
Hospital Inpatient Mortality Indicators for California
http://www.oshpd.ca.gov/HID/Products/PatDischargeData/AHRQ/iqi-imi_overview.html

Illinois (state hospital association)
Illinois Hospitals Caring for You
www.illinoishospitals.org

Kentucky (Norton Healthcare, a hospital system)
Norton Healthcare Quality Report
http://www.nortonhealthcare.com/body.cfm?id=157

New Jersey (state)
Find and Compare Quality Care in NJ Hospitals
http://www.nj.gov/health/healthcarequality/

New York (health care coalition)
New York State Hospital Report Card
http://www.myhealthfinder.com/

Texas (state)
Reports on Hospital Performance
http://www.dshs.state.tx.us/thcic/

Vermont (state)
Dept of Banking, Insurance, Securities & Health Care Administration Comparison Report

http://www.bishca.state.vt.us/health-care/hospitals-health-care-practitioners/2009-vermont-hospital-report-card

Washington (health care coalition)
Washington State Hospital Report Card
http://www.myhealthfinder.com/wa09/index.php

The measure is also reported on HCUPnet:
http://hcupnet.ahrq.gov/HCUPnet.jsp?Id=EB57801381F71C41&Form=MAINSEL&JS=Y&Action=%3E%3ENext%3E%3E&_MAINSEL=AHRQ%20Quality%20Indicators

This measure is used in the MONAHRQ system that is provided for public reporting and quality improvement throughout the United States: http://monahrq.ahrq.gov/

3a.3 **If used in other programs/initiatives (***If used in quality improvement or other programs/initiatives, name of initiative(s), locations, Web page URL(s). If not used for QI, state the plans to achieve use for QI within 3 years*):
University Healthcare Consortium - An alliance of 103 academic medical centers and 219 of their affiliated hospitals. Reporting the AHRQ QIs to their member hospitals. (see www.uhc.edu. Note: measure results reported to hospitals; not reported on site).

Dallas Fort Worth Hospital Council – Reporting on measure results to over 70 hospitals in Texas (see www.dfwhc.ord. Note: measure results reported to hospitals; not reported on site).

Norton Healthcare - a multi-hospital system in Kentucky (see http://www.nortonhealthcare.com/about/Our_Performance/index.aspx)
Ministry Health Care - a multi-hospital system in Wisconsin (see http://ministryhealth.org/display/router.aspx. Note: measure results reported to hospitals; not reported on site).

Minnesota Hospital Association http://www.mnhospitals.org/ Note: measure used in quality improvement. Not reported publicly by the association). This measure is used in the MONAHRQ system that is provided for public reporting and quality improvement throughout the United States: http://monahrq.ahrq.gov/ **Testing of Interpretability** (*Testing that demonstrates the results are understood by the potential users for public reporting and quality improvement*) **3a.4 Data/sample** *(description of data/sample and size)*: AHRQ 2007 State Inpatient Databases (SID) with 4,000 hospitals and 30 million adult discharges **3a.5 Methods** *(e.g., focus group, survey, QI project)*: A research team from the School of Public Affairs, Baruch College, under contracts with the Department of Public Health, Weill Medical College and Battelle, Inc., has developed a pair of Hospital Quality Model Reports at the request of the Agency for Healthcare Research & Quality (AHRQ). These reports are designed specifically to report comparative information on hospital performance based on the AHRQ Quality Indicators (QIs). The work was done in close collaboration with AHRQ staff and the AHRQ Quality Indicators team. The Model Reports (discussed immediately above) are based on: • Extensive search and analysis of the literature on hospital quality measurement and reporting, as well as public reporting on health care quality more broadly; • Interviews with quality measurement and reporting experts, purchasers, staff of purchasing coalitions, and executives of integrated health care delivery systems who are responsible for quality in their facilities; • Two focus groups with chief medical officers of hospitals and/or systems and two focus groups with quality managers from a broad mix of hospitals; • Four focus groups with members of the public who had recently experienced a hospital admission; and • Four rounds of cognitive interviews (a total of 62 interviews) to test draft versions of the two Model Reports with members of the public with recent hospital experience, basic computer literacy but widely varying levels of education. **3a.6 Results** *(qualitative and/or quantitative results and conclusions)*: Given the above review of the literature and original research that was conducted, a Model report was the result that could help sponsors use the best evidence on public reports so they are most likely to have the desired effects on quality.	
3b/3c. Relation to other NQF-endorsed measures **3b.1 NQF # and Title of similar or related measures:** Leapfrog survival predictor	
(for NQF staff use) **Notes on similar/related endorsed or submitted measures:**	
3b. Harmonization If this measure is related to measure(s) already endorsed by NQF (e.g., same topic, but different target population/setting/data source or different topic but same target population): **3b.2 Are the measure specifications harmonized? If not, why?** Other measure is based on the AHRQ QI specification, but volume not reported separately	**3b** C☐ P☐ M☐ N☐ NA ☐
3c. Distinctive or Additive Value **3c.1 Describe the distinctive, improved, or additive value this measure provides to existing NQF-endorsed measures:** AHRQ QI reports separate volume and mortality, which is risk-adjusted **5.1 If this measure is similar to measure(s) already endorsed by NQF (i.e., on the same topic and the same target population), Describe why it is a more valid or efficient way to measure quality:** The AHRQ QI is associated with a risk-adjusted mortality measure	**3c** C☐ P☐ M☐ N☐ NA ☐
TAP/Workgroup: What are the strengths and weaknesses in relation to the subcriteria for *Usability?*	**3**

Steering Committee: Overall, to what extent was the criterion, *Usability*, met? **Rationale:**	**3** C☐ P☐ M☐ N☐
4. FEASIBILITY	
Extent to which the required data are readily available, retrievable without undue burden, and can be implemented for performance measurement. (evaluation criteria)	Eval Rating
4a. Data Generated as a Byproduct of Care Processes 4a.1-2 **How are the data elements that are needed to compute measure scores generated?** Coding/abstraction performed by someone other than person obtaining original information (E.g., DRG, ICD-9 codes on claims, chart abstraction for quality measure or registry)	**4a** C☐ P☐ M☐ N☐
4b. Electronic Sources 4b.1 **Are all the data elements available electronically?** (*elements that are needed to compute measure scores are in defined, computer-readable fields, e.g., electronic health record, electronic claims*) Yes 4b.2 **If not, specify the near-term path to achieve electronic capture by most providers.**	**4b** C☐ P☐ M☐ N☐
4c. Exclusions 4c.1 **Do the specified exclusions require additional data sources beyond what is required for the numerator and denominator specifications?** No 4c.2 **If yes, provide justification.**	**4c** C☐ P☐ M☐ N☐ NA☐
4d. Susceptibility to Inaccuracies, Errors, or Unintended Consequences 4d.1 **Identify susceptibility to inaccuracies, errors, or unintended consequences of the measure and describe how these potential problems could be audited. If audited, provide results.** Coding professionals follow detail guidelines, are subject to training and credentialing requirements, peer review and audit. Pancreatic resection is measured accurately with discharge data. Most facilities perform 10 or fewer pancreatectomies for cancer during a 5year period; therefore, this indicator is expected to have poor precision.	**4d** C☐ P☐ M☐ N☐
4e. Data Collection Strategy/Implementation 4e.1 **Describe what you have learned/modified as a result of testing and/or operational use of the measure regarding data collection, availability of data/missing data, timing/frequency of data collection, patient confidentiality, time/cost of data collection, other feasibility/ implementation issues:** Low-volume providers may attempt to increase their volume without improving quality of care by performing the procedure on patients who may not qualify or benefit from the procedure. Additionally, shifting procedures to high-volume providers may impair access to care for certain types of patients. 4e.2 **Costs to implement the measure** (*costs of data collection, fees associated with proprietary measures*)**:** All data necessary to calculate this measure are routinely collected for hospital administrative purposes. The software for calculating the measure is available for free at: http://www.qualityindicators.ahrq.gov/software.htm 4e.3 **Evidence for costs:**	**4e** C☐ P☐ M☐ N☐

All data necessary to calculate this measure are routinely collected for hospital administrative purposes. The software for calculating the measure is available for free at: http://www.qualityindicators.ahrq.gov/software.htm 4e.4 **Business case documentation:** All data necessary to calculate this measure are routinely collected for hospital administrative purposes. The software for calculating the measure is available for free at: http://www.qualityindicators.ahrq.gov/software.htm	
TAP/Workgroup: What are the strengths and weaknesses in relation to the subcriteria for *Feasibility?*	**4**
Steering Committee: Overall, to what extent was the criterion, *Feasibility*, met? **Rationale:**	**4** **C☐** **P☐** **M☐** **N☐**
RECOMMENDATION	
(for NQF staff use) **Check if measure is untested and only eligible for time-limited endorsement.**	**Time-limited ☐**
Steering Committee: Do you recommend for endorsement? **Comments:**	**Y☐** **N☐** **A☐**

CONTACT INFORMATION

Co.1 **Measure Steward (Intellectual Property Owner)**
Co.1 **Organization**
Agency for Healthcare Research and Quality, 540 Gaither Road, Rockville, Maryland, 20850

Co.2 **Point of Contact**
Joh, Bott, MSSW, MBA, david.atkins@ahrq.hhs.gov, 301-427-1317-

Measure Developer If different from Measure Steward
Co.3 **Organization**
Agency for Healthcare Research and Quality, 540 Gaither Road, Rockville, Maryland, 20850

Co.4 **Point of Contact**
Joh, Bott, MSSW, MBA, david.atkins@ahrq.hhs.gov, 301-427-1317-

Co.5 **Submitter If different from Measure Steward POC**
Joh, Bott, MSSW, MBA, david.atkins@ahrq.hhs.gov, 301-427-1317-, Agency for Healthcare Research and Quality

Co.6 **Additional organizations that sponsored/participated in measure development**
UC Davis,
Stanford University,
Battelle Memorial Institute

ADDITIONAL INFORMATION

Workgroup/Expert Panel involved in measure development
Ad.1 **Provide a list of sponsoring organizations and workgroup/panel members' names and organizations. Describe the members' role in measure development.**
None

Ad.2 **If adapted, provide name of original measure:** None
Ad.3-5 **If adapted, provide original specifications URL or attachment**

Measure Developer/Steward Updates and Ongoing Maintenance
Ad.6 **Year the measure was first released:** 2001
Ad.7 **Month and Year of most recent revision:** 10, 2010

Ad.8 What is your frequency for review/update of this measure? Annual **Ad.9 When is the next scheduled review/update for this measure?** 05, 2011
Ad.10 Copyright statement/disclaimers: The AHRQ QI software is publicly available; no copyright disclaimers.
Ad.11 -13 Additional Information web page URL or attachment:
Date of Submission (*MM/DD/YY*)**:** 06/14/2011

NATIONAL QUALITY FORUM

Measure Evaluation 4.1
December 2009

This form contains the measure information submitted by stewards. Blank fields indicate no information was provided. Attachments also may have been submitted and are provided to reviewers. The subcriteria and most of the footnotes from the evaluation criteria are provided in Word comments within the form and will appear if your cursor is over the highlighted area. Hyperlinks to the evaluation criteria and ratings are provided in each section.

TAP/Workgroup (if utilized)**:** Complete all yellow highlighted areas of the form. Evaluate the extent to which each subcriterion is met. Based on your evaluation, summarize the strengths and weaknesses in each section.

Note: *If there is no TAP or workgroup, the SC also evaluates the subcriteria (yellow highlighted areas).*

Steering Committee: Complete all pink highlighted areas of the form. Review the workgroup/TAP assessment of the subcriteria, noting any areas of disagreement; then evaluate the extent to which each major criterion is met; and finally, indicate your recommendation for the endorsement. Provide the rationale for your ratings.

Evaluation ratings of the extent to which the criteria are met
C = Completely (unquestionably demonstrated to meet the criterion)
P = Partially (demonstrated to partially meet the criterion)
M = Minimally (addressed BUT demonstrated to only minimally meet the criterion)
N = Not at all (NOT addressed; OR incorrectly addressed; OR demonstrated to NOT meet the criterion)
NA = Not applicable (only an option for a few subcriteria as indicated)

(for NQF staff use) **NQF Review #:** 0265 **NQF Project:** Surgery Endorsement Maintenance 2010
MEASURE DESCRIPTIVE INFORMATION
De.1 **Measure Title:** Hospital Transfer/Admission
De.2 **Brief description of measure:** Rate of ASC admissions requiring a hospital transfer or hospital admission upon discharge from the ASC
1.1-2 **Type of Measure:** Outcome De.3 **If included in a composite or paired with another measure, please identify composite or paired measure** This measure is not included in a composite or paired with another measure
De.4 **National Priority Partners Priority Area:** Safety De.5 **IOM Quality Domain:** Effectiveness De.6 **Consumer Care Need:** Staying healthy

CONDITIONS FOR CONSIDERATION BY NQF	
Four conditions must be met before proposed measures may be considered and evaluated for suitability as voluntary consensus standards:	**NQF Staff**
A. The measure is in the public domain or an intellectual property (measure steward agreement) is signed. *Public domain only applies to governmental organizations. All non-government organizations must sign a measure steward agreement even if measures are made publicly and freely available.* A.1 **Do you attest that the measure steward holds intellectual property rights to the measure and the right to use aspects of the measure owned by another entity (e.g., risk model, code set)?** Yes A.2 **Indicate if Proprietary Measure** (*as defined in measure steward agreement*)**:** Proprietary measure A.3 **Measure Steward Agreement:** Agreement will be signed and submitted prior to or at the time of measure submission A.4 **Measure Steward Agreement attached:** NQF Measure Steward Agreement with ASC QC-634279428602873330.pdf	**A** Y☐ N☐

B. The measure owner/steward verifies there is an identified responsible entity and process to maintain and update the measure on a schedule that is commensurate with the rate of clinical innovation, but at least every 3 years. Yes, information provided in contact section	**B** Y☐ N☐
C. The intended use of the measure includes both public reporting and quality improvement. ►**Purpose:** Public Reporting, Quality Improvement (Internal to the specific organization), Quality Improvement with Benchmarking (external benchmarking to multiple organizations)	**C** Y☐ N☐
D. The requested measure submission information is complete. Generally, measures should be fully developed and tested so that all the evaluation criteria have been addressed and information needed to evaluate the measure is provided. Measures that have not been tested are only potentially eligible for a time-limited endorsement and in that case, measure owners must verify that testing will be completed within 12 months of endorsement. D.1**Testing:** Yes, fully developed and tested D.2 **Have NQF-endorsed measures been reviewed to identify if there are similar or related measures?** Yes	**D** Y☐ N☐
(for NQF staff use) **Have all conditions for consideration been met?** **Staff Notes to Steward** (*if submission returned*)**:**	**Met** Y☐ N☐
Staff Notes to Reviewers (*issues or questions regarding any criteria*)**:**	
Staff Reviewer Name(s):	

TAP/Workgroup Reviewer Name:	
Steering Committee Reviewer Name:	
1. IMPORTANCE TO MEASURE AND REPORT	
Extent to which the specific measure focus is important to making significant gains in health care quality (safety, timeliness, effectiveness, efficiency, equity, patient-centeredness) and improving health outcomes for a specific high impact aspect of healthcare where there is variation in or overall poor performance. ***Measures must be judged to be important to measure and report*** *in order to be evaluated against the remaining criteria.* (evaluation criteria) **1a. High Impact**	**Eval Rating**
(for NQF staff use) **Specific NPP goal**:	
1a.1 **Demonstrated High Impact Aspect of Healthcare:** Frequently performed procedure, High resource use, Patient/societal consequences of poor quality 1a.2 1a.3 **Summary of Evidence of High Impact:** As a result of advances in surgery and anesthesia, approximately 80 percent of surgeries in the United States are now performed on an outpatient basis. Ambulatory surgical centers perform approximately 40%, or more than 22 million, of those outpatient surgeries. 1 Patients selected for ambulatory surgery are not anticipated to require hospital care upon discharge. The need for a hospital transfer and/ or admission is an unanticipated outcome that can result in unplanned cost and other burdens. Mean charges for unanticipated admissions/readmissions due to pain have been estimated at $1896 +/- $4553 per visit; mean charges for unanticipated admissions/readmissions unrelated to pain have been estimated at $12,000 +/- $36,886 per visit. 2 While hospital transfers and admissions undoubtedly represent good patient care when necessary, high rates may be an indicator that practice patterns or patient selection guidelines are in need of review. Studies suggest providers can reduce rates of unplanned admissions through the use of strategies including: careful preoperative assessment and diligence in patient selection; screening for proper support at home; earlier operating time for certain surgical procedures; and the implementation of clinical pathways for early and	**1a** C☐ P☐ M☐ N☐

aggressive treatment of pain and postoperative nausea and vomiting. 3-10

1a.4 Citations for Evidence of High Impact: 1 U.S. Department of Health and Human Services. Centers for Medicare & Medicaid Services. http://www.cms.gov/.

2 Coley KC, Williams BA, DaPos SV, Chen C, Smith RB. Retrospective evaluation of unanticipated admissions and readmissions after same day surgery and associated costs. J Clin Anesth. 2002 Aug; 14(5):349-53.

3 Margovsky A. Unplanned admissions in day-case surgery as a clinical indicator for quality assurance. Aust N Z J Surg. 2000 Mar;70(3):216-20.

4 Tewfik MA, Frenkiel S, Gasparrini R, Zeitouni A, Daniel SJ, Dolev Y, Kost K, Samaha M, Sweet R, Tewfik TL. Factors affecting unanticipated hospital admission following otolaryngologic day surgery. J Otolaryngol. 2006 Aug;35(4):235-41.

5 Fortier J, Chung F, Su J. Unanticipated admission after ambulatory surgery--a prospective study. Can J Anaesth. 1998 Jul;45(7):612-9.

6. Lin D, Dalgorf D, Witterick IJ. Predictors of unexpected hospital admissions after outpatient endoscopic sinus surgery: retrospective review. J Otolaryngol Head Neck Surg. 2008 Jun;37(3):309-11.

7. Hofer RE, Kai T, Decker PA, Warner DO. Obesity as a risk factor for unanticipated admissions after ambulatory surgery. Mayo Clin Proc. 2008 Aug;83(8):908-16.

8. Lledó JB, Planells M, Espí A, Serralta A, García R, Sanahuja A. Predictive model of failure of outpatient laparoscopic cholecystectomy. Surg Laparosc Endosc Percutan Tech. 2008 Jun;18(3):248-53.

9. Lau H, Brooks DC. Predictive factors for unanticipated admissions after ambulatory laparoscopic cholecystectomy. Arch Surg. 2001 Oct;136(10):1150-3.

10. Junger A, Klasen J, Benson M, Sciuk G, Hartmann B, Sticher J, Hempelmann G. Factors determining length of stay of surgical day-case patients. Eur J Anaesthesiol. 2001 May;18(5):314-21.

1b. Opportunity for Improvement

1b.1 Benefits (improvements in quality) envisioned by use of this measure: The measure can be used to benchmark rates of hospital transfer and admission upon discharge from ASCs. Benchmarking may prompt providers to take steps to reduce rates of unplanned transfers and admissions. Fewer hospital transfers and admissions result in more satisfactory and less costly care for ASC patients.

1b.2 Summary of data demonstrating performance gap (variation or overall poor performance) across providers:
Although data for 1,185 ASCs are included in the ASC QC database for this measure, many report at the corporate level and do not report data for individual ASCs. The ASC QC database includes center-level rates for this measure for 526 ASCs throughout the US. The rates for this measure are based on the 526 individually-reporting ambulatory surgery centers throughout the US for services provided during April to June 2010. The rate for unscheduled transfer or admission to a hospital ranged from a minimum of 0.0% to a maximum of 2.3%. The mean rate was 0.1% (SD: 0.2%), while the median rate was 0.1%. The maximum transfer rate of 2.3% and a third quartile value of 0.2% demonstrate that there is an opportunity for improvement in this measure.

1b.3 Citations for data on performance gap:
Although data for 1,185 ASCs are included in the ASC QC database for this measure, many report at the corporate level and do not report data for individual ASCs. The ASC QC database includes center-level rates for this measure for 526 ASCs throughout the US. The 526 individually-reporting ambulatory surgery centers represent a convenience sample of the ASC population were used to assess the opportunity for improvement for this measure. The centers were located throughout the US. Services from the second calendar quarter of 2010 were included in this portion of the study.

1b
C☐
P☐
M☐
N☐

1b.4 Summary of Data on disparities by population group:
This measure is not intended to measure disparities by population group.

1b.5 Citations for data on Disparities:
No data available for disparities by population group. Please see 1b.4. above.

1c. Outcome or Evidence to Support Measure Focus

1c.1 Relationship to Outcomes (*For non-outcome measures, briefly describe the relationship to desired outcome. For outcomes, describe why it is relevant to the target population*)**:** This measure describes hospital transfer and admission rates following admission to an ASC. The goal of measurement is to reduce preventable hospital transfers and admissions following care in an ASC.

The measure is currently used by ASCs to benchmark their performance. These comparisons may be helpful in performance improvement efforts seeking to minimize hospital transfers and admissions from the ASC setting.

1c.2-3. Type of Evidence: Expert opinion, Systematic synthesis of research

1c.4 Summary of Evidence (*as described in the criteria; for outcomes, summarize any evidence that healthcare services/care processes influence the outcome*)**:**
Prior research suggests there are many factors providers can use to both screen prospective patients to determine if they are appropriate candidates for ambulatory surgery, and to reduce the chances of an unanticipated hospital transfer or hospital admission. See citations provided in 1c.8. below as a sample of the available literature on this topic.

1c.5 Rating of strength/quality of evidence (*also provide narrative description of the rating and by whom***):**
Not applicable

1c.6 Method for rating evidence: Not applicable

1c.7 Summary of Controversy/Contradictory Evidence: Measurement is limited to those patients directly transferred or admitted to the hospital upon discharge from the ASC. This measure does not seek to capture later admissions to the hospital because, at the present time, there is no reliable means of consistently detecting later admissions and attributing them to a given ASC.

1c.8 Citations for Evidence (*other than guidelines***):** 1: Lin D, Dalgorf D, Witterick IJ. Predictors of unexpected hospital admissions
after outpatient endoscopic sinus surgery: retrospective review. J Otolaryngol Head Neck Surg. 2008 Jun;37(3):309-11.

2: Hofer RE, Kai T, Decker PA, Warner DO. Obesity as a risk factor for unanticipated admissions after ambulatory surgery. Mayo Clin Proc. 2008 Aug;83(8):908-16.

3: Lledó JB, Planells M, Espí A, Serralta A, García R, Sanahuja A. Predictive model of failure of outpatient laparoscopic cholecystectomy. Surg Laparosc Endosc Percutan Tech. 2008 Jun;18(3):248-53.

4: Tewfik MA, Frenkiel S, Gasparrini R, Zeitouni A, Daniel SJ, Dolev Y, Kost K, Samaha M, Sweet R, Tewfik TL. Factors affecting unanticipated hospital admission following otolaryngologic day surgery. J Otolaryngol. 2006 Aug;35(4):235-41.

5: Shirakami G, Teratani Y, Namba T, Hirakata H, Tazuke-Nishimura M, Fukuda K. Delayed discharge and acceptability of ambulatory surgery in adult outpatients receiving general anesthesia. J Anesth. 2005;19(2):93-101.

6: Shaikh S, Chung F, Imarengiaye C, Yung D, Bernstein M. Pain, nausea, vomiting and ocular complications delay discharge following ambulatory microdiscectomy. Can J Anaesth. 2003 May;50(5):514-8.

1c
C☐
P☐
M☐
N☐

7: Coley KC, Williams BA, DaPos SV, Chen C, Smith RB. Retrospective evaluation of unanticipated admissions and readmissions after same day surgery and associated costs. J Clin Anesth. 2002 Aug;14(5):349-53.

8: Lau H, Brooks DC. Predictive factors for unanticipated admissions after ambulatory laparoscopic cholecystectomy. Arch Surg. 2001 Oct;136(10):1150-3.

9: Junger A, Klasen J, Benson M, Sciuk G, Hartmann B, Sticher J, Hempelmann G. Factors determining length of stay of surgical day-case patients. Eur J Anaesthesiol. 2001 May;18(5):314-21.

10: Fortier J, Chung F, Su J. Unanticipated admission after ambulatory surgery--a prospective study. Can J Anaesth. 1998 Jul;45(7):612-9.

11: Osborne GA, Rudkin GE. Outcome after day-care surgery in a major teaching hospital. Anaesth Intensive Care. 1993 Dec;21(6):822-7.

12: Rudkin GE, Osborne GA, Doyle CE. Assessment and selection of patients for day surgery in a public hospital. Med J Aust. 1993 Mar 1;158(5):308-12.

1c.9 Quote the Specific guideline recommendation (*including guideline number and/or page number***):**
Not applicable

1c.10 Clinical Practice Guideline Citation: Not applicable
1c.11 National Guideline Clearinghouse or other URL: Not applicable

1c.12 Rating of strength of recommendation (*also provide narrative description of the rating and by whom***):**
Not applicable

1c.13 Method for rating strength of recommendation (*If different from USPSTF system, also describe rating and how it relates to USPSTF)*:
Not applicable

1c.14 Rationale for using this guideline over others:
Not applicable

TAP/Workgroup: What are the strengths and weaknesses in relation to the subcriteria for *Importance to Measure and Report?*	**1**
Steering Committee: Was the threshold criterion, *Importance to Measure and Report*, met? **Rationale:**	**1** **Y☐** **N☐**
2. SCIENTIFIC ACCEPTABILITY OF MEASURE PROPERTIES	
Extent to which the measure, as specified, produces consistent (reliable) and credible (valid) results about the quality of care when implemented. (evaluation criteria)	**Eval Rating**
2a. MEASURE SPECIFICATIONS	
S.1 Do you have a web page where current detailed measure specifications can be obtained? **S.2 If yes, provide web page URL:** **2a. Precisely Specified**	**2a-specs** **C☐** **P☐** **M☐** **N☐**
2a.1 Numerator Statement (*Brief, text description of the numerator - what is being measured about the target population, e.g. target condition, event, or outcome***):** Ambulatory surgical center (ASC) admissions requiring a hospital transfer or hospital admission upon	

discharge from the ASC.

2a.2 Numerator Time Window (*The time period in which cases are eligible for inclusion in the numerator***):**
In-facility, upon discharge from the ASC

2a.3 Numerator Details (*All information required to collect/calculate the numerator, including all codes, logic, and definitions***):**
DEFINITIONS:

Admission: completion of registration upon entry into the facility

Hospital transfer or hospital admission: any transfer or admission from an ASC directly to an acute care hospital, including a hospital emergency room

Discharge: occurs when the patient leaves the confines of the ASC

2a.4 Denominator Statement (*Brief, text description of the denominator - target population being measured***):**
All ASC admissions

2a.5 Target population gender: Female, Male
2a.6 Target population age range: All ages

2a.7 Denominator Time Window (*The time period in which cases are eligible for inclusion in the denominator***):**
In-facility, upon discharge from the ASC

2a.8 Denominator Details (*All information required to collect/calculate the denominator - the target population being measured - including all codes, logic, and definitions***):**
DEFINITIONS:

Admission: completion of registration upon entry into the facility

2a.9 Denominator Exclusions (*Brief text description of exclusions from the target population***):** None

2a.10 Denominator Exclusion Details (*All information required to collect exclusions to the denominator, including all codes, logic, and definitions***):**
Not applicable

2a.11 Stratification Details/Variables (*All information required to stratify the measure including the stratification variables, all codes, logic, and definitions***):**
Not stratified

2a.12-13 Risk Adjustment Type: No risk adjustment necessary

2a.14 Risk Adjustment Methodology/Variables (*List risk adjustment variables and describe conceptual models, statistical models, or other aspects of model or method***):**
Not applicable

2a.15-17 Detailed risk model available Web page URL or attachment:

2a.18-19 Type of Score: Rate/proportion
2a.20 Interpretation of Score: Better quality = Lower score
2a.21 Calculation Algorithm (*Describe the calculation of the measure as a flowchart or series of steps***):**
The number of admissions experiencing a hospital transfer/admission upon discharge is divided by the number of ASC admissions during the reporting period, yielding the rate of hospital transfers/admissions upon discharge for the reporting period.

2a.22 Describe the method for discriminating performance *(e.g., significance testing)***:**
Facilities reporting data may compare their performance to the average performance. Alternatively, facilities may compare their performance to a percentile ranking (such as the 50th percentile (median)) to

determine their relative performance.

2a.23 Sampling (Survey) Methodology *If measure is based on a sample (or survey), provide instructions for obtaining the sample, conducting the survey and guidance on minimum sample size (response rate)*:
The measure is not based on a sample

2a.24 Data Source (*Check the source(s) for which the measure is specified and tested)*
Paper Records

2a.25 Data source/data collection instrument (*Identify the specific data source/data collection instrument, e.g. name of database, clinical registry, collection instrument, etc.***):**
ASC medical records, as well as incident/occurrence reports, and variance reports may serve as data sources. No specific collection instrument is required although the ASC Quality Collaboration has developed a sample data collection instrument that may be used as desired. Facilities may use any collection instrument that allows tracking of all hospital transfers/admissions upon discharge.

2a.26-28 Data source/data collection instrument reference web page URL or attachment: URL Not needed http://ascquality.org/documents/ASCQualityCollaborationImplementationGuide.pdf

2a.29-31 Data dictionary/code table web page URL or attachment: URL Not needed
http://ascquality.org/documents/ASCQualityCollaborationImplementationGuide.pdf

2a.32-35 Level of Measurement/Analysis (*Check the level(s) for which the measure is specified and tested)*
Facility

2a.36-37 Care Settings (*Check the setting(s) for which the measure is specified and tested)*
Ambulatory Care : Ambulatory Surgery Center (ASC)

2a.38-41 Clinical Services (*Healthcare services being measured, check all that apply*)
Other Ambulatory surgical center

TESTING/ANALYSIS

2b. Reliability testing

2b.1 Data/sample *(description of data/sample and size)*: A convenience sample of 16 ambulatory surgery centers was selected for a retrospective chart audit comparing the reported values for the measure versus the values identified from the medical record. The centers were located in eight different states throughout the US. Services from April 1, 2010 to June 30, 2010 were reviewed in the course of the reliability testing.

2b.2 Analytic Method *(type of reliability & rationale, method for testing)*:
The numerator (number of Ambulatory Surgery Center (ASC) admissions requiring a hospital transfer or hospital admission upon discharge from the ASC) and denominator (number of ASC admissions) values were compared for all 16 centers in the sample.

2b.3 Testing Results *(reliability statistics, assessment of adequacy in the context of norms for the test conducted)*:
The error rates at all 16 of the ASCs (100%) were zero for both the numerator and denominator. The results show an excellent level of reliability with an overall 100% accuracy rate.

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2c. Validity testing

2c.1 Data/sample *(description of data/sample and size)*: Validity was measured via a formal consensus process. A questionnaire that included ratings of the various characteristics of the measure was distributed to 8 clinicians (RNs) who currently work in ambulatory surgery centers or have responsibility for multiple surgery centers. Two have credentials in quality and the others are involved in quality in their current positions. Responses were received from 7 of the panel members.

2c.2 Analytic Method *(type of validity & rationale, method for testing)*:
Validity was measured via a formal consensus process. Six of the seven respondents responded with a 5/5

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rating for the question most related to content validity for this measure. Due to the high level of consensus on the primary validity question, multiple rounds of Delphi-type evaluations were not necessary. These results demonstrate a high level of agreement around the validity of the measure.

2c.3 **Testing Results** *(statistical results, assessment of adequacy in the context of norms for the test conducted)*:
Each attribute was measured on a 5 point Likert Scale. The attributes related to validity and average scores are listed below:
1. The measure appears to measure what it is intended to. (Median: 5/5; Mean: 4.3/5.0)
2. The measure is defined in a way that will allow for consistent interpretation of the inclusion and exclusion criteria from center to center. (Median: 5/5; Mean 3.9/5.0)
3. The data required for the measure are likely to be obtained with reasonable effort. (Median: 5/5; Mean: 4.9/5.0)
4. The data required for the measure are likely to be obtained with reasonable cost. (Median: 5/5; Mean: 4.9/5.0)
5. The data required for the measure can be generated during care delivery. (Median: 5/5; Mean: 4.9/5.0)

2d. Exclusions Justified

2d.1 **Summary of Evidence supporting exclusion(s):**
No exclusions

2d.2 **Citations for Evidence:**
Not applicable

2d.3 **Data/sample** *(description of data/sample and size)*: Not applicable

2d.4 **Analytic Method** *(type analysis & rationale)*:
Not applicable

2d.5 **Testing Results** *(e.g., frequency, variability, sensitivity analyses)*:
Not applicable

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NA ☐

2e. Risk Adjustment for Outcomes/ Resource Use Measures

2e.1 **Data/sample** *(description of data/sample and size)*: This measure is not risk adjusted

2e.2 **Analytic Method** *(type of risk adjustment, analysis, & rationale)*:
Not applicable

2e.3 **Testing Results** *(risk model performance metrics)*:
Not applicable

2e.4 **If outcome or resource use measure is not risk adjusted, provide rationale:** Transfer or admission to a hospital should be a rare event if appropriate patient and procedure selection criteria are in place. Risk adjustment for patient characteristics would mask any measurement of performance difference. Thus we believe this measure should not be risk adjusted.

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NA ☐

2f. Identification of Meaningful Differences in Performance

2f.1 **Data/sample from Testing or Current Use** *(description of data/sample and size)*: Although data for 1,185 ASCs are included in the ASC QC database, many report at the corporate level and do not report data for individual ASCs. The ASC QC database includes center-level rates for this measure for 526 ASCs throughout the US. The rates for this measure were collected for the 526 individually-reporting ambulatory surgery centers throughout the US for services provided during April to June 2010.

2f.2 **Methods to identify statistically significant and practically/meaningfully differences in performance** *(type of analysis & rationale)*:
An individual ASC's transfer rate may be compared to the standard rate from the ASC Quality website (http://www.ascquality.org/qualityreport.cfm#Transfer). A statistically significant difference in

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performance may be detected by using a standard test of proportions as outlined in most standard statistical texts. Since each transfer may represent increased risk exposure for the patient, a rate higher than the standard of 1 per 1000 is also of practical significance. The null hypothesis for this test is that the sample proportion from the ASC is not different from the industry standard taken from the ASC Quality website. The alternative is that there is a statistically significant difference. We recommend that this test be performed in its two-sided form so that the ASC may determine if they are either statistically higher or lower than the standard. The recommended p-value for this test is the 0.05 level, but ASCs may have justification for different value. Using this statistical method for detecting significant variances from the industry standard will allow users to determine if differences may be due to sampling error or may indicate a true difference in performance. 2f.3 **Provide Measure Scores from Testing or Current Use** *(description of scores, e.g., distribution by quartile, mean, median, SD, etc.; identification of statistically significant and meaningfully differences in performance)*: The rate for unscheduled transfer or admission to a hospital ranged from a minimum of 0.0% to a maximum of 2.3%. The mean rate was 0.1 (SD: 0.2%), while the median rate was 0.1%. The maximum transfer rate of 2.3% and a third quartile value of 0.2% demonstrate that there is an opportunity for improvement in this measure.	
2g. Comparability of Multiple Data Sources/Methods 2g.1 **Data/sample** *(description of data/sample and size)*: This measure is specified for a single data source (paper medical record/flow sheet) as noted in 2a.24 above 2g.2 **Analytic Method** *(type of analysis & rationale)*: Not applicable 2g.3 **Testing Results** *(e.g., correlation statistics, comparison of rankings)*: Not applicable	**2g** C☐ P☐ M☐ N☐ NA ☐
2h. Disparities in Care 2h.1 **If measure is stratified, provide stratified results** *(scores by stratified categories/cohorts)*: This measure is not stratified 2h.2 **If disparities have been reported/identified, but measure is not specified to detect disparities, provide follow-up plans:** At the present time, a federal quality reporting system has not yet been proposed or implemented for ambulatory surgical centers. We anticipate that CMS will issue its proposals for an ASC quality reporting system in the near future. The data the ASC Quality Collaboration currently receives for this measure is collected at the ASC-level or at the level of the corporate parent of the ASC. Corporate parent data submissions combine data from multiple ASCs. Disparity measures by population group require the collection of patient-level data or collection of the data for individual populations of patients. At this time, the ASC Quality Collaboration does not have access to any patient-level or individual population level data that would allow for analysis of subpopulation disparities based on race, sex and age. However, we understand the importance of subpopulation data and are taking steps that would allow us to collect the necessary data. We are actively pursuing the development of a registry that would allow us to develop subpopulation performance data for this measure and others. Potential registry development vendors have been identified and initial communications regarding the project have already taken place. We plan to select a vendor by third quarter of 2011, initiate the development of the registry database immediately upon contract acceptance, and have a functioning registry three months thereafter.	**2h** C☐ P☐ M☐ N☐ NA ☐
TAP/Workgroup: What are the strengths and weaknesses in relation to the subcriteria for *Scientific Acceptability of Measure Properties?*	**2**
Steering Committee: Overall, to what extent was the criterion, *Scientific Acceptability of Measure Properties*, met? **Rationale:**	***2*** C☐ P☐ M☐ N☐
3. USABILITY	

Extent to which intended audiences (e.g., consumers, purchasers, providers, policy makers) can understand the results of the measure and are likely to find them useful for decision making. (evaluation criteria)	Eval Rating
3a. Meaningful, Understandable, and Useful Information 3a.1 **Current Use:** In use 3a.2 **Use in a public reporting initiative (disclosure of performance results to the public at large)** (*If used in a public reporting initiative, provide name of initiative(s), locations, Web page URL(s). If not publicly reported, state the plans to achieve public reporting within 3 years*)**:** The ASC Quality Collaboration posts a public report of quality data on six ASC quality measures endorsed by the NQF on a quarterly basis. This quarterly report includes aggregated performance data on the Hospital Transfer/Admission measure. The report for the second quarter of 2010 is available at: http://www.ascquality.org/qualityreport.cfm. One thousand one hundred eighty-five (1,185) ASCs submitted hospital transfer/admission date for the second quarter 2010 report. 3a.3 **If used in other programs/initiatives (***If used in quality improvement or other programs/initiatives, name of initiative(s), locations, Web page URL(s). If not used for QI, state the plans to achieve use for QI within 3 years***):** This measure is in use in several other initiatives. For example, the ASC Association includes this metric in its Outcomes Monitoring Project, which is described at http://www.ascassociation.org/outcomes/. It is also in use in various state association quality data collection and reporting projects, including the Texas Ambulatory Surgery Center Association, located at http://tascs.org/. In addition, the measure has been adopted by the Minnesota Department of Health (MDH) for state reporting by ASCs beginning July 2011. This is described at the MDH website at: http://www.health.state.mn.us/healthreform/measurement/adoptedrule/QualityMeasurementAppendices_101129.pdf **Testing of Interpretability** (*Testing that demonstrates the results are understood by the potential users for public reporting and quality improvement*) 3a.4 **Data/sample** *(description of data/sample and size)***:** Interpretability was measured via a formal consensus process. A questionnaire that included ratings of the various characteristics of the measure was distributed to 8 clinicians (RNs) who currently work in ambulatory surgery centers or have responsibility for multiple surgery centers. Two have credentials in quality and the others are involved in quality in their current positions. Responses were received from 7 of the panel members. 3a.5 **Methods** *(e.g., focus group, survey, QI project)***:** The survey was summarized to assess the panel's level of agreement with statements that measured the interpretability of the measure. 3a.6 **Results** *(qualitative and/or quantitative results and conclusions)***:** Each attribute was measured on a 5 point Likert Scale. The attributes related to usability and average scores are listed below: 1. A provider can understand the results of the measure. (Median: 5/5; Mean: 4.3/5.0) 2. If necessary, a provider can use the results of the measure to take action. (Median: 5/5; Mean: 4.3/5.0) 3. This measure has a direct link to improving the outcome and/or process of care. (Median: 5/5; Mean: 4.0/5.0)	**3a** **C**☐ **P**☐ **M**☐ **N**☐
3b/3c. Relation to other NQF-endorsed measures 3b.1 **NQF # and Title of similar or related measures:**	
(for NQF staff use) **Notes on similar/related endorsed or submitted measures:**	
3b. Harmonization If this measure is related to measure(s) already endorsed by NQF (e.g., same topic, but different target population/setting/data source or different topic but same target population):	**3b** **C**☐ **P**☐

3b.2 Are the measure specifications harmonized? If not, why?	**M☐ N☐ NA ☐**
3c. Distinctive or Additive Value **3c.1 Describe the distinctive, improved, or additive value this measure provides to existing NQF-endorsed measures:** **5.1 If this measure is similar to measure(s) already endorsed by NQF (i.e., on the same topic and the same target population), Describe why it is a more valid or efficient way to measure quality:** Not similar to another measure endorsed by NQF	**3c C☐ P☐ M☐ N☐ NA ☐**
TAP/Workgroup: What are the strengths and weaknesses in relation to the subcriteria for *Usability?*	**3**
Steering Committee: Overall, to what extent was the criterion, *Usability*, met? **Rationale:**	**3 C☐ P☐ M☐ N☐**
4. FEASIBILITY	
Extent to which the required data are readily available, retrievable without undue burden, and can be implemented for performance measurement. (evaluation criteria)	**Eval Rating**
4a. Data Generated as a Byproduct of Care Processes **4a.1-2 How are the data elements that are needed to compute measure scores generated?** Data generated as byproduct of care processes during care delivery (Data are generated and used by healthcare personnel during the provision of care, e.g., blood pressure, lab value, medical condition)	**4a C☐ P☐ M☐ N☐**
4b. Electronic Sources **4b.1 Are all the data elements available electronically?** (*elements that are needed to compute measure scores are in defined, computer-readable fields, e.g., electronic health record, electronic claims*) No **4b.2 If not, specify the near-term path to achieve electronic capture by most providers.** Widespread adoption of electronic health records in ambulatory surgical centers would be needed to achieve electronic capture of data elements.	**4b C☐ P☐ M☐ N☐**
4c. Exclusions **4c.1 Do the specified exclusions require additional data sources beyond what is required for the numerator and denominator specifications?** No **4c.2 If yes, provide justification.**	**4c C☐ P☐ M☐ N☐ NA ☐**
4d. Susceptibility to Inaccuracies, Errors, or Unintended Consequences **4d.1 Identify susceptibility to inaccuracies, errors, or unintended consequences of the measure and describe how these potential problems could be audited. If audited, provide results.** Experience with this measure and feedback from users indicates that it is easy to use and has limited susceptibility to inaccuracies and errors. Reliability is very high. The ASC Quality Collaboration is not aware of any unintended consequences as a result of the use of this measure.	**4d C☐ P☐ M☐ N☐**
4e. Data Collection Strategy/Implementation	**4e C☐**

4e.1 Describe what you have learned/modified as a result of testing and/or operational use of the measure regarding data collection, availability of data/missing data, timing/frequency of data collection, patient confidentiality, time/cost of data collection, other feasibility/ implementation issues: The ASC Quality Collaboration has included "Frequently Asked Questions" in the Implementation Guide for the measure to assist users in their implementation of data collection. **4e.2 Costs to implement the measure** (*costs of data collection, fees associated with proprietary measures*)**:** Because the information needed to determine the numerator and denominator(admission, patient disposition at discharge) are routinely collected as part of the patient care process, there are no additional costs for data element collection for this measure. There are no fees associated with the use of this measure and benchmarking data is publicly available on the ASC Quality Collaboration´s website. **4e.3 Evidence for costs:** The survey used for validity and interpretability also asked respondents about the feasibility and cost of collecting data. The following two questions support the premise that the cost to collect this information is reasonable for the ASC: The data required for the measure are likely to be obtained with reasonable effort. (Median: 5/5; Mean: 4.9/5.0) The data required for the measure are likely to be obtained with reasonable cost. (Median: 5/5; Mean: 4.9/5.0) **4e.4 Business case documentation:** Not applicable	**P☐ M☐ N☐**
TAP/Workgroup: What are the strengths and weaknesses in relation to the subcriteria for *Feasibility?*	**4**
Steering Committee: Overall, to what extent was the criterion, *Feasibility*, met? **Rationale:**	**4** **C☐ P☐ M☐ N☐**
RECOMMENDATION	
(for NQF staff use) **Check if measure is untested and only eligible for time-limited endorsement.**	**Time-limited ☐**
Steering Committee: Do you recommend for endorsement? **Comments:**	**Y☐ N☐ A☐**
CONTACT INFORMATION	
Co.1 Measure Steward (Intellectual Property Owner) **Co.1 Organization** ASC Quality Collaboration, 5686 Escondida Blvd S, St. Petersburg, Florida, 33715 **Co.2 Point of Contact** Donna, Slosburg, BSN, LHRM, CASC, donnaslosburg@ascquality.org, 727-867-0072-	
Measure Developer If different from Measure Steward **Co.3 Organization** ASC Quality Collaboration, 5686 Escondida Blvd S, St. Petersburg, Florida, 33715 **Co.4 Point of Contact** Donna, Slosburg, BSN, LHRM, CASC, donnaslosburg@ascquality.org, 727-867-0072-	
Co.5 Submitter If different from Measure Steward POC Donna, Slosburg, BSN, LHRM, CASC, donnaslosburg@ascquality.org, 727-867-0072-, ASC Quality Collaboration	
Co.6 Additional organizations that sponsored/participated in measure development	

ADDITIONAL INFORMATION

Workgroup/Expert Panel involved in measure development

Ad.1 Provide a list of sponsoring organizations and workgroup/panel members' names and organizations. Describe the members' role in measure development.

The ASC Quality Collaboration workgroup members meet via teleconference to develop, critique, and modify candidate measures; to maintain existing measures; and to offer sites willing to participate in testing. No contractors are used.

The following is a list of the individuals (and their affiliation at the time of their participation) serving on the workgroup and contributing to this measure:

AAAHC: Naomi Kuznets, PhD
Ambulatory Surgery Foundation: Debra Stinchcomb, BSN, CASC, David Shapiro, MD,
Sarah Martin, RN, BS, CASC and Marian Lowe
AMSURG: Deby Samuels, Lorri Smith RN, BSN and Linda Brooks-Belli
AOA/HFAP: Monda Shaver, RN, BSN, CPHIT and Susan Lautner, RN, BSN, MSHL
AORN: Bev Kirchner BSN, CNOR, CASC and Bonnie Denholm, RN, MS, CNOR
ASCOA: Ann Geier RN, MS, CNOR, CASC
ASC Quality Collaboration: Donna Slosburg, BSN, LHRM, CASC
HCA: Kathy Wilson
The Joint Commission: Michael Kulczycki and Kathleen Domzalski
NATIONAL: Rhonda Arnwine, MBA and Terry Hawes, RN, BHA
Novamed: Cassandra Speier
NUETERRA: Rachelle Babin RN, BSN
Surgical Care Affiliates: Kim Wood, MD
Symbion: Steve Whitmore and Gina Throneberry RN, MBA, CASC
USPI: David Zarin, MD, Julie Gunderson RN, MM, CPHQ and Clint Chain, RN, BSN

Ad.2 If adapted, provide name of original measure: Not adapted
Ad.3-5 If adapted, provide original specifications URL or attachment

Measure Developer/Steward Updates and Ongoing Maintenance
Ad.6 Year the measure was first released: 2007
Ad.7 Month and Year of most recent revision: 12, 2010
Ad.8 What is your frequency for review/update of this measure? Annually or more frequently if indicated
Ad.9 When is the next scheduled review/update for this measure? 12, 2011

Ad.10 Copyright statement/disclaimers: None

Ad.11 -13 Additional Information web page URL or attachment:

Date of Submission (*MM/DD/YY*)**:** 06/13/2011

NATIONAL QUALITY FORUM

Measure Evaluation 4.1
December 2009

This form contains the measure information submitted by stewards. Blank fields indicate no information was provided. Attachments also may have been submitted and are provided to reviewers. The subcriteria and most of the footnotes from the evaluation criteria are provided in Word comments within the form and will appear if your cursor is over the highlighted area. Hyperlinks to the evaluation criteria and ratings are provided in each section.

TAP/Workgroup (if utilized)**:** Complete all yellow highlighted areas of the form. Evaluate the extent to which each subcriterion is met. Based on your evaluation, summarize the strengths and weaknesses in each section.

Note: *If there is no TAP or workgroup, the SC also evaluates the subcriteria (yellow highlighted areas).*

Steering Committee: Complete all pink highlighted areas of the form. Review the workgroup/TAP assessment of the subcriteria, noting any areas of disagreement; then evaluate the extent to which each major criterion is met; and finally, indicate your recommendation for the endorsement. Provide the rationale for your ratings.

Evaluation ratings of the extent to which the criteria are met
C = Completely (unquestionably demonstrated to meet the criterion)
P = Partially (demonstrated to partially meet the criterion)
M = Minimally (addressed BUT demonstrated to only minimally meet the criterion)
N = Not at all (NOT addressed; OR incorrectly addressed; OR demonstrated to NOT meet the criterion)
NA = Not applicable (only an option for a few subcriteria as indicated)

(for NQF staff use) **NQF Review #:** 1519 **NQF Project:** Surgery Endorsement Maintenance 2010
MEASURE DESCRIPTIVE INFORMATION
De.1 **Measure Title:** Statin Therapy at Discharge after Lower Extremity Bypass (LEB)
De.2 **Brief description of measure:** Percentage of patients aged 18 years and older undergoing infrainguinal lower extremity bypass who are prescribed a statin medication at discharge. This measure is proposed for both hospitals and individual providers.
1.1-2 **Type of Measure:** Process De.3 **If included in a composite or paired with another measure, please identify composite or paired measure** NA
De.4 **National Priority Partners Priority Area:** Population health, Safety De.5 **IOM Quality Domain**: Effectiveness, Patient-centered De.6 **Consumer Care Need:** Getting better

CONDITIONS FOR CONSIDERATION BY NQF	
Four conditions must be met before proposed measures may be considered and evaluated for suitability as voluntary consensus standards:	**NQF Staff**
A. The measure is in the public domain or an intellectual property (measure steward agreement) is signed. *Public domain only applies to governmental organizations. All non-government organizations must sign a measure steward agreement even if measures are made publicly and freely available.* A.1 **Do you attest that the measure steward holds intellectual property rights to the measure and the right to use aspects of the measure owned by another entity (e.g., risk model, code set)?** Yes A.2 **Indicate if Proprietary Measure** (*as defined in measure steward agreement*)**:** A.3 **Measure Steward Agreement:** Agreement will be signed and submitted prior to or at the time of measure submission A.4 **Measure Steward Agreement attached:** Agreement With Measure Stewards_Agreement Between_National Quality Forum (12-6-2010)-634278516835518374.pdf	**A** Y☐ N☐

B. The measure owner/steward verifies there is an identified responsible entity and process to maintain and update the measure on a schedule that is commensurate with the rate of clinical innovation, but at least every 3 years. Yes, information provided in contact section	**B** Y☐ N☐
C. The intended use of the measure includes both public reporting and quality improvement. ►**Purpose:** Payment Program	**C** Y☐ N☐
D. The requested measure submission information is complete. Generally, measures should be fully developed and tested so that all the evaluation criteria have been addressed and information needed to evaluate the measure is provided. Measures that have not been tested are only potentially eligible for a time-limited endorsement and in that case, measure owners must verify that testing will be completed within 12 months of endorsement. D.1**Testing:** Yes, fully developed and tested D.2 **Have NQF-endorsed measures been reviewed to identify if there are similar or related measures?** Yes	**D** Y☐ N☐
(for NQF staff use) **Have all conditions for consideration been met?** **Staff Notes to Steward** (*if submission returned*)**:**	**Met** Y☐ N☐
Staff Notes to Reviewers (*issues or questions regarding any criteria*)**:**	
Staff Reviewer Name(s):	

TAP/Workgroup Reviewer Name:	
Steering Committee Reviewer Name:	
1. IMPORTANCE TO MEASURE AND REPORT	
Extent to which the specific measure focus is important to making significant gains in health care quality (safety, timeliness, effectiveness, efficiency, equity, patient-centeredness) and improving health outcomes for a specific high impact aspect of healthcare where there is variation in or overall poor performance. ***Measures must be judged to be important to measure and report*** *in order to be evaluated against the remaining criteria.* (evaluation criteria) **1a. High Impact**	**Eval Rating**
(for NQF staff use) **Specific NPP goal**:	
1a.1 Demonstrated High Impact Aspect of Healthcare: Affects large numbers, Frequently performed procedure, High resource use, Severity of illness, Patient/societal consequences of poor quality **1a.2** **1a.3 Summary of Evidence of High Impact:** Patients who present with lower extremity ischemia bear a large systemic burden of atherosclerotic disease, and therefore face not only the immediate risk of limb loss1 but also an increased risk for cardiovascular events.2-4 The benefits of statin therapy for cardiovascular risk reduction in the PAD population have been demonstrated in several studies, most notably the Heart Protection Study.5, 6 The Heart Protection Study (HPS) is the largest trial to assess the effects of statins on major morbidity and mortality. The investigators enrolled over 20,000 patients deemed to be at high risk for cardiovascular events and randomized them to receive either 40mg of simvastatin or placebo. On survival analysis, they demonstrated that treatment with a statin was significantly associated with a decrease in all-cause mortality (12.9% vs. 14.7%, p=.0003) and that this effect was primarily driven by the reduction in death from vascular causes (7.6% vs. 9.1%, p<.0001). A recently published subgroup analysis6 focusing specifically on patients with documented PAD (n=6748) did not include mortality data. However, the authors demonstrated a significant reduction in the rate of first major vascular event in the simvastatin treatment arm (relative reduction of 22%; p<.0001), when compared to placebo. The PREVENT III trial was a prospective, randomized, double-blinded, multicenter trial designed to examine the efficacy of a novel pharmacologic agent (edifoligide) in preventing autogenous vein graft failure in 1404	**1a** C☐ P☐ M☐ N☐

patients who underwent infrainguinal vein bypass at 83 hospitals exclusively for the treatment of critical limb ischemia.7 This LEB trial, with its high-risk critical limb ischemia (CLI) population, provides another relevant database for examination of the role of statins. The salient finding from this study is that the use of statin drugs was associated with a significant one-year survival benefit in patients undergoing surgical bypass for CLI.8 The Kaplan-Meier analysis also suggested that the benefit continues to increase with time, and might be even greater with longer term follow-up. In these 1404 patients, those not receiving statins experienced a 40% increase in the risk of death at one year. This effect was demonstrated both in the propensity score weighted analysis (HR 1.40, CI 1.02-1.92), and in the Cox proportional hazards model (HR 1.47, CI 1.11-1.96). These findings are consistent with prior observational studies that have examined the effects of statins, albeit, in heterogeneous PAD populations.9-11 The largest of these observational studies, conducted by Feringa and colleagues, enrolled 1374 patients with PAD and followed them for a mean duration of 6.4 years. The authors demonstrated a strong independent association between statin use and all-cause mortality (HR 1.41 for non-users, p<0.0001).9

The DECREASE study randomized 497 patients who had not previously been treated with a statin to receive either 80 mg of extended-release fluvastatin or placebo once daily before undergoing major non-cardiac vascular surgery.12 On evaluation of the primary endpoint, statin therapy conferred a 45% decreased hazard ratio (10.8% versus 19%, p=0.01) for perioperative myocardial infarction. Furthermore, death from cardiovascular causes or myocardial infarction occurred in 4.8% of patients in the fluvastatin group and 10.1% of patients in the placebo group (hazard ratio, 0.47; 95% CI, 0.24 to 0.94; p= 0.03). Fluvastatin therapy was not associated with a significant increase in the rate of adverse events. Several additional studies in patients undergoing LEB have shown similar reductions in perioperative morbidity and mortality associated with statin use.10, 13, 14

Recent studies have also demonstrated a specific benefit in graft patency after LEB in patients on statin therapy.15-17 Abbruzzese et al observed that statin use was associated with improved secondary patency (3-fold increased risk compared to non-users) among 197 patients who had undergone lower extremity bypass using saphenous vein, in a single-center retrospective analysis.16

1a.4 Citations for Evidence of High Impact:

1. Dormandy JA, Rutherford RB. Management of peripheral arterial disease (PAD). TASC Working Group. TransAtlantic Inter-Society Consensus (TASC). J Vasc Surg 2000;31:S1-S296.
2. Criqui MH, Langer RD, Fronek A, Feigelson HS, Klauber MR, McCann TJ, et al. Mortality over a period of 10 years in patients with peripheral arterial disease. N Engl J Med 1992;326:381-6.
3. McKenna M, Wolfson S, Kuller L. The ratio of ankle and arm arterial pressure as an independent predictor of mortality. Atherosclerosis 1991;87:119-28.
4. Howell MA, Colgan MP, Seeger RW, Ramsey DE, Sumner DS. Relationship of severity of lower limb peripheral vascular disease to mortality and morbidity: a six-year follow-up study. J Vasc Surg 1989;9:691-6; discussion 6-7.
5. MRC/BHF Heart Protection Study of cholesterol lowering with simvastatin in 20,536 high-risk individuals: a randomised placebo-controlled trial. Lancet 2002;360:7-22.
6. Randomized trial of the effects of cholesterol-lowering with simvastatin on peripheral vascular and other major vascular outcomes in 20,536 people with peripheral arterial disease and other high-risk conditions. J Vasc Surg 2007;45:645-54; discussion 53-4.
7. Conte MS, Bandyk DF, Clowes AW, Moneta GL, Seely L, Lorenz TJ, et al. Results of PREVENT III: a multicenter, randomized trial of edifoligide for the prevention of vein graft failure in lower extremity bypass surgery. J Vasc Surg 2006;43:742-51; discussion 51.
8. Schanzer A, Hevelone N, Owens CD, Beckman JA, Belkin M, Conte MS. Statins are independently associated with reduced mortality in patients undergoing infrainguinal bypass graft surgery for critical limb ischemia. J Vasc Surg 2008;47:774-81.
9. Feringa HH, Karagiannis SE, van Waning VH, Boersma E, Schouten O, Bax JJ, et al. The effect of intensified lipid-lowering therapy on long-term prognosis in patients with peripheral arterial disease. J Vasc Surg 2007;45:936-43.
10. Ward RP, Leeper NJ, Kirkpatrick JN, Lang RM, Sorrentino MJ, Williams KA. The effect of preoperative statin therapy on cardiovascular outcomes in patients undergoing infrainguinal vascular surgery. Int J Cardiol 2005;104:264-8.
11. Kertai MD, Boersma E, Westerhout CM, van Domburg R, Klein J, Bax JJ, et al. Association between long-term statin use and mortality after successful abdominal aortic aneurysm surgery. Am J Med

2004;116:96-103.
12. Schouten O, Boersma E, Hoeks SE, Benner R, van Urk H, van Sambeek MR, et al. Fluvastatin and perioperative events in patients undergoing vascular surgery. N Engl J Med 2009;361:980-9.
13. Poldermans D, Bax JJ, Kertai MD, Krenning B, Westerhout CM, Schinkel AF, et al. Statins are associated with a reduced incidence of perioperative mortality in patients undergoing major noncardiac vascular surgery. Circulation 2003;107:1848-51.
14. O´Neil-Callahan K, Katsimaglis G, Tepper MR, Ryan J, Mosby C, Ioannidis JP, et al. Statins decrease perioperative cardiac complications in patients undergoing noncardiac vascular surgery: the Statins for Risk Reduction in Surgery (StaRRS) study. J Am Coll Cardiol 2005;45:336-42.
15. Christenson J. Preoperative lipid control with simvastatin reduces the risk for graft failure already 1 year after myocardial revascularization. Cardiovasc Surg 2001;9:33-43.
16. Abbruzzese TA, Havens J, Belkin M, Donaldson MC, Whittemore AD, Liao JK, et al. Statin therapy is associated with improved patency of autogenous infrainguinal bypass grafts. J Vasc Surg 2004;39:1178-85.
17. Henke PK, Blackburn S, Proctor MC, Stevens J, Mukherjee D, Rajagopalin S, et al. Patients undergoing infrainguinal bypass to treat atherosclerotic vascular disease are underprescribed cardioprotective medications: effect on graft patency, limb salvage, and mortality. Journal of Vascular Surgery 2004;39:357-65.
18. Hirsch AT, Haskal ZJ, Hertzer NR, Bakal CW, Creager MA, Halperin JL, et al. ACC/AHA 2005 Practice Guidelines for the management of patients with peripheral arterial disease (lower extremity, renal, mesenteric, and abdominal aortic): a collaborative report from the American Association for Vascular Surgery/Society for Vascular Surgery, Society for Cardiovascular Angiography and Interventions, Society for Vascular Medicine and Biology, Society of Interventional Radiology, and the ACC/AHA Task Force on Practice Guidelines (Writing Committee to Develop Guidelines for the Management of Patients With Peripheral Arterial Disease): endorsed by the American Association of Cardiovascular and Pulmonary Rehabilitation; National Heart, Lung, and Blood Institute; Society for Vascular Nursing; TransAtlantic Inter-Society Consensus; and Vascular Disease Foundation. Circulation 2006;113:e463-654.
19. Hirsch AT, Criqui MH, Treat-Jacobson D, Regensteiner JG, Creager MA, Olin JW, et al. Peripheral arterial disease detection, awareness, and treatment in primary care. Jama 2001;286:1317-24.
20. McDermott MM, Mehta S, Ahn H, Greenland P. Atherosclerotic Risk Factors Are Less Intensively Treated in Patients with Peripheral Arterial Disease Than in Patients with Coronary Artery Disease. J Gen Intern Med 1997;12:209-15.
21. Mukherjee D, Lingam P, Chetcuti S, Grossman PM, Moscucci M, Luciano AE, et al. Missed opportunities to treat atherosclerosis in patients undergoing peripheral vascular interventions: insights from the University of Michigan Peripheral Vascular Disease Quality Improvement Initiative (PVD-QI2). Circulation 2002;106:1909-12.

1b. Opportunity for Improvement

1b.1 Benefits (improvements in quality) envisioned by use of this measure: Based on the data summarized in this application, this quality measure will be associated with decreased perioperative morbidity and mortality from major adverse cardiac events including stroke, myocardial infarction, and death. The data also suggest a potential association between perioperative statin use and improved bypass graft patency.

Patients who require LEB have advanced peripheral arterial disease and meet guidelines for secondary prevention with statins. Many of these patients have not received adequate managment of PAD risk factors. The episode of care assoicated with LEB provides an opportunity to initiate statin therapy in these patients in order to improve survival and reduce cardiovascular complications following the procedure.

1b.2 Summary of data demonstrating performance gap (variation or overall poor performance) across providers:
Current guidelines support the use of statin therapy in all PAD patients with a target LDL level of less than 100 mg/dL (<70 mg/dL for patients deemed at very high risk).18 Because of the pleiotrophic effects of statins, PAD guidelines recommend that all PAD patients be treated, independent of LDL level. However, a significant percentage of patients undergoing lower extremity bypass are not on statin therapy before or after surgery. In the PREVENT III trial referenced above, only 46% of patients were on statin therapy prior to surgery and only 45% of patients were prescribed statin therapy on hospital discharge.8 In the Vascular Study Group of New England (VSGNE), a multicenter quality improvement consortium, data has been collected on 3,693 patients who have undergone LEB. Unpublished analyses of these data demonstrate

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that only 41% of patients were taking statins preoperatively before LEB in 2004. Through quality improvement efforts, this percentage of patients dischared on statins has increased to 79% during the first 6 months of 2010. However, this rate of statin use falls significantly short of the 90% goal set forth by this quality improvement group in 2008. This under-treatment of patients with PAD has been echoed by several other reports in the literature and provides substantial opportunity for improvement.19-21

Patients undergoing infrainguinal LEB in VSGNE were analyzed for this measure submission. There are 2496 patients in the registry who underwent infrainguinal LEB between 2003-2010. Of these, 2% died in hospital. Of those discharged alive, only 2% were intolerant to statins. Across 13 hospitals, the median statin prescribed at discharge rate was 73%, with an interquartile range of 69% to 80%. Across 63 individual providers, the median statin prescribed at discharge rate was 75%, with an interquartile range of 66% to 84%. SVS and VSGNE have set quality targets at 90%. These data demonstrate both significant variation and a significant performance gap.

1b.3 Citations for data on performance gap:

1. Dormandy JA, Rutherford RB. Management of peripheral arterial disease (PAD). TASC Working Group. TransAtlantic Inter-Society Consensus (TASC). J Vasc Surg 2000;31:S1-S296.
2. Criqui MH, Langer RD, Fronek A, Feigelson HS, Klauber MR, McCann TJ, et al. Mortality over a period of 10 years in patients with peripheral arterial disease. N Engl J Med 1992;326:381-6.
3. McKenna M, Wolfson S, Kuller L. The ratio of ankle and arm arterial pressure as an independent predictor of mortality. Atherosclerosis 1991;87:119-28.
4. Howell MA, Colgan MP, Seeger RW, Ramsey DE, Sumner DS. Relationship of severity of lower limb peripheral vascular disease to mortality and morbidity: a six-year follow-up study. J Vasc Surg 1989;9:691-6; discussion 6-7.
5. MRC/BHF Heart Protection Study of cholesterol lowering with simvastatin in 20,536 high-risk individuals: a randomised placebo-controlled trial. Lancet 2002;360:7-22.
6. Randomized trial of the effects of cholesterol-lowering with simvastatin on peripheral vascular and other major vascular outcomes in 20,536 people with peripheral arterial disease and other high-risk conditions. J Vasc Surg 2007;45:645-54; discussion 53-4.
7. Conte MS, Bandyk DF, Clowes AW, Moneta GL, Seely L, Lorenz TJ, et al. Results of PREVENT III: a multicenter, randomized trial of edifoligide for the prevention of vein graft failure in lower extremity bypass surgery. J Vasc Surg 2006;43:742-51; discussion 51.
8. Schanzer A, Hevelone N, Owens CD, Beckman JA, Belkin M, Conte MS. Statins are independently associated with reduced mortality in patients undergoing infrainguinal bypass graft surgery for critical limb ischemia. J Vasc Surg 2008;47:774-81.
9. Feringa HH, Karagiannis SE, van Waning VH, Boersma E, Schouten O, Bax JJ, et al. The effect of intensified lipid-lowering therapy on long-term prognosis in patients with peripheral arterial disease. J Vasc Surg 2007;45:936-43.
10. Ward RP, Leeper NJ, Kirkpatrick JN, Lang RM, Sorrentino MJ, Williams KA. The effect of preoperative statin therapy on cardiovascular outcomes in patients undergoing infrainguinal vascular surgery. Int J Cardiol 2005;104:264-8.
11. Kertai MD, Boersma E, Westerhout CM, van Domburg R, Klein J, Bax JJ, et al. Association between long-term statin use and mortality after successful abdominal aortic aneurysm surgery. Am J Med 2004;116:96-103.
12. Schouten O, Boersma E, Hoeks SE, Benner R, van Urk H, van Sambeek MR, et al. Fluvastatin and perioperative events in patients undergoing vascular surgery. N Engl J Med 2009;361:980-9.
13. Poldermans D, Bax JJ, Kertai MD, Krenning B, Westerhout CM, Schinkel AF, et al. Statins are associated with a reduced incidence of perioperative mortality in patients undergoing major noncardiac vascular surgery. Circulation 2003;107:1848-51.
14. O´Neil-Callahan K, Katsimaglis G, Tepper MR, Ryan J, Mosby C, Ioannidis JP, et al. Statins decrease perioperative cardiac complications in patients undergoing noncardiac vascular surgery: the Statins for Risk Reduction in Surgery (StaRRS) study. J Am Coll Cardiol 2005;45:336-42.
15. Christenson J. Preoperative lipid control with simvastatin reduces the risk for graft failure already 1 year after myocardial revascularization. Cardiovasc Surg 2001;9:33-43.
16. Abbruzzese TA, Havens J, Belkin M, Donaldson MC, Whittemore AD, Liao JK, et al. Statin therapy is associated with improved patency of autogenous infrainguinal bypass grafts. J Vasc Surg 2004;39:1178-85.
17. Henke PK, Blackburn S, Proctor MC, Stevens J, Mukherjee D, Rajagopalin S, et al. Patients undergoing infrainguinal bypass to treat atherosclerotic vascular disease are underprescribed

cardioprotective medications: effect on graft patency, limb salvage, and mortality. Journal of Vascular Surgery 2004;39:357-65.
18. Hirsch AT, Haskal ZJ, Hertzer NR, Bakal CW, Creager MA, Halperin JL, et al. ACC/AHA 2005 Practice Guidelines for the management of patients with peripheral arterial disease (lower extremity, renal, mesenteric, and abdominal aortic): a collaborative report from the American Association for Vascular Surgery/Society for Vascular Surgery, Society for Cardiovascular Angiography and Interventions, Society for Vascular Medicine and Biology, Society of Interventional Radiology, and the ACC/AHA Task Force on Practice Guidelines (Writing Committee to Develop Guidelines for the Management of Patients With Peripheral Arterial Disease): endorsed by the American Association of Cardiovascular and Pulmonary Rehabilitation; National Heart, Lung, and Blood Institute; Society for Vascular Nursing; TransAtlantic Inter-Society Consensus; and Vascular Disease Foundation. Circulation 2006;113:e463-654.
19. Hirsch AT, Criqui MH, Treat-Jacobson D, Regensteiner JG, Creager MA, Olin JW, et al. Peripheral arterial disease detection, awareness, and treatment in primary care. Jama 2001;286:1317-24.
20. McDermott MM, Mehta S, Ahn H, Greenland P. Atherosclerotic Risk Factors Are Less Intensively Treated in Patients with Peripheral Arterial Disease Than in Patients with Coronary Artery Disease. J Gen Intern Med 1997;12:209-15.
21. Mukherjee D, Lingam P, Chetcuti S, Grossman PM, Moscucci M, Luciano AE, et al. Missed opportunities to treat atherosclerosis in patients undergoing peripheral vascular interventions: insights from the University of Michigan Peripheral Vascular Disease Quality Improvement Initiative (PVD-QI2). Circulation 2002;106:1909-12.

1b.4 Summary of Data on disparities by population group:
There are not published data regarding disparities in statin usage after infrainguinal bypass in different population groups. Such data will become available if this measure is adopted for reporting and used by more centers with more varied population demographics than found in the New England region.

1b.5 Citations for data on Disparities:
None found

1c. Outcome or Evidence to Support Measure Focus

1c.1 Relationship to Outcomes (*For non-outcome measures, briefly describe the relationship to desired outcome. For outcomes, describe why it is relevant to the target population*)**:** As summarized above, this quality measure will be associated with decreased perioperative morbidity and mortality from major adverse cardiac events including stroke, myocardial infarction, and death in patients undergoing lower extremity bypass. The data also suggest a potential association between perioperative statin use and improved bypass graft patency.

1c.2-3. Type of Evidence: Cohort study, Observational study, Evidence-based guideline, Randomized controlled trial, Expert opinion, Meta-analysis

1c.4 Summary of Evidence (*as described in the criteria; for outcomes, summarize any evidence that healthcare services/care processes influence the outcome*)**:**
Please see the summary of the data presented in 1.a.3.

1c.5 Rating of strength/quality of evidence (*also provide narrative description of the rating and by whom***):**
Level 1.

1c.6 Method for rating evidence: Data obtained from randomized prospective controlled trials.
1. MRC/BHF Heart Protection Study of cholesterol lowering with simvastatin in 20,536 high-risk individuals: a randomised placebo-controlled trial. Lancet 2002;360:7-22.
2. Randomized trial of the effects of cholesterol-lowering with simvastatin on peripheral vascular and other major vascular outcomes in 20,536 people with peripheral arterial disease and other high-risk conditions. J Vasc Surg 2007;45:645-54
3. Schouten O, Boersma E, Hoeks SE, Benner R, van Urk H, van Sambeek MR, et al. Fluvastatin and perioperative events in patients undergoing vascular surgery. N Engl J Med 2009;361:980-9.

1c.7 Summary of Controversy/Contradictory Evidence: None

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1c.8 Citations for Evidence (*other than guidelines*): 1.MRC/BHF Heart Protection Study of cholesterol lowering with simvastatin in 20,536 high-risk individuals: a randomised placebo-controlled trial. Lancet 2002;360:7-22.
2. Randomized trial of the effects of cholesterol-lowering with simvastatin on peripheral vascular and other major vascular outcomes in 20,536 people with peripheral arterial disease and other high-risk conditions. J Vasc Surg 2007;45:645-54; discussion 53-4.
3. Schanzer A, Hevelone N, Owens CD, Beckman JA, Belkin M, Conte MS. Statins are independently associated with reduced mortality in patients undergoing infrainguinal bypass graft surgery for critical limb ischemia. J Vasc Surg 2008;47:774-81.
4. Feringa HH, Karagiannis SE, van Waning VH, Boersma E, Schouten O, Bax JJ, et al. The effect of intensified lipid-lowering therapy on long-term prognosis in patients with peripheral arterial disease. J Vasc Surg 2007;45:936-43.
5. Ward RP, Leeper NJ, Kirkpatrick JN, Lang RM, Sorrentino MJ, Williams KA. The effect of preoperative statin therapy on cardiovascular outcomes in patients undergoing infrainguinal vascular surgery. Int J Cardiol 2005;104:264-8.
6. Kertai MD, Boersma E, Westerhout CM, van Domburg R, Klein J, Bax JJ, et al. Association between long-term statin use and mortality after successful abdominal aortic aneurysm surgery. Am J Med 2004;116:96-103.
7. Schouten O, Boersma E, Hoeks SE, Benner R, van Urk H, van Sambeek MR, et al. Fluvastatin and perioperative events in patients undergoing vascular surgery. N Engl J Med 2009;361:980-9.
8. Poldermans D, Bax JJ, Kertai MD, Krenning B, Westerhout CM, Schinkel AF, et al. Statins are associated with a reduced incidence of perioperative mortality in patients undergoing major noncardiac vascular surgery. Circulation 2003;107:1848-51.
9. O´Neil-Callahan K, Katsimaglis G, Tepper MR, Ryan J, Mosby C, Ioannidis JP, et al. Statins decrease perioperative cardiac complications in patients undergoing noncardiac vascular surgery: the Statins for Risk Reduction in Surgery (StaRRS) study. J Am Coll Cardiol 2005;45:336-42.
10. Christenson J. Preoperative lipid control with simvastatin reduces the risk for graft failure already 1 year after myocardial revascularization. Cardiovasc Surg 2001;9:33-43.
11. Abbruzzese TA, Havens J, Belkin M, Donaldson MC, Whittemore AD, Liao JK, et al. Statin therapy is associated with improved patency of autogenous infrainguinal bypass grafts. J Vasc Surg 2004;39:1178-85.
12. Henke PK, Blackburn S, Proctor MC, Stevens J, Mukherjee D, Rajagopalin S, et al. Patients undergoing infrainguinal bypass to treat atherosclerotic vascular disease are underprescribed cardioprotective medications: effect on graft patency, limb salvage, and mortality. Journal of Vascular Surgery 2004;39:357-65.

1c.9 Quote the Specific guideline recommendation (*including guideline number and/or page number*):
Recommendation #2, Section B1.2.3 (Dormandy et al.)
"In symptomatic PAD patients, statins should be the primary agents to lower LDL cholesterol levels to reduce the risk of cardiovascular events (1)."

Section 2.6.1.1. (Hirsch et al)
"Treatment with a hydroxymethyl glutaryl (HMG)coenzyme-A reductase inhibitor (statin) medication is indicated for all patients with PAD to achieve a target
LDL cholesterol level of less than 100 mg per dL.(Level of Evidence: B)
1. Treatment with an HMG coenzyme-A reductase inhibitor (statin) medication to achieve a target LDL cholesterol level of less than 70 mg per dL is reasonable
for patients with lower extremity PAD at very high risk of ischemic events. (Level of Evidence: B"

1c.10 Clinical Practice Guideline Citation: 1. Dormandy JA, Rutherford RB. Management of peripheral arterial disease (PAD). TASC Working Group. TransAtlantic Inter-Society Consensus (TASC). J Vasc Surg 2000;31:S1-S296.
2. Hirsch AT, Haskal ZJ, Hertzer NR, Bakal CW, Creager MA, Halperin JL, et al. ACC/AHA 2005 Practice Guidelines for the management of patients with peripheral arterial disease (lower extremity, renal, mesenteric, and abdominal aortic): a collaborative report from the American Association for Vascular Surgery/Society for Vascular Surgery, Society for Cardiovascular Angiography and Interventions, Society for Vascular Medicine and Biology, Society of Interventional Radiology, and the ACC/AHA Task Force on Practice Guidelines (Writing Committee to Develop Guidelines for the Management of Patients With Peripheral

Arterial Disease): endorsed by the American Association of Cardiovascular and Pulmonary Rehabilitation; National Heart, Lung, and Blood Institute; Society for Vascular Nursing; TransAtlantic Inter-Society Consensus; and Vascular Disease Foundation. Circulation 2006;113:e463-654. 1c.11 **National Guideline Clearinghouse or other URL:** NA 1c.12 **Rating of strength of recommendation (***also provide narrative description of the rating and by whom***):** NA 1c.13 **Method for rating strength of recommendation** (*If different from USPSTF system, also describe rating and how it relates to USPSTF)*: NA 1c.14 **Rationale for using this guideline over others:** This quality measure will be associated with decreased perioperative morbidity and mortality from major adverse cardiac events including stroke, myocardial infarction, and death, in patients undergoing lower extremity bypass.	
TAP/Workgroup: What are the strengths and weaknesses in relation to the subcriteria for *Importance to Measure and Report?*	**1**
Steering Committee: Was the threshold criterion, *Importance to Measure and Report*, met? **Rationale:**	**1** **Y☐** **N☐**
2. SCIENTIFIC ACCEPTABILITY OF MEASURE PROPERTIES	
Extent to which the measure, as specified, produces consistent (reliable) and credible (valid) results about the quality of care when implemented. (evaluation criteria)	**Eval Rating**
2a. MEASURE SPECIFICATIONS	
S.1 **Do you have a web page where current detailed measure specifications can be obtained?** S.2 **If yes, provide web page URL:** **2a. Precisely Specified**	
2a.1 **Numerator Statement (***Brief, text description of the numerator - what is being measured about the target population, e.g. target condition, event, or outcome***):** Patients undergoing infrainguinal lower extremity bypass who are prescribed a statin medication at discharge. 2a.2 **Numerator Time Window (***The time period in which cases are eligible for inclusion in the numerator***):** Since hospitals have sufficient annual volume to generate accurate reporting levels, these are proposed for reporting every 12 months for hospital. Since surgeons have lower individual volume, we recommend annual reporting of the last 50 consecutive procedures, which may span more than one year, with suppression if < 10 procedures (ie, reported as too low volume to report). 2a.3 **Numerator Details (***All information required to collect/calculate the numerator, including all codes, logic, and definitions***):** ANY registry that includes anatomic details or CPT procedure codes is required to identify patients for numerator inclusion. The Society for Vascular Surgery Vascular Quality Initiative (SVS VQI) and the Vascular Study Group of New England (VSGNE)are examples of registries capture detailed anatomic information, but the measure is not limited to these registries. Infrainguinal lower extremity bypass is defined as a bypass beginning at or below the external iliac artery and extending into the ipsilateral leg. It includes procedures with CPT codes 35656, 35556, 35583, 35666, 35566, 35585, 35671, 35571, 35587. The numerator is calculated as the number of patients age 18 and over undergoing such a procedure who are prescribed a statin medication at the time of discharge, which is also captured in the above registries.	**2a-specs** **C☐** **P☐** **M☐** **N☐**
2a.4 **Denominator Statement (***Brief, text description of the denominator - target population being*	

measured):
All patients aged 18 years and older undergoing lower extremity bypass as defined above who are discharged alive, excluding those patients who are intolerant to statins.

2a.5 **Target population gender:** Female, Male
2a.6 **Target population age range:** 18 years or older

2a.7 **Denominator Time Window** (*The time period in which cases are eligible for inclusion in the denominator*):
Since hospitals have sufficient annual volume to generate accurate reporting levels, these are proposed for reporting every 12 months for hospital. Since surgeons have lower individual volume, we recommend annual reporting of the last 50 consecutive procedures, which may span more than one year, with suppression if < 10 procedures (ie, reported as too low volume to report).

2a.8 **Denominator Details** (*All information required to collect/calculate the denominator - the target population being measured - including all codes, logic, and definitions*):
ANY registry that includes anatomic details or CPT procedure codes is required to identify patients for denominator inclusion. The Society for Vascular Surgery Vascular Quality Initiative and the Vascular Study Group of New England are examples of registries that capture detailed anatomic information, but the measure is not limited to these registries. Infrainguinal lower extremity bypass is defined as a bypass beginning at or below the external iliac artery and extending into the ipsilateral leg. It includes procedures with CPT codes 35656, 35556, 35583, 35666, 35566, 35585, 35671, 35571, 35587. Only patients who are discharged alive are included in the denominator, and patients who are intolerant to statins are excluded, as described below.

2a.9 **Denominator Exclusions** (*Brief text description of exclusions from the target population*): Chart documentation that patient was not an eligible candidate for statin therapy due to known drug intolerance, or patient died before discharge.

2a.10 **Denominator Exclusion Details** (*All information required to collect exclusions to the denominator, including all codes, logic, and definitions*):
Chart documentation that patient was not an eligible candidate for statin therapy due to known drug intolerance, or patient died before discharge. These data are captured in the SVS VQI and VSGNE registries.

2a.11 **Stratification Details/Variables** (*All information required to stratify the measure including the stratification variables, all codes, logic, and definitions*):
Not required

2a.12-13 **Risk Adjustment Type:** No risk adjustment necessary

2a.14 **Risk Adjustment Methodology/Variables** (*List risk adjustment variables and describe conceptual models, statistical models, or other aspects of model or method*):
NA

2a.15-17 **Detailed risk model available Web page URL or attachment:**

2a.18-19 **Type of Score:** Rate/proportion
2a.20 **Interpretation of Score:** Better quality = Higher score
2a.21 **Calculation Algorithm** (*Describe the calculation of the measure as a flowchart or series of steps*):
All patients age 18 and older undergoing infrainguinal LEB who were prescribed statin at discharge divided by (all patients over 18 undergoing infrainguinal LEB minus those intolerant to statins minus those who died before discharge).

2a.22 **Describe the method for discriminating performance** *(e.g., significance testing)*:
Standard statistical comparison of rates to provide confidence levels to discriminate meaningful differences from the mean.

2a.23 **Sampling (Survey) Methodology** *If measure is based on a sample (or survey), provide instructions for obtaining the sample, conducting the survey and guidance on minimum sample size (response rate)*:
NA

2a.24 **Data Source** (*Check the source(s) for which the measure is specified and tested)*

Electronic Clinical Data : Registry

2a.25 **Data source/data collection instrument (***Identify the specific data source/data collection instrument, e.g. name of database, clinical registry, collection instrument, etc.***):**
The Society for Vascular Surgery Vascular Quality Initiative Registry
The Vascular Study Group of New England Registry

2a.26-28 **Data source/data collection instrument reference web page URL or attachment:** Attachment Infra-Inguinal_Bypass_v1.9.xls

2a.29-31 **Data dictionary/code table web page URL or attachment:** Attachment LEB defs v.01.09.doc

2a.32-35 **Level of Measurement/Analysis** (*Check the level(s) for which the measure is specified and tested)*
Clinician : Group/Practice, Clinician : Individual, Facility

2a.36-37 **Care Settings (***Check the setting(s) for which the measure is specified and tested)*
Hospital/Acute Care Facility

2a.38-41 **Clinical Services** (*Healthcare services being measured, check all that apply*)
Clinicians: Physicians (MD/DO)

TESTING/ANALYSIS

2b. Reliability testing

2b.1 **Data/sample** *(description of data/sample and size)*: A random sample of 100 patient records representing 5 procedures relevant to the measure from 5 different hospitals based on data collected during the past 2 years. In addition, in-hospital mortality was examined by claims based analysis of 7,205 patients discharged and recorded in the VSGNE registry between 2003 to 2007.

2b.2 **Analytic Method** *(type of reliability & rationale, method for testing)*:
A nurse abstractor completed a form based on medical record review for the variables relevant to this measure. The results of this chart review were then compared with the original registry data. The Kappa statistic was used to judge reliability of the data. For mortality validation, claims data from each of 12 hospitals were matched to patient identified data within the VSGNE registry to compare discharge status (alive vs. dead). Any discrepencies were then further evaluated based on a medical record audit.

2b.3 **Testing Results** *(reliability statistics, assessment of adequacy in the context of norms for the test conducted)*:
The key variables for this measure and testing results were:

1. Correct procedure (infrainguinal lower extremity bypass) performed. Kappa =1.0
2. Statin prescribed at discharge: Kappa=.80 (.11 SE)
3. Hospital mortality: Kappa = .91 (SE .01)

4. Age: 100% agreement, Kappa = 1.0 for age 18 or older categories.
5. Intolerant to statins: Kappa = 1.0

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2c. Validity testing

2c.1 **Data/sample** *(description of data/sample and size)*: See reliability testing

2c.2 **Analytic Method** *(type of validity & rationale, method for testing)*:
The valididty testing of statin prescribed at discharge used the medical record as the gold standard. Discharge medications are routinely and carefully documented in both the discharge summary and discharge orders. The medication list on both the discharge summary and discharge orders were compared to confirm validity.

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Patient age and hospital mortality have face validity. Correctness of operation type compared the operative report as the gold standard with the progress note in the medical record.

Data collected over time in VSGNE have been compared to published literature.

2c.3 Testing Results *(statistical results, assessment of adequacy in the context of norms for the test conducted)*:
100% agreement was found between statin prescribed at discharge on the discharge summary and discharge orders. 100% agreement was also found between the procedure type reported in the operative note and that recorded in the daily progress notes.

Discharge statin use has been tracked in VSGNE for these procedures since 2003. Under a quality program, the proportion of patients discharged on statins has gradually improved, providing validity for this measurement.

2d. Exclusions Justified

2d.1 Summary of Evidence supporting exclusion(s):
The only exclusions are patients who died before discharge, and patients intolerant to statins, as documented in the medical record. Such patients cannot receive statins.

2d.2 Citations for Evidence:
face validity

2d.3 Data/sample *(description of data/sample and size)*: 2496 patients in the registry who underwent infrainguinal LEB between 2003-2010 in VSGNE, all patients in registry for this procedure

2d.4 Analytic Method *(type analysis & rationale)*:
Rate determination

2d.5 Testing Results *(e.g., frequency, variability, sensitivity analyses)*:
2% patients died in hospital
2% were alive but intolerant to statins
Of the remaining, 73% were discharged on statins.
Across 13 hospitals, the median statin prescribed at discharge rate was 73%, with an interquartile range of 69% to 80%. Across 63 individual providers, the median statin prescribed at discharge rate was 75%, with an interquartile range of 66% to 84%.

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C☐ P☐ M☐ N☐ NA☐

2e. Risk Adjustment for Outcomes/ Resource Use Measures

2e.1 Data/sample *(description of data/sample and size)*: Not required for this process measure.

2e.2 Analytic Method *(type of risk adjustment, analysis, & rationale)*:
NA

2e.3 Testing Results *(risk model performance metrics)*:
NA

2e.4 If outcome or resource use measure is not risk adjusted, provide rationale: NA

2e
C☐ P☐ M☐ N☐ NA☐

2f. Identification of Meaningful Differences in Performance

2f.1 Data/sample from Testing or Current Use *(description of data/sample and size)*: see section 1.b.3 and above 2,d,5

2f.2 Methods to identify statistically significant and practically/meaningfully differences in performance *(type of analysis & rationale)*:
Standard statistial analysis to determine 95% confidence interval for hospitals and providers to determine practical difference from mean

2f
C☐ P☐ M☐ N☐

2f.3 Provide Measure Scores from Testing or Current Use *(description of scores, e.g., distribution by quartile, mean, median, SD, etc.; identification of statistically significant and meaningfully differences in performance)*: see above	
2g. Comparability of Multiple Data Sources/Methods **2g.1 Data/sample** *(description of data/sample and size)*: Other sources not available for testing. **2g.2 Analytic Method** *(type of analysis & rationale)*: NA **2g.3 Testing Results** *(e.g., correlation statistics, comparison of rankings)*: NA	**2g** C☐ P☐ M☐ N☐ NA☐
2h. Disparities in Care **2h.1 If measure is stratified, provide stratified results** *(scores by stratified categories/cohorts)*: NA **2h.2 If disparities have been reported/identified, but measure is not specified to detect disparities, provide follow-up plans:** NA	**2h** C☐ P☐ M☐ N☐ NA☐
TAP/Workgroup: What are the strengths and weaknesses in relation to the subcriteria for *Scientific Acceptability of Measure Properties?*	**2**
Steering Committee: Overall, to what extent was the criterion, *Scientific Acceptability of Measure Properties*, met? **Rationale:**	***2*** C☐ P☐ M☐ N☐
3. USABILITY	
Extent to which intended audiences (e.g., consumers, purchasers, providers, policy makers) can understand the results of the measure and are likely to find them useful for decision making. (evaluation criteria)	Eval Rating
3a. Meaningful, Understandable, and Useful Information **3a.1 Current Use:** In use **3a.2 Use in a public reporting initiative (disclosure of performance results to the public at large)** (*If used in a public reporting initiative, provide name of initiative(s), locations, Web page URL(s). If not publicly reported, state the plans to achieve public reporting within 3 years*): Data from SVS VQI and VSGNE are reported to each hospital and provider in a format that can be transmitted to an appropriate public reporting mechanism. **3a.3 If used in other programs/initiatives (***If used in quality improvement or other programs/initiatives, name of initiative(s), locations, Web page URL(s). If not used for QI, state the plans to achieve use for QI within 3 years***):** The Vascular Surgery Group of New England (VSGNE) has been tracking periperative statin use in patients undergoing lower extremity bypass. In the VSGNE, a multicenter quality improvement consortium, data has been collected on 3,693 patients who have undergone LEB. Unpublished analyses of these data demonstrate that only 41% of patients were taking statins preoperatively before LEB in 2004. Through quality improvement efforts, percentage of statins prescribed at disccharge has increased to 79% during the first 6 months of 2010. However, this rate of statin use falls significantly short of the 90% goal set forth by this quality improvement group in 2008. www.vsgne.org **Testing of Interpretability** (*Testing that demonstrates the results are understood by the potential users for public reporting and quality improvement*) **3a.4 Data/sample** *(description of data/sample and size)*: VSGNE samples previously described	**3a** C☐ P☐ M☐ N☐

3a.5 Methods *(e.g., focus group, survey, QI project)*: Semi-annual meetings of providers in VSGNE **3a.6 Results** *(qualitative and/or quantitative results and conclusions)*: Benchamrk reports of this process measure have been provided to VSGNE member physician and hospitals since 2003, and discussed at semi-annual meetings. There have been no questions about interpretability.	
3b/3c. Relation to other NQF-endorsed measures **3b.1 NQF # and Title of similar or related measures:** 0118 Antilipid therapy at discharge 0439 Discharged on statin medication	
(for NQF staff use) **Notes on similar/related endorsed or submitted measures:**	
3b. Harmonization If this measure is related to measure(s) already endorsed by NQF (e.g., same topic, but different target population/setting/data source or different topic but same target population): **3b.2 Are the measure specifications harmonized? If not, why?** Yes	**3b** C☐ P☐ M☐ N☐ NA☐
3c. Distinctive or Additive Value **3c.1 Describe the distinctive, improved, or additive value this measure provides to existing NQF-endorsed measures:** Different patient population **5.1 If this measure is similar to measure(s) already endorsed by NQF (i.e., on the same topic and the same target population), Describe why it is a more valid or efficient way to measure quality:**	**3c** C☐ P☐ M☐ N☐ NA☐
TAP/Workgroup: What are the strengths and weaknesses in relation to the subcriteria for *Usability?*	**3**
Steering Committee: Overall, to what extent was the criterion, *Usability*, met? **Rationale:**	**3** C☐ P☐ M☐ N☐
4. FEASIBILITY	
Extent to which the required data are readily available, retrievable without undue burden, and can be implemented for performance measurement. (evaluation criteria)	**Eval Rating**
4a. Data Generated as a Byproduct of Care Processes **4a.1-2 How are the data elements that are needed to compute measure scores generated?** Data generated as byproduct of care processes during care delivery (Data are generated and used by healthcare personnel during the provision of care, e.g., blood pressure, lab value, medical condition), Coding/abstraction performed by someone other than person obtaining original information (E.g., DRG, ICD-9 codes on claims, chart abstraction for quality measure or registry)	**4a** C☐ P☐ M☐ N☐
4b. Electronic Sources **4b.1 Are all the data elements available electronically?** (*elements that are needed to compute measure scores are in defined, computer-readable fields, e.g., electronic health record, electronic claims*) Yes **4b.2 If not, specify the near-term path to achieve electronic capture by most providers.**	**4b** C☐ P☐ M☐ N☐
4c. Exclusions	**4c** C☐

4c.1 Do the specified exclusions require additional data sources beyond what is required for the numerator and denominator specifications? No **4c.2 If yes, provide justification.**	P☐ M☐ N☐ NA☐
4d. Susceptibility to Inaccuracies, Errors, or Unintended Consequences **4d.1 Identify susceptibility to inaccuracies, errors, or unintended consequences of the measure and describe how these potential problems could be audited. If audited, provide results.** It is possible to miss or inacurately code statin status. We have overcome this by providing each site with a list of generic and trade names for known statin medications.	4d C☐ P☐ M☐ N☐
4e. Data Collection Strategy/Implementation **4e.1 Describe what you have learned/modified as a result of testing and/or operational use of the measure regarding data collection, availability of data/missing data, timing/frequency of data collection, patient confidentiality, time/cost of data collection, other feasibility/ implementation issues:** In the VSGNE experience which has been tracking statin usage since 2003, we have not experienced any difficulty with obtaining data related to statin usage. Our percent missing for perioperative statin use has been less than 2%. **4e.2 Costs to implement the measure** (*costs of data collection, fees associated with proprietary measures*)**:** In the context of the VSGNE and SVS VQI registries, there is no additional cost as all of these data are already collected. **4e.3 Evidence for costs:** NA **4e.4 Business case documentation:**	4e C☐ P☐ M☐ N☐
TAP/Workgroup: What are the strengths and weaknesses in relation to the subcriteria for *Feasibility?*	4
Steering Committee: Overall, to what extent was the criterion, *Feasibility*, met? **Rationale:**	4 C☐ P☐ M☐ N☐
RECOMMENDATION	
(for NQF staff use) **Check if measure is untested and only eligible for time-limited endorsement.**	Time-limited ☐
Steering Committee: Do you recommend for endorsement? **Comments:**	Y☐ N☐ A☐
CONTACT INFORMATION	
Co.1 Measure Steward (Intellectual Property Owner) **Co.1 Organization** Society for Vascular Surgery, 633 N. Saint Clair St., 22nd Floor, Chicago, Illinois, 60611 **Co.2 Point of Contact** Sarah, Murphy, Staff, smurphy@vascularsociety.org, 312-334-2305-	
Measure Developer If different from Measure Steward	

Co.3 Organization
Society for Vascular Surgery, 633 N. Saint Clair St., 22nd Floor, Chicago, Illinois, 60611

Co.4 Point of Contact
Sarah, Murphy, Staff, smurphy@vascularsociety.org, 312-334-2305-

Co.5 Submitter If different from Measure Steward POC
Sarah, Murphy, Staff, smurphy@vascularsociety.org, 312-334-2305-, Society for Vascular Surgery

Co.6 Additional organizations that sponsored/participated in measure development
The Vascular Study Group of New England

ADDITIONAL INFORMATION

Workgroup/Expert Panel involved in measure development
Ad.1 Provide a list of sponsoring organizations and workgroup/panel members' names and organizations. Describe the members' role in measure development.
N/A

Ad.2 If adapted, provide name of original measure:
Ad.3-5 If adapted, provide original specifications URL or attachment

Measure Developer/Steward Updates and Ongoing Maintenance
Ad.6 Year the measure was first released: 2010
Ad.7 Month and Year of most recent revision: 12, 2010
Ad.8 What is your frequency for review/update of this measure?
Ad.9 When is the next scheduled review/update for this measure?

Ad.10 Copyright statement/disclaimers:

Ad.11 -13 Additional Information web page URL or attachment:

Date of Submission (*MM/DD/YY*)**:** 06/13/2011

NATIONAL QUALITY FORUM

Measure Evaluation 4.1
December 2009

This form contains the measure information submitted by stewards. Blank fields indicate no information was provided. Attachments also may have been submitted and are provided to reviewers. The subcriteria and most of the footnotes from the evaluation criteria are provided in Word comments within the form and will appear if your cursor is over the highlighted area. Hyperlinks to the evaluation criteria and ratings are provided in each section.

TAP/Workgroup (if utilized)**:** Complete all yellow highlighted areas of the form. Evaluate the extent to which each subcriterion is met. Based on your evaluation, summarize the strengths and weaknesses in each section.

Note: *If there is no TAP or workgroup, the SC also evaluates the subcriteria (yellow highlighted areas).*

Steering Committee: Complete all pink highlighted areas of the form. Review the workgroup/TAP assessment of the subcriteria, noting any areas of disagreement; then evaluate the extent to which each major criterion is met; and finally, indicate your recommendation for the endorsement. Provide the rationale for your ratings.

Evaluation ratings of the extent to which the criteria are met
C = Completely (unquestionably demonstrated to meet the criterion)
P = Partially (demonstrated to partially meet the criterion)
M = Minimally (addressed BUT demonstrated to only minimally meet the criterion)
N = Not at all (NOT addressed; OR incorrectly addressed; OR demonstrated to NOT meet the criterion)
NA = Not applicable (only an option for a few subcriteria as indicated)

(for NQF staff use) **NQF Review #:** 0357 **NQF Project:** Surgery Endorsement Maintenance 2010
MEASURE DESCRIPTIVE INFORMATION
De.1 **Measure Title:** Abdominal Aortic Aneurysm (AAA) Repair Volume (IQI 4)
De.2 **Brief description of measure:** Count of discharges with a procedure code of provider-level AAA repair.
1.1-2 **Type of Measure:** Structure De.3 **If included in a composite or paired with another measure, please identify composite or paired measure** Abdominal Aortic Aneurysm (AAA) Repair Mortality (IQI 11) (NQF #0359) and Mortality for Selected Procedures composite
De.4 **National Priority Partners Priority Area:** Population health, Safety De.5 **IOM Quality Domain**: Effectiveness, Safety De.6 **Consumer Care Need:** Getting better

CONDITIONS FOR CONSIDERATION BY NQF	
Four conditions must be met before proposed measures may be considered and evaluated for suitability as voluntary consensus standards:	**NQF Staff**
A. The measure is in the public domain or an intellectual property (measure steward agreement) is signed. *Public domain only applies to governmental organizations. All non-government organizations must sign a measure steward agreement even if measures are made publicly and freely available.* A.1 **Do you attest that the measure steward holds intellectual property rights to the measure and the right to use aspects of the measure owned by another entity (e.g., risk model, code set)?** Yes A.2 **Indicate if Proprietary Measure** (*as defined in measure steward agreement*)**:** A.3 **Measure Steward Agreement:** Government entity and in the public domain - no agreement necessary A.4 **Measure Steward Agreement attached:**	**A** Y☐ N☐
B. The measure owner/steward verifies there is an identified responsible entity and process to maintain and update the measure on a schedule that is commensurate with the rate of clinical innovation, but at least	**B** Y☐

every 3 years. Yes, information provided in contact section	N☐
C. The intended use of the measure includes both public reporting and quality improvement. ►**Purpose:** Public Reporting, Quality Improvement (Internal to the specific organization)	C Y☐ N☐
D. The requested measure submission information is complete. Generally, measures should be fully developed and tested so that all the evaluation criteria have been addressed and information needed to evaluate the measure is provided. Measures that have not been tested are only potentially eligible for a time-limited endorsement and in that case, measure owners must verify that testing will be completed within 12 months of endorsement. D.1**Testing:** Yes, fully developed and tested D.2 **Have NQF-endorsed measures been reviewed to identify if there are similar or related measures?** Yes	D Y☐ N☐
(for NQF staff use) **Have all conditions for consideration been met?** **Staff Notes to Steward** (*if submission returned*)**:**	Met Y☐ N☐
Staff Notes to Reviewers (*issues or questions regarding any criteria*)**:**	
Staff Reviewer Name(s):	

TAP/Workgroup Reviewer Name:	
Steering Committee Reviewer Name:	
1. IMPORTANCE TO MEASURE AND REPORT	
Extent to which the specific measure focus is important to making significant gains in health care quality (safety, timeliness, effectiveness, efficiency, equity, patient-centeredness) and improving health outcomes for a specific high impact aspect of healthcare where there is variation in or overall poor performance. ***Measures must be judged to be important to measure and report*** *in order to be evaluated against the remaining criteria.* (evaluation criteria) **1a. High Impact**	Eval Rating
(for NQF staff use) **Specific NPP goal**:	
1a.1 **Demonstrated High Impact Aspect of Healthcare:** Patient/societal consequences of poor quality 1a.2 1a.3 **Summary of Evidence of High Impact:** Most studies published since 1985 showed a significant association between either hospital or surgeon volume and inpatient mortality after AAA repair, although these findings may be limited by inadequate risk adjustment of the outcome measure and differ by type of aneurysms (intact vs. ruptured) being considered. Several studies have explored whether experience on related, but not identical, cases may lead to improved outcomes. One study found that hospital volume of surgery for ruptured aneurysms was not associated with postoperative inpatient mortality, but it was associated with fewer inpatient deaths for ruptured aneurysms, suggesting that high-volume hospitals may manage ruptured aneurysms more aggressively. [1] One study that evaluated the impact of total vascular surgery volume found a significant effect for both ruptured and intact aneurysms. [2] Empirical evidence shows that AAA repair volume and mortality—after adjusting for age, sex, and APR-DRG—are independently and negatively correlated with each other (r=-.35, p<.001). [3] 1a.4 **Citations for Evidence of High Impact:** Updated citations will be presented in the May Steering Committee meeting [1] Kantonen I, Lepantalo M, Brommels M, et al. Mortality in ruptured abdominal aortic aneurysms. The Finnvasc Study Group. . Eur J Vasc Endovasc Surg 1999;17(3):208-12. [2] Amundsen S, Skjaerven R, Trippestad A, et al. Abdominal aortic aneurysms. Is there an association between surgical volume, surgical experience, hospital type and operative mortality? Members of the Norwegian Abdominal Aortic Aneurysm Trial. Acta Chir Scand 1990;156(4):323-7; discussion 327-8.	1a C☐ P☐ M☐ N☐

[3] Nationwide Inpatient Sample.

1b. Opportunity for Improvement

1b.1 Benefits (improvements in quality) envisioned by use of this measure: Abdominal Aortic Aneurysm (AAA) repair is a relatively rare procedure that requires proficiency with the use of complex equipment; and technical errors may lead to clinically significant complications, such as arrhythmias, acute myocardial infarction, colonic ischemia, and death. Higher volumes have been associated with better outcomes, which represent better quality.

1b.2 Summary of data demonstrating performance gap (variation or overall poor performance) across providers:
Comparative Data for the IQI based on the 2008 Nationwide Inpatient Sample (NIS):

	SEX
7,795	Males
1,996	Females
	AGE
12	18 to 39
1,574	40 to 64
3,618	65 to 74
4,587	75+
	PAYER
7,377	Medicare
155	Medicaid
2,243	Other

Based on the above, we see AAAs are occurring nearly four times more frequently in males compared to females. We also observe the procedure occurs primarily with the Medicare population; age 65 years and older.

Information about NIS can be found at this AHRQ link: http://www.hcup-us.ahrq.gov/nisoverview.jsp#Whatis

1b.3 Citations for data on performance gap:
See the following report for a complete treatment of the methodology: "Methods: Applying AHRQ Quality Indicators to Healthcare Cost and Utilization Project (HCUP) Data for the National Healthcare Quality Report" [URL: http://hcupnet.ahrq.gov/QI%20Methods.pdf?JS=Y]

1b.4 Summary of Data on disparities by population group:
Comparative Data for the IQI based on the 2008 Nationwide Inpatient Sample (NIS):

	SEX
7,795	Males
1,996	Females
	AGE
12	18 to 39
1,574	40 to 64
3,618	65 to 74
4,587	75+
	PAYER
7,377	Medicare
155	Medicaid
2,243	Other

Information about NIS can be found at this AHRQ link: http://www.hcup-us.ahrq.gov/nisoverview.jsp#Whatis

1b
C☐
P☐
M☐
N☐

RACE
29,703 White
1,350 Black
949 Hispanic
457 Asian and NH/PI
240 Amer Indian/AN
7,537 Other

Source: 2008 State Inpatient Databases (SID). http://hcup-us.ahrq.gov/sidoverview.jsp

1b.5 Citations for data on Disparities:
See the following report for a complete treatment of the methodology: "Methods: Applying AHRQ Quality Indicators to Healthcare Cost and Utilization Project (HCUP) Data for the National Healthcare Quality Report" [URL: http://hcupnet.ahrq.gov/QI%20Methods.pdf?JS=Y]

1c. Outcome or Evidence to Support Measure Focus

1c.1 Relationship to Outcomes (*For non-outcome measures, briefly describe the relationship to desired outcome. For outcomes, describe why it is relevant to the target population*)**:** Abdominal Aortic Aneurysm (AAA) repair is a relatively rare procedure that requires proficiency with the use of complex equipment; and technical errors may lead to clinically significant complications, such as arrhythmias, acute myocardial infarction, colonic ischemia, and death. Higher volumes have been associated with better outcomes, which represent better quality.

1c.2-3. Type of Evidence: Evidence-based guideline, Expert opinion

1c.4 Summary of Evidence (*as described in the criteria; for outcomes, summarize any evidence that healthcare services/care processes influence the outcome*)**:**
Most studies published since 1985 showed a significant association between either hospital or surgeon volume and inpatient mortality after AAA repair, although these findings may be limited by inadequate risk adjustment of the outcome measure and differ by type of aneurysms (intact vs. ruptured) being considered. Several studies have explored whether experience on related, but not identical, cases may lead to improved outcomes. One study found that hospital volume of surgery for ruptured aneurysms was not associated with postoperative inpatient mortality, but it was associated with fewer inpatient deaths for ruptured aneurysms, suggesting that high-volume hospitals may manage ruptured aneurysms more aggressively. [1] One study that evaluated the impact of total vascular surgery volume found a significant effect for both ruptured and intact aneurysms. [2] Empirical evidence shows that AAA repair volume and mortality—after adjusting for age, sex, and APR-DRG—are independently and negatively correlated with each other (r=-.35, p<.001). [3]

[1] Kantonen I, Lepantalo M, Brommels M, et al. Mortality in ruptured abdominal aortic aneurysms. The Finnvasc Study Group. . Eur J Vasc Endovasc Surg 1999;17(3):208-12.
[2] Amundsen S, Skjaerven R, Trippestad A, et al. Abdominal aortic aneurysms. Is there an association between surgical volume, surgical experience, hospital type and operative mortality? Members of the Norwegian Abdominal Aortic Aneurysm Trial. Acta Chir Scand 1990;156(4):323-7; discussion 327-8.
[3] Nationwide Inpatient Sample.

1c.5 Rating of strength/quality of evidence (*also provide narrative description of the rating and by whom***):**
B. Testing, rating, and review were conducted by the project team. A full report on the literature review and empirical evaluation can be found in Refinement of the HCUP Quality Indicators by the UCSF-Stanford EPC, Detailed coding information for each QI is provided in the document Prevention Quality Indicators Technical Specifications. Rating of performance on empirical evaluations, ranged from 0 to 26. The scores were intended as a guide for summarizing the performance of each indicator on four empirical tests of precision (signal variance, area-level share, signal ratio, and R-squared) and five tests of minimum bias (rank correlation, top and bottom decile movement, absolute change, and change over two deciles), as described in the previous section.

1c.6 Method for rating evidence: The project team conducted extensive empirical testing of all potential indicators using the 1995-97 HCUP State Inpatient Databases (SID) and Nationwide Inpatient Sample (NIS) to

1c
C☐
P☐
M☐
N☐

determine precision, bias, and construct validity. The 1997 SID contains uniform data on inpatient stays in community hospitals for 22 States covering approximately 60% of all U.S. hospital discharges. The NIS is designed to approximate a 20% of U.S. community hospitals and includes all stays in the sampled hospitals. Each year of the NIS contains between 6 million and 7 million records from about 1,000 hospitals. The NIS combines a subset of the SID data, hospital-level variables, and hospital and discharge weights for producing national estimates. The project team conducted tests to examine three things: precision, bias, and construct validity.

Precision. The first step in the analysis involved precision tests to determine the reliability of the indicator for distinguishing real differences in provider performance. For indicators that may be used for quality improvement, it is important to know with what precision, or surety, a measure can be attributed to an actual construct rather than random variation.

For each indicator, the variance can be broken down into three components: variation within a provider (actual differences in performance due to differing patient characteristics), variation among providers (actual differences in performance among providers), and random variation. An ideal indicator would have a substantial amount of the variance explained by between-provider variance, possibly resulting from differences in quality of care, and a minimum amount of random variation. The project team performed four tests of precision to estimate the magnitude of between-provider variance on each indicator:

• Signal standard deviation was used to measure the extent to which performance of the QI varies systematically across hospitals or areas.

• Provider/area variation share was used to calculate the percentage of signal (or true) variance relative to the total variance of the QI.

• Signal-to-noise ratio was used to measure the percentage of the apparent variation in QIs across providers that is truly related to systematic differences across providers and not random variations (noise) from year to year.

• In-sample R-squared was used to identify the incremental benefit of applying multivariate signal extraction methods for identifying additional signal on top of the signal-to-noise ratio.

In general, random variation is most problematic when there are relatively few observations per provider, when adverse outcome rates are relatively low, and when providers have little control over patient outcomes or variation in important processes of care is minimal. If a large number of patient factors that are difficult to observe influence whether or not a patient has an adverse outcome, it may be difficult to separate the "quality signal" from the surrounding noise. Two signal extraction techniques were applied to improve the precision of an indicator:

• Univariate methods were used to estimate the "true" quality signal of an indicator based on information from the specific indicator and 1 year of data.

• Multivariate signal extraction (MSX) methods were used to estimate the "true" quality signal based on information from a set of indicators and multiple years of data. In most cases, MSX methods extracted additional signal, which provided much more precise estimates of true hospital or area quality.

Bias. To determine the sensitivity of potential QIs to bias from differences in patient severity, unadjusted performance measures for specific hospitals were compared with performance measures that had been adjusted for age and gender. All of the PQIs and some of the Inpatient Quality Indicators (IQIs) could only be risk-adjusted for age and sex. The 3M™ APR-DRG System Version 12 with Severity of Illness and Risk of Mortality subclasses was used for risk adjustment of the utilization indicators and the in-hospital mortality indicators, respectively. Five empirical tests were performed to investigate the degree of bias in an indicator:

• Rank correlation coefficient of the area or hospital with (and without) risk adjustment—gives the overall impact of risk adjustment on relative provider or area performance.

• Average absolute value of change relative to mean—highlights the amount of absolute change in performance, without reference to other providers' performance.

• Percentage of highly ranked hospitals that remain in high decile—reports the percentage of hospitals or areas that are in the highest deciles without risk adjustment that remain there after risk adjustment is performed.

• Percentage of lowly ranked hospitals that remain in low decile—reports the percentage of hospitals or areas that are in the lowest deciles without risk adjustment that remain there after risk adjustment is performed.

• Percentage that change more than two deciles—identifies the percentage of hospitals whose relative rank changes by a substantial percentage (more than 20%) with and without risk adjustment.

Construct validity. Construct validity analyses provided information regarding the relatedness or independence of the indicators. If quality indicators do indeed measure quality, then two measures of the same construct would be expected to yield similar results. The team used factor analysis to reveal underlying patterns among large numbers of variables—in this case, to measure the degree of relatedness between

indicators. In addition, they analyzed correlation matrices for indicators.

1c.7 Summary of Controversy/Contradictory Evidence: Some users have questioned the inclusion of both ruptured and unruptured AAA and open and endovascular procedures. However, the experience of repair procedures (open or endovascular) carriers over to both types of classes of patients, and total volume was a better predictor of overall mortality than the individual volumes.

1c.8 Citations for Evidence (*other than guidelines*): Updated citations will be presented in the May Steering Committee meeting

Hannan EL, Kilburn H, Jr., O'Donnell JF, et al. A longitudinal analysis of the relationship between in-hospital mortality in New York state and the volume of abdominal aortic aneurysm surgeries performed. Health Serv Res 1992;27(4):517-42.
Kazmers A, Jacobs L, Perkins A, et al. Abdominal aortic aneurysm repair in Veterans Affairs medical centers. J Vasc Surg 1996;23(2):191-200.
Pronovost PJ, Jenckes MW, Dorman T, et al. Organizational characteristics of intensive care units related to outcomes of abdominal aortic surgery. JAMA 1999;281(14):1310-7.

1c.9 Quote the Specific guideline recommendation (*including guideline number and/or page number*):
EVAR for AAA represents an advance in patient care, serving as an effective alternative to traditional open surgical AAA repair, and is now the most common treatment method for AAA repair in the United States.

1c.10 Clinical Practice Guideline Citation: http://www.sirweb.org/clinical/cpg/QI12.pdf
1c.11 National Guideline Clearinghouse or other URL: Not Applicable.

1c.12 Rating of strength of recommendation (*also provide narrative description of the rating and by whom*):
Not Applicable.

1c.13 Method for rating strength of recommendation (*If different from USPSTF system, also describe rating and how it relates to USPSTF)*:
Not Applicable.

1c.14 Rationale for using this guideline over others:
Not Applicable.

TAP/Workgroup: What are the strengths and weaknesses in relation to the subcriteria for *Importance to Measure and Report?*	**1**
Steering Committee: Was the threshold criterion, *Importance to Measure and Report*, met? **Rationale:**	**1** **Y☐** **N☐**
2. SCIENTIFIC ACCEPTABILITY OF MEASURE PROPERTIES	
Extent to which the measure, as specified, produces consistent (reliable) and credible (valid) results about the quality of care when implemented. (evaluation criteria)	Eval Rating
2a. MEASURE SPECIFICATIONS	
S.1 Do you have a web page where current detailed measure specifications can be obtained? **S.2 If yes, provide web page URL:** **2a. Precisely Specified**	**2a-specs** **C☐** **P☐** **M☐** **N☐**
2a.1 Numerator Statement (*Brief, text description of the numerator - what is being measured about the target population, e.g. target condition, event, or outcome*): Discharges, age 18 years and older, with an abdominal aortic aneurysm repair procedure and a primary or secondary diagnosis of AAA.	

2a.2 Numerator Time Window (*The time period in which cases are eligible for inclusion in the numerator*):
Time window can be determined by user, but is generally a calendar year.

2a.3 Numerator Details (*All information required to collect/calculate the numerator, including all codes, logic, and definitions*):
Discharges, age 18 years and older, with an abdominal aortic aneurysm repair procedure and a primary or secondary diagnosis of AAA in any field.

ICD-9-CM AAA procedure codes:
3834
AORTA RESECTION & ANAST
3844
RESECT ABDM AORTA W REPL
3864
EXCISION OF AORTA
3971
ENDO IMPLANT OF GRAFT IN AORTA

ICD-9-CM AAA diagnosis codes:
4413
RUPT ABD AORTIC ANEURYSM
4414
ABDOM AORTIC ANEURYSM

Exclude cases:
• MDC 14 (pregnancy, childbirth, and puerperium)

2a.4 Denominator Statement (*Brief, text description of the denominator - target population being measured*):
This volume measure does not have a denominator.

2a.5 Target population gender: Female, Male
2a.6 Target population age range: 18 and older

2a.7 Denominator Time Window (*The time period in which cases are eligible for inclusion in the denominator*):
Not applicable

2a.8 Denominator Details (*All information required to collect/calculate the denominator - the target population being measured - including all codes, logic, and definitions*):
Not applicable

2a.9 Denominator Exclusions (*Brief text description of exclusions from the target population*): Numerator exclusions
• MDC 14 (pregnancy, childbirth, and puerperium)

2a.10 Denominator Exclusion Details (*All information required to collect exclusions to the denominator, including all codes, logic, and definitions*):
This volume measure does not have a denominator.

2a.11 Stratification Details/Variables (*All information required to stratify the measure including the stratification variables, all codes, logic, and definitions*):
Stratified by endovascular and open repairs (additional methodological development will be required to ensure the measures have adequate reliability).

2a.12-13 Risk Adjustment Type: No risk adjustment necessary

2a.14 Risk Adjustment Methodology/Variables (*List risk adjustment variables and describe conceptual models, statistical models, or other aspects of model or method*):
None.

2a.15-17 Detailed risk model available Web page URL or attachment:

2a.18-19 Type of Score: Count
2a.20 Interpretation of Score: Better quality = Higher score
2a.21 Calculation Algorithm (*Describe the calculation of the measure as a flowchart or series of steps***):**
The volume is the number of discharges with a diagnosis of, and a procedure for AAA.

2a.22 Describe the method for discriminating performance *(e.g., significance testing)***:**
Performance discrimination is based on pre-defined thresholds derived from the literature. Threshold 1: 10 or more procedures per year Threshold 2: 32 or more procedures per year.

2a.23 Sampling (Survey) Methodology *If measure is based on a sample (or survey), provide instructions for obtaining the sample, conducting the survey and guidance on minimum sample size (response rate)*:
Not applicable

2a.24 Data Source (*Check the source(s) for which the measure is specified and tested)*
Administrative claims

2a.25 Data source/data collection instrument (*Identify the specific data source/data collection instrument, e.g. name of database, clinical registry, collection instrument, etc.***):**
The data source is hospital discharge data such as the HCUP State Inpatient Databases (SID) or equivalent using UB-04 coding standards. The data collection instrument is public-use AHRQ QI software available in SAS or Windows versions.

2a.26-28 Data source/data collection instrument reference web page URL or attachment: URL None
http://www.qualityindicators.ahrq.gov/software.htm

2a.29-31 Data dictionary/code table web page URL or attachment: URL None
http://www.qualityindicators.ahrq.gov/downloads/winqi/AHRQ_QI_Windows_Software_Documentation_V41a.pdf

2a.32-35 Level of Measurement/Analysis (*Check the level(s) for which the measure is specified and tested)*
Facility

2a.36-37 Care Settings (*Check the setting(s) for which the measure is specified and tested)*
Hospital/Acute Care Facility

2a.38-41 Clinical Services (*Healthcare services being measured, check all that apply*)
Clinicians: Physicians (MD/DO)

TESTING/ANALYSIS

2b. Reliability testing

2b.1 Data/sample *(description of data/sample and size)***:** AHRQ 2007 State Inpatient Databases (SID) with 4,000 hospitals and 30 million adult discharges

2b.2 Analytic Method *(type of reliability & rationale, method for testing)***:**
Literature summary, expert panels and empirical analysis

2b.3 Testing Results *(reliability statistics, assessment of adequacy in the context of norms for the test conducted)***:**
AAA repair is an uncommon cardiovascular procedure—only 50,000 were performed in the United States in 2007. Although AAA repair is measured accurately with discharge data, the relatively small number of procedures performed annually at most hospitals suggests that volume may be subject to much random variation.

2b C☐ P☐ M☐ N☐

2c. Validity testing

2c.1 Data/sample *(description of data/sample and size)***:** AHRQ 2007 State Inpatient Databases (SID) with

2c C☐ P☐

4,000 hospitals and 30 million adult discharges **2c.2 Analytic Method** *(type of validity & rationale, method for testing)*: Literature summary, expert panels and empirical analysis **2c.3 Testing Results** *(statistical results, assessment of adequacy in the context of norms for the test conducted)*: Most studies published since 1985 showed a significant association between either hospital or surgeon volume and inpatient mortality after AAA repair, although these findings may be limited by inadequate risk adjustment of the outcome measure and differ by type of aneurysms (intact vs. ruptured) being considered. Several studies have explored whether experience on related, but not identical, cases may lead to improved outcomes. One study found that hospital volume of surgery for ruptured aneurysms was not associated with postoperative inpatient mortality, but it was associated with fewer inpatient deaths for ruptured aneurysms, suggesting that high-volume hospitals may manage ruptured aneurysms more aggressively.[3] One study that evaluated the impact of total vascular surgery volume found a significant effect for both ruptured and intact aneurysms.[2] Empirical evidence shows that AAA repair volume and mortality—after adjusting for age, sex, and APR-DRG—are independently and negatively correlated with each other (r=-.35, p<.001).[3] References: [1] Kantonen I, Lepantalo M, Brommels M, et al. Mortality in ruptured abdominal aortic aneurysms. The Finnvasc Study Group. . Eur J Vasc Endovasc Surg 1999;17(3):208-12. [2] Amundsen S, Skjaerven R, Trippestad A, et al. Abdominal aortic aneurysms. Is there an association between surgical volume, surgical experience, hospital type and operative mortality? Members of the Norwegian Abdominal Aortic Aneurysm Trial. Acta Chir Scand 1990;156(4):323-7; discussion 327-8. [3] Nationwide Inpatient Sample.	M☐ N☐
2d. Exclusions Justified **2d.1 Summary of Evidence supporting exclusion(s):** Not applicable **2d.2 Citations for Evidence:** Not applicable **2d.3 Data/sample** *(description of data/sample and size)*: Not applicable **2d.4 Analytic Method** *(type analysis & rationale)*: Not applicable **2d.5 Testing Results** *(e.g., frequency, variability, sensitivity analyses)*: Not applicable	**2d** C☐ P☐ M☐ N☐ NA ☐
2e. Risk Adjustment for Outcomes/ Resource Use Measures **2e.1 Data/sample** *(description of data/sample and size)*: Not applicable **2e.2 Analytic Method** *(type of risk adjustment, analysis, & rationale)*: Not applicable **2e.3 Testing Results** *(risk model performance metrics)*: Not applicable **2e.4 If outcome or resource use measure is not risk adjusted, provide rationale:** Volume	**2e** C☐ P☐ M☐ N☐ NA ☐
2f. Identification of Meaningful Differences in Performance **2f.1 Data/sample from Testing or Current Use** *(description of data/sample and size)*: AHRQ 2007 State Inpatient Databases (SID) with 4,000 hospitals and 30 million adult discharges **2f.2 Methods to identify statistically significant and practically/meaningfully differences in performance**	**2f** C☐ P☐ M☐ N☐

(type of analysis & rationale): Predefined thresholds based on the literature 2f.3 **Provide Measure Scores from Testing or Current Use** *(description of scores, e.g., distribution by quartile, mean, median, SD, etc.; identification of statistically significant and meaningfully differences in performance)*: Q1 Q2 Q3 Q4 1.9 5.6 13.8 47.3 N = 1,963	
2g. Comparability of Multiple Data Sources/Methods 2g.1 **Data/sample** *(description of data/sample and size)*: Not applicable 2g.2 **Analytic Method** *(type of analysis & rationale)*: Not applicable 2g.3 **Testing Results** *(e.g., correlation statistics, comparison of rankings)*: Not applicable	**2g** C☐ P☐ M☐ N☐ NA ☐
2h. Disparities in Care 2h.1 **If measure is stratified, provide stratified results** *(scores by stratified categories/cohorts)*: Not applicable 2h.2 **If disparities have been reported/identified, but measure is not specified to detect disparities, provide follow-up plans:** Not applicable	**2h** C☐ P☐ M☐ N☐ NA ☐
TAP/Workgroup: What are the strengths and weaknesses in relation to the subcriteria for *Scientific Acceptability of Measure Properties?*	**2**
Steering Committee: Overall, to what extent was the criterion, *Scientific Acceptability of Measure Properties*, met? **Rationale:**	***2*** **C** ☐ **P** ☐ **M** ☐ **N** ☐
3. USABILITY	
Extent to which intended audiences (e.g., consumers, purchasers, providers, policy makers) can understand the results of the measure and are likely to find them useful for decision making. (evaluation criteria)	Eval Rating
3a. Meaningful, Understandable, and Useful Information 3a.1 **Current Use:** In use 3a.2 **Use in a public reporting initiative (disclosure of performance results to the public at large)** *(If used in a public reporting initiative, provide name of initiative(s), locations, Web page URL(s). If not publicly reported, state the plans to achieve public reporting within 3 years)*: California (state) Hospital Volume and Utilization Indicators for California http://www.oshpd.ca.gov/HID/Products/PatDischargeData/ResearchReports/HospIPQualInd/Vol-Util_IndicatorsRpt/index.html Colorado (state hospital association) Colorado Hospital Report Card	**3a** C☐ P☐ M☐ N☐

http://www.cohospitalquality.org/index.php?option=com_frontpage&Itemid=1

Illinois (state hospital association)
Illinois Hospitals Caring for You
www.illinoishospitals.org

Kentucky (Norton Healthcare, a hospital system)
Norton Healthcare Quality Report
http://www.nortonhealthcare.com/body.cfm?id=157

New Jersey (state)
Find and Compare Quality Care in NJ Hospitals
http://www.nj.gov/health/healthcarequality/

New York (health care coalition)
New York State Hospital Report Card
http://www.myhealthfinder.com/

Oregon (state)
Oregon Hospital Quality Indicators
http://www.oregon.gov/OHPPR/HQ/

Texas (state)
Reports on Hospital Performance
http://www.dshs.state.tx.us/thcic/

Vermont (state)
Dept of Banking, Insurance, Securities & Health Care Administration Comparison Report
http://www.bishca.state.vt.us/health-care/hospitals-health-care-practitioners/2009-vermont-hospital-report-card

Washington (health care coalition)
Washington State Hospital Report Card
http://www.myhealthfinder.com/wa09/index.php

The measure is also reported on HCUPnet:
http://hcupnet.ahrq.gov/HCUPnet.jsp?Id=EB57801381F71C41&Form=MAINSEL&JS=Y&Action=%3E%3ENext%3E%3E&_MAINSEL=AHRQ%20Quality%20Indicators

This measure is used in the MONAHRQ system that is provided for public reporting and quality improvement throughout the United States: http://monahrq.ahrq.gov/

3a.3 If used in other programs/initiatives (*If used in quality improvement or other programs/initiatives, name of initiative(s), locations, Web page URL(s). If not used for QI, state the plans to achieve use for QI within 3 years***):**
University Healthcare Consortium - An alliance of 103 academic medical centers and 219 of their affiliated hospitals. Reporting the AHRQ QIs to their member hospitals. (see www.uhc.edu. Note: measure results reported to hospitals; not reported on site).

Dallas Fort Worth Hospital Council – Reporting on measure results to over 70 hospitals in Texas (see www.dfwhc.ord. Note: measure results reported to hospitals; not reported on site).

Norton Healthcare - a multi-hospital system in Kentucky (see http://www.nortonhealthcare.com/about/Our_Performance/index.aspx)
Ministry Health Care - a multi-hospital system in Wisconsin (see http://ministryhealth.org/display/router.aspx. Note: measure results reported to hospitals; not reported on site).

Minnesota Hospital Association
http://www.mnhospitals.org/ Note: measure used in quality improvement. Not reported publicly by the association).

This measure is used in the MONAHRQ system that is provided for public reporting and quality improvement throughout the United States: http://monahrq.ahrq.gov/

Testing of Interpretability (*Testing that demonstrates the results are understood by the potential users for public reporting and quality improvement*)
3a.4 **Data/sample** *(description of data/sample and size)*: AHRQ 2007 State Inpatient Databases (SID) with 4,000 hospitals and 30 million adult discharges

3a.5 **Methods** *(e.g., focus group, survey, QI project)*:
A research team from the School of Public Affairs, Baruch College, under contracts with the Department of Public Health, Weill Medical College and Battelle, Inc., has developed a pair of Hospital Quality Model Reports at the request of the Agency for Healthcare Research & Quality (AHRQ). These reports are designed specifically to report comparative information on hospital performance based on the AHRQ Quality Indicators (QIs). The work was done in close collaboration with AHRQ staff and the AHRQ Quality Indicators team.
The Model Reports (discussed immediately above) are based on:
• Extensive search and analysis of the literature on hospital quality measurement and reporting, as well as public reporting on health care quality more broadly;
• Interviews with quality measurement and reporting experts, purchasers, staff of purchasing coalitions, and executives of integrated health care delivery systems who are responsible for quality in their facilities;
• Two focus groups with chief medical officers of hospitals and/or systems and two focus groups with quality managers from a broad mix of hospitals;
• Four focus groups with members of the public who had recently experienced a hospital admission; and
• Four rounds of cognitive interviews (a total of 62 interviews) to test draft versions of the two Model Reports with members of the public with recent hospital experience, basic computer literacy but widely varying levels of education

3a.6 **Results** *(qualitative and/or quantitative results and conclusions)*:
Given the above review of the literature and original research that was conducted, a Model report was the result that could help sponsors use the best evidence on public reports so they are most likely to have the desired effects on quality

3b/3c. Relation to other NQF-endorsed measures

3b.1 **NQF # and Title of similar or related measures:**
Leapfrog survival predicator

(for NQF staff use) **Notes on similar/related endorsed or submitted measures:**

3b. Harmonization
If this measure is related to measure(s) already endorsed by NQF (e.g., same topic, but different target population/setting/data source or different topic but same target population):
3b.2 **Are the measure specifications harmonized? If not, why?**
Leapfrog measure specification is based on the AHRQ QI, but is not reported separately

3b
C☐ P☐ M☐ N☐ NA☐

3c. Distinctive or Additive Value
3c.1 **Describe the distinctive, improved, or additive value this measure provides to existing NQF-endorsed measures:**
The AHRQ QI measure is paried with a risk-adjusted mortality measure

5.1 **If this measure is similar to measure(s) already endorsed by NQF (i.e., on the same topic and the same target population), Describe why it is a more valid or efficient way to measure quality:**
The AHRQ QI measure is paried with a risk-adjusted mortality measure

3c
C☐ P☐ M☐ N☐ NA☐

TAP/Workgroup: What are the strengths and weaknesses in relation to the subcriteria for *Usability?*

3

Steering Committee: Overall, to what extent was the criterion, *Usability*, met? **Rationale:**	**3** C☐ P☐ M☐ N☐
4. FEASIBILITY	
Extent to which the required data are readily available, retrievable without undue burden, and can be implemented for performance measurement. (evaluation criteria)	**Eval Rating**
4a. Data Generated as a Byproduct of Care Processes 4a.1-2 **How are the data elements that are needed to compute measure scores generated?** Coding/abstraction performed by someone other than person obtaining original information (E.g., DRG, ICD-9 codes on claims, chart abstraction for quality measure or registry)	**4a** C☐ P☐ M☐ N☐
4b. Electronic Sources 4b.1 **Are all the data elements available electronically?** (*elements that are needed to compute measure scores are in defined, computer-readable fields, e.g., electronic health record, electronic claims*) Yes 4b.2 **If not, specify the near-term path to achieve electronic capture by most providers.**	**4b** C☐ P☐ M☐ N☐
4c. Exclusions 4c.1 **Do the specified exclusions require additional data sources beyond what is required for the numerator and denominator specifications?** No 4c.2 **If yes, provide justification.**	**4c** C☐ P☐ M☐ N☐ NA☐
4d. Susceptibility to Inaccuracies, Errors, or Unintended Consequences 4d.1 **Identify susceptibility to inaccuracies, errors, or unintended consequences of the measure and describe how these potential problems could be audited. If audited, provide results.** Coding professionals follow detail guidelines, are subject to training and credentialing requirements, peer review and audit. AAA repair volume is measured with great precision, although volume indicators overall are not direct measures of quality and are relatively insensitive. For this reason, this indicator should be used in conjunction with other measures of mortality to ensure that increasing volumes truly improve patient outcomes. The volume-outcome relationship on which this indicator is based may not hold over time, as providers become more experienced or as technology changes.	**4d** C☐ P☐ M☐ N☐
4e. Data Collection Strategy/Implementation 4e.1 **Describe what you have learned/modified as a result of testing and/or operational use of the measure regarding data collection, availability of data/missing data, timing/frequency of data collection, patient confidentiality, time/cost of data collection, other feasibility/ implementation issues:** Low-volume providers may attempt to increase their volume without improving quality of care by performing the procedure on patients who may not qualify or benefit. Additionally, shifting procedures to high-volume providers may impair access to care for certain types of patients. 4e.2 **Costs to implement the measure** (*costs of data collection, fees associated with proprietary measures*)**:** All data necessary to calculate this measure are routinely collected for hospital administrative purposes. The software for calculating the measure is available for free at: http://www.qualityindicators.ahrq.gov/software.htm	**4e** C☐ P☐ M☐ N☐

4e.3 Evidence for costs: All data necessary to calculate this measure are routinely collected for hospital administrative purposes. The software for calculating the measure is available for free at: http://www.qualityindicators.ahrq.gov/software.htm **4e.4 Business case documentation:** All data necessary to calculate this measure are routinely collected for hospital administrative purposes. The software for calculating the measure is available for free at: http://www.qualityindicators.ahrq.gov/software.htm	
TAP/Workgroup: What are the strengths and weaknesses in relation to the subcriteria for *Feasibility?*	**4**
Steering Committee: Overall, to what extent was the criterion, *Feasibility*, met? **Rationale:**	**4** **C☐** **P☐** **M☐** **N☐**
RECOMMENDATION	
(for NQF staff use) **Check if measure is untested and only eligible for time-limited endorsement.**	**Time-limited ☐**
Steering Committee: Do you recommend for endorsement? **Comments:**	**Y☐** **N☐** **A☐**
CONTACT INFORMATION	
Co.1 Measure Steward (Intellectual Property Owner) **Co.1 Organization** Agency for Healthcare Research and Quality, 540 Gaither Road, Rockville, Maryland, 20850 **Co.2 Point of Contact** John, Bott, MSSW, MBA, John.Bott@AHRQ.hhs.gov, 301-427-1317-	
Measure Developer If different from Measure Steward **Co.3 Organization** Agency for Healthcare Research and Quality, 540 Gaither Road, Rockville, Maryland, 20850 **Co.4 Point of Contact** John, Bott, MSSW, MBA, John.Bott@AHRQ.hhs.gov, 301-427-1317-	
Co.5 Submitter If different from Measure Steward POC John, Bott, MSSW, MBA, John.Bott@AHRQ.hhs.gov, 301-427-1317-, Agency for Healthcare Research and Quality	
Co.6 Additional organizations that sponsored/participated in measure development UC Davis, Stanford University, Battelle Memorial Institute	
ADDITIONAL INFORMATION	
Workgroup/Expert Panel involved in measure development **Ad.1 Provide a list of sponsoring organizations and workgroup/panel members' names and organizations. Describe the members' role in measure development.** None	
Ad.2 If adapted, provide name of original measure: None **Ad.3-5 If adapted, provide original specifications URL or attachment**	
Measure Developer/Steward Updates and Ongoing Maintenance	

Ad.6 Year the measure was first released: 2001 **Ad.7 Month and Year of most recent revision:** 10, 2010 **Ad.8 What is your frequency for review/update of this measure?** Annual **Ad.9 When is the next scheduled review/update for this measure?** 05, 2011
Ad.10 Copyright statement/disclaimers: The AHRQ QI software is publicly available; no copyright disclaimers
Ad.11 -13 Additional Information web page URL or attachment:
Date of Submission (*MM/DD/YY*)**:** 06/14/2011

NATIONAL QUALITY FORUM

Measure Evaluation 4.1
December 2009

This form contains the measure information submitted by stewards. Blank fields indicate no information was provided. Attachments also may have been submitted and are provided to reviewers. The subcriteria and most of the footnotes from the evaluation criteria are provided in Word comments within the form and will appear if your cursor is over the highlighted area. Hyperlinks to the evaluation criteria and ratings are provided in each section.

TAP/Workgroup (if utilized)**:** Complete all yellow highlighted areas of the form. Evaluate the extent to which each subcriterion is met. Based on your evaluation, summarize the strengths and weaknesses in each section.

Note: *If there is no TAP or workgroup, the SC also evaluates the subcriteria (yellow highlighted areas).*

Steering Committee: Complete all pink highlighted areas of the form. Review the workgroup/TAP assessment of the subcriteria, noting any areas of disagreement; then evaluate the extent to which each major criterion is met; and finally, indicate your recommendation for the endorsement. Provide the rationale for your ratings.

Evaluation ratings of the extent to which the criteria are met
C = Completely (unquestionably demonstrated to meet the criterion)
P = Partially (demonstrated to partially meet the criterion)
M = Minimally (addressed BUT demonstrated to only minimally meet the criterion)
N = Not at all (NOT addressed; OR incorrectly addressed; OR demonstrated to NOT meet the criterion)
NA = Not applicable (only an option for a few subcriteria as indicated)

(for NQF staff use) **NQF Review #:** 0359 **NQF Project:** Surgery Endorsement Maintenance 2010
MEASURE DESCRIPTIVE INFORMATION
De.1 **Measure Title:** Abdominal Aortic Artery (AAA) Repair Mortality Rate (IQI 11)
De.2 **Brief description of measure***:* Percent of discharges with procedure code of AAA repair with an in-hospital death.
1.1-2 **Type of Measure:** Outcome De.3 **If included in a composite or paired with another measure, please identify composite or paired measure** Abdominal Aortic Artery (AAA) Repair Volume (IQI 4) (NQF #0357)
De.4 **National Priority Partners Priority Area:** Population health, Safety De.5 **IOM Quality Domain**: Effectiveness, Safety De.6 **Consumer Care Need:** Getting better

CONDITIONS FOR CONSIDERATION BY NQF	
Four conditions must be met before proposed measures may be considered and evaluated for suitability as voluntary consensus standards:	**NQF Staff**
A. The measure is in the public domain or an intellectual property (measure steward agreement) is signed. *Public domain only applies to governmental organizations. All non-government organizations must sign a measure steward agreement even if measures are made publicly and freely available.* A.1 **Do you attest that the measure steward holds intellectual property rights to the measure and the right to use aspects of the measure owned by another entity (e.g., risk model, code set)?** Yes A.2 **Indicate if Proprietary Measure** (*as defined in measure steward agreement*)**:** A.3 **Measure Steward Agreement:** Government entity and in the public domain - no agreement necessary A.4 **Measure Steward Agreement attached:**	**A** Y☐ N☐
B. The measure owner/steward verifies there is an identified responsible entity and process to maintain and update the measure on a schedule that is commensurate with the rate of clinical innovation, but at least	**B** Y☐

every 3 years. Yes, information provided in contact section	N☐
C. The intended use of the measure includes both public reporting and quality improvement. ►**Purpose:** Public Reporting, Quality Improvement (Internal to the specific organization)	C Y☐ N☐
D. The requested measure submission information is complete. Generally, measures should be fully developed and tested so that all the evaluation criteria have been addressed and information needed to evaluate the measure is provided. Measures that have not been tested are only potentially eligible for a time-limited endorsement and in that case, measure owners must verify that testing will be completed within 12 months of endorsement. D.1**Testing:** Yes, fully developed and tested D.2 **Have NQF-endorsed measures been reviewed to identify if there are similar or related measures?** Yes	D Y☐ N☐
(for NQF staff use) **Have all conditions for consideration been met?** **Staff Notes to Steward** (*if submission returned*)**:**	Met Y☐ N☐
Staff Notes to Reviewers (*issues or questions regarding any criteria*)**:**	
Staff Reviewer Name(s):	

TAP/Workgroup Reviewer Name:	
Steering Committee Reviewer Name:	
1. IMPORTANCE TO MEASURE AND REPORT	
Extent to which the specific measure focus is important to making significant gains in health care quality (safety, timeliness, effectiveness, efficiency, equity, patient-centeredness) and improving health outcomes for a specific high impact aspect of healthcare where there is variation in or overall poor performance. ***Measures must be judged to be important to measure and report*** *in order to be evaluated against the remaining criteria.* (evaluation criteria) **1a. High Impact**	Eval Rating
(for NQF staff use) **Specific NPP goal**:	
1a.1 **Demonstrated High Impact Aspect of Healthcare:** Patient/societal consequences of poor quality 1a.2 1a.3 **Summary of Evidence of High Impact:** The correlation between hospital or physician characteristics and in-hospital mortality in most studies supports the validity of in-hospital mortality as a measure of quality. [1] [2] Finally, excessive blood loss, which is a potentially preventable complication of surgery, has been identified as the most important predictor of mortality after elective AAA repair. [3] Empirical evidence shows that AAA repair mortality is positively related to other post-procedural mortality measures, such as craniotomy (r=.28, p<.0001) and coronary artery bypass graft (CABG) (r=.17, p<.01). [4] 1a.4 **Citations for Evidence of High Impact:** Updated citations will be presented in the May Steering Committee meeting [1] Pearce WH, Parker MA, Feinglass J, et al. The importance of surgeon volume and training in outcomes for vascular surgical procedures. J Vasc Surg 1999;29(5):768-76. [2] Rutledge R, Oller DW, Meyer AA, et al. A statewide, population-based time-series analysis of the outcome of ruptured abdominal aortic aneurysm. Ann Surg 1996;223(5):492-502. [3] Pilcher DB, Davis JH, Ashikaga T, et al. Treatment of abdominal aortic aneurysm in an entire state over 7½ years. Am J Surg 1980;139(4):487-94. [4] Nationwide Inpatient Sample.	1a C☐ P☐ M☐ N☐
1b. Opportunity for Improvement 1b.1 **Benefits (improvements in quality) envisioned by use of this measure:** Abdominal aortic aneurysm	1b C☐ P☐

(AAA) repair is a relatively rare procedure that requires proficiency with the use of complex equipment; and technical errors may lead to clinically significant complications, such as arrhythmias, acute myocardial infarction, colonic ischemia, and death. Better processes of care may reduce mortality for AAA repair, which represents better quality care.

M☐
N☐

1b.2 Summary of data demonstrating performance gap (variation or overall poor performance) across providers:

Adjusted per 1,000 rates by patient/hospital characteristics, 2007

Estimate	Standard error	Age: for conditions affecting any age
*	*	18-44
23.652	1.960	45-64
66.393	1.451	65 and over

Estimate	Standard error	Age: for conditions affecting elderly
43.864	2.381	65-69
50.251	2.498	70-74
79.688	3.095	75-79
72.624	3.695	80-84
107.763	6.188	85 and over

Estimate	Standard error	Gender
51.876	1.339	Male
90.433	3.249	Female

Estimate	Standard error	Median income of patient´s ZIP code
59.088	2.445	First quartile (lowest income)
54.793	2.336	Second quartile
58.174	2.397	Third quartile
54.942	2.561	Fourth quartile (highest income)

Estimate	Standard error	Location of patient residence (NCHS)
48.893	2.572	Large central metropolitan
57.852	2.538	Large fringe metropolitan
57.678	2.492	Medium metropolitan
64.648	3.682	Small metropolitan
56.657	3.484	Micropolitan
62.375	4.327	Not metropolitan or micropolitan

Estimate	Standard error	Expected payment source
45.140	3.185	Private insurance
57.658	1.353	Medicare
85.285	9.645	Medicaid
76.100	9.933	Other insurance
73.418	9.344	Uninsured / self-pay / no charge

Estimate	Standard error	Hospital Ownership/control
56.433	1.380	Private, not-for-profit
56.869	3.651	Private, for-profit

58.869	3.602	Public

Estimate	Standard error	Teaching status
52.177	1.899	Teaching
59.950	1.582	Nonteaching

Estimate	Standard error	Location of hospital
49.673	2.096	Large central metropolitan
59.498	2.865	Large fringe metropolitan
57.560	2.322	Medium metropolitan
68.001	3.190	Small metropolitan
60.056	4.952	Micropolitan
*	*	Not metropolitan or micropolitan

Estimate	Standard error	Bed size of hospital
55.838	6.706	Less than 100
66.185	2.122	100 - 299
54.707	1.998	300 - 499
48.492	2.343	500 or more

1b.3 Citations for data on performance gap:
See the following report for a complete treatment of the methodology: "Methods: Applying AHRQ Quality Indicators to Healthcare Cost and Utilization Project (HCUP) Data for the National Healthcare Quality Report" [URL: http://hcupnet.ahrq.gov/QI%20Methods.pdf?JS=Y]

1b.4 Summary of Data on disparities by population group:
Information on results by geographic areas noted below. Also 1b2 provides results by age, gender, income, micropolitian and metropolitian and payer.

Adjusted per 1,000 rates by patient and hospital characteristics, 2007

Mean	Standard error	Location	P-value: Relative to Northeast
61.859	2.711	Northeast	1.000
49.824	2.554	Midwest	0.001
53.232	2.053	South	0.011
65.177	2.577	West	0.375

RACE / ETHNICITY
Rate per 100

White	4.52
Black	5.48
Hispanic	5.40
Asian and NH/PI	5.33
Amer Indian/AN	4.58
Other	4.66

Source: 2008 State Inpatient Databases (SID) (N=39,963)

1b.5 Citations for data on Disparities:
See the following report for a complete treatment of the methodology: "Methods: Applying AHRQ Quality Indicators to Healthcare Cost and Utilization Project (HCUP) Data for the National Healthcare Quality Report"

[URL: http://hcupnet.ahrq.gov/QI%20Methods.pdf?JS=Y]

1c. Outcome or Evidence to Support Measure Focus

1c.1 Relationship to Outcomes (*For non-outcome measures, briefly describe the relationship to desired outcome. For outcomes, describe why it is relevant to the target population*)**:** Abdominal aortic aneurysm (AAA) repair is a relatively rare procedure that requires proficiency with the use of complex equipment; and technical errors may lead to clinically significant complications, such as arrhythmias, acute myocardial infarction, colonic ischemia, and death. Better processes of care may reduce mortality for AAA repair, which represents better quality care.

1c.2-3. Type of Evidence: Expert opinion, Systematic synthesis of research

1c.4 Summary of Evidence (*as described in the criteria; for outcomes, summarize any evidence that healthcare services/care processes influence the outcome*)**:**
Most studies published since 1985 showed a significant association between either hospital or surgeon volume and inpatient mortality after AAA repair, although these findings may be limited by inadequate risk adjustment of the outcome measure and differ by type of aneurysms (intact vs. ruptured) being considered. Several studies have explored whether experience on related, but not identical, cases may lead to improved outcomes. One study found that hospital volume of surgery for ruptured aneurysms was not associated with postoperative inpatient mortality, but it was associated with fewer inpatient deaths for ruptured aneurysms, suggesting that high-volume hospitals may manage ruptured aneurysms more aggressively. [1] One study that evaluated the impact of total vascular surgery volume found a significant effect for both ruptured and intact aneurysms. [2] Empirical evidence shows that AAA repair volume and mortality—after adjusting for age, sex, and APR-DRG—are independently and negatively correlated with each other ($r=-.35$, $p<.001$). [3]

In some recent studies, in-hospital mortality rates for Abdominal Aortic Aneurysm (AAA) Repair Mortality were unchanged over time. The IQIs are easily applied to VA administrative data. They can be useful to tracks rate trends over time, reveal variation between sites, and for trend comparisons with other healthcare systems. [4]

The existence of a board quality committee was associated with higher likelihoods of adopting various oversight practices and lower mortality rates for abdominal aortic aneurysm repair measured by the Agency for Healthcare Research and Quality´s Inpatient Quality Indicators and the State Inpatient Databases. [5]

In assessing the ability of hospital mortality rankings to predict future performance, reliability adjustment was particularly important for pancreatic resection and AAA repair, hospital rankings based on reliability-adjusted mortality were superior at identifying hospitals likely to have the lowest future mortality. Without reliability adjustment, hospitals in the "best" quintile (2003-2004) with pancreatic resection had a mortality of 7.6 percent in 2005-2006; with reliability adjustment, the "best" hospital quintile had a mortality of 2.7 percent in 2003-2006. Similarly, without reliability adjustment, hospitals in the "best" quintile (2003-2004) with AAA repair had a mortality of 4.0 percent in 2005-2006; with reliability adjustment, the "best" hospital quintile had a mortality of 3.2 percent in 2005-2006. [6]

1c.5 Rating of strength/quality of evidence (*also provide narrative description of the rating and by whom***):**
B. Testing, rating, and review were conducted by the project team. A full report on the literature review and empirical evaluation can be found in Refinement of the HCUP Quality Indicators by the UCSF-Stanford EPC, Detailed coding information for each QI is provided in the document Prevention Quality Indicators Technical Specifications. Rating of performance on empirical evaluations, ranged from 0 to 26. The scores were intended as a guide for summarizing the performance of each indicator on four empirical tests of precision (signal variance, area-level share, signal ratio, and R-squared) and five tests of minimum bias (rank correlation, top and bottom decile movement, absolute change, and change over two deciles)

1c.6 Method for rating evidence: The project team conducted extensive empirical testing of all potential indicators using the 1995-97 HCUP State Inpatient Databases (SID) and Nationwide Inpatient Sample (NIS) to determine precision, bias, and construct validity. The 1997 SID contains uniform data on inpatient stays in community hospitals for 22 States covering approximately 60% of all U.S. hospital discharges. The NIS is designed to approximate a 20% of U.S. community hospitals and includes all stays in the sampled hospitals. Each year of the NIS contains between 6 million and 7 million records from about 1,000 hospitals. The NIS

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combines a subset of the SID data, hospital-level variables, and hospital and discharge weights for producing national estimates. The project team conducted tests to examine three things: precision, bias, and construct validity.

Precision. The first step in the analysis involved precision tests to determine the reliability of the indicator for distinguishing real differences in provider performance. For indicators that may be used for quality improvement, it is important to know with what precision, or surety, a measure can be attributed to an actual construct rather than random variation.

For each indicator, the variance can be broken down into three components: variation within a provider (actual differences in performance due to differing patient characteristics), variation among providers (actual differences in performance among providers), and random variation. An ideal indicator would have a substantial amount of the variance explained by between-provider variance, possibly resulting from differences in quality of care, and a minimum amount of random variation. The project team performed four tests of precision to estimate the magnitude of between-provider variance on each indicator:

• Signal standard deviation was used to measure the extent to which performance of the QI varies systematically across hospitals or areas.

• Provider/area variation share was used to calculate the percentage of signal (or true) variance relative to the total variance of the QI.

• Signal-to-noise ratio was used to measure the percentage of the apparent variation in QIs across providers that is truly related to systematic differences across providers and not random variations (noise) from year to year.

• In-sample R-squared was used to identify the incremental benefit of applying multivariate signal extraction methods for identifying additional signal on top of the signal-to-noise ratio.

In general, random variation is most problematic when there are relatively few observations per provider, when adverse outcome rates are relatively low, and when providers have little control over patient outcomes or variation in important processes of care is minimal. If a large number of patient factors that are difficult to observe influence whether or not a patient has an adverse outcome, it may be difficult to separate the "quality signal" from the surrounding noise. Two signal extraction techniques were applied to improve the precision of an indicator:

• Univariate methods were used to estimate the "true" quality signal of an indicator based on information from the specific indicator and 1 year of data.

• Multivariate signal extraction (MSX) methods were used to estimate the "true" quality signal based on information from a set of indicators and multiple years of data. In most cases, MSX methods extracted additional signal, which provided much more precise estimates of true hospital or area quality.

Bias. To determine the sensitivity of potential QIs to bias from differences in patient severity, unadjusted performance measures for specific hospitals were compared with performance measures that had been adjusted for age and gender. All of the PQIs and some of the Inpatient Quality Indicators (IQIs) could only be risk-adjusted for age and sex. The 3M™ APR-DRG System Version 12 with Severity of Illness and Risk of Mortality subclasses was used for risk adjustment of the utilization indicators and the in-hospital mortality indicators, respectively. Five empirical tests were performed to investigate the degree of bias in an indicator:

• Rank correlation coefficient of the area or hospital with (and without) risk adjustment—gives the overall impact of risk adjustment on relative provider or area performance.

• Average absolute value of change relative to mean—highlights the amount of absolute change in performance, without reference to other providers' performance.

• Percentage of highly ranked hospitals that remain in high decile—reports the percentage of hospitals or areas that are in the highest deciles without risk adjustment that remain there after risk adjustment is performed.

• Percentage of lowly ranked hospitals that remain in low decile—reports the percentage of hospitals or areas that are in the lowest deciles without risk adjustment that remain there after risk adjustment is performed.

• Percentage that change more than two deciles—identifies the percentage of hospitals whose relative rank changes by a substantial percentage (more than 20%) with and without risk adjustment.

Construct validity. Construct validity analyses provided information regarding the relatedness or independence of the indicators. If quality indicators do indeed measure quality, then two measures of the same construct would be expected to yield similar results. The team used factor analysis to reveal underlying patterns among large numbers of variables—in this case, to measure the degree of relatedness between indicators. In addition, they analyzed correlation matrices for indicators.

1c.7 **Summary of Controversy/Contradictory Evidence:** Some users have questioned the inclusion of both ruptured and unruptured AAA in the denominator. However, the risk-adjustment model was well calibrated

for these classes of patients. We also included ruptured status as a covariate in the model to improve the calibration further.

1c.8 **Citations for Evidence (***other than guidelines***):** Updated citations will be presented in the May Steering Committee meeting

[1] Kantonen I, Lepantalo M, Brommels M, et al. Mortality in ruptured abdominal aortic aneurysms. The Finnvasc Study Group. . Eur J Vasc Endovasc Surg 1999;17(3):208-12.
[2] Amundsen S, Skjaerven R, Trippestad A, et al. Abdominal aortic aneurysms. Is there an association between surgical volume, surgical experience, hospital type and operative mortality? Members of the Norwegian Abdominal Aortic Aneurysm Trial. Acta Chir Scand 1990;156(4):323-7; discussion 327-8.
[3] Nationwide Inpatient Sample (NIS). http://hcupnet.ahrq.gov/
[4] Borzecki AM, Christiansen CL, Loveland S, Chew P, Rosen AK. Trends in the inpatient quality indicators: the Veterans Health Administration experience. Med Care. 2010 Aug;48(8):694-702.
[5] Jiang, H. Joanna; Lockee, Carlin; Bass, Karma; Fraser, Irene; Kiely, Robert. (2008). Board engagement in quality: findings of a survey of hospital and system leaders. Journal of Healthcare Management, 53, 2, 121(15)
[6] Dimick, Justin B.; Staiger, Douglas O.; Birkmeyer, John D. Ranking hospitals on surgical mortality: the importance of reliability adjustment. Health Serv Res. 2010 Dec;45(6 Pt 1):1614-29. doi: 10.1111/j.1475-6773.2010.01158.x. Epub 2010 Aug 16.

1c.9 **Quote the Specific guideline recommendation (***including guideline number and/or page number***):** EVAR for AAA represents an advance in patient care, serving as an effective alternative to traditional open surgical AAA repair, and is now the most common treatment method for AAA repair in the United States.

1c.10 **Clinical Practice Guideline Citation:** http://www.sirweb.org/clinical/cpg/QI12.pdf
1c.11 **National Guideline Clearinghouse or other URL:** Not Applicable

1c.12 **Rating of strength of recommendation (***also provide narrative description of the rating and by whom***):** Not Applicable

1c.13 **Method for rating strength of recommendation** (*If different from USPSTF system, also describe rating and how it relates to USPSTF)*:
Not Applicable

1c.14 **Rationale for using this guideline over others:**
Not Applicable

TAP/Workgroup: What are the strengths and weaknesses in relation to the subcriteria for *Importance to Measure and Report?*	**1**
Steering Committee: Was the threshold criterion, *Importance to Measure and Report*, met? **Rationale:**	**1** **Y☐** **N☐**
2. SCIENTIFIC ACCEPTABILITY OF MEASURE PROPERTIES	
Extent to which the measure, as specified, produces consistent (reliable) and credible (valid) results about the quality of care when implemented. (evaluation criteria)	**Eval Rating**
2a. MEASURE SPECIFICATIONS	
S.1 **Do you have a web page where current detailed measure specifications can be obtained?** S.2 **If yes, provide web page URL:** **2a. Precisely Specified**	**2a-specs** **C☐** **P☐** **M☐** **N☐**
2a.1 **Numerator Statement (***Brief, text description of the numerator - what is being measured about the target population, e.g. target condition, event, or outcome***):** Number of deaths (DISP=20) among cases meeting the inclusion and exclusion rules for the denominator.	

2a.2 Numerator Time Window (*The time period in which cases are eligible for inclusion in the numerator***):**
Time window can be determined by user, but is generally a calendar year.

2a.3 Numerator Details (*All information required to collect/calculate the numerator, including all codes, logic, and definitions***):**
Number of deaths (DISP=20) among cases meeting the inclusion and exclusion rules for the denominator.

2a.4 Denominator Statement (*Brief, text description of the denominator - target population being measured***):**
Discharges, age 18 years and older, with ICD-9-CM AAA repair code procedure and a diagnosis of AAA in any field.

2a.5 Target population gender: Female, Male
2a.6 Target population age range: 18 and older

2a.7 Denominator Time Window (*The time period in which cases are eligible for inclusion in the denominator***):**
Time window can be determined by user, but is generally a calendar year.

2a.8 Denominator Details (*All information required to collect/calculate the denominator - the target population being measured - including all codes, logic, and definitions***):**
Discharges, age 18 years and older, with ICD-9-CM AAA repair code procedure and a diagnosis of AAA in any field.
ICD-9-CM AAA repair procedure codes:
3834
AORTA RESECTION & ANAST
3844
RESECT ABDM AORTA W REPL
3864
EXCISION OF AORTA
3971
ENDO IMPLANT OF GRAFT IN AORTA

ICD-9-CM AAA diagnosis codes:
4413
RUPT ABD AORTIC ANEURYSM
4414
ABDOM AORTIC ANEURYSM

Exclude cases:
• missing discharge disposition (DISP=missing), gender (SEX=missing), age (AGE=missing), quarter (DQTR=missing), year (YEAR=missing) or principal diagnosis (DX1 =missing)
• transferring to another short-term hospital (DISP=2)
• MDC 14 (pregnancy, childbirth, and puerperium)

2a.9 Denominator Exclusions (*Brief text description of exclusions from the target population***):** Exclude cases:
• missing discharge disposition (DISP=missing), gender (SEX=missing), age (AGE=missing), quarter (DQTR=missing), year (YEAR=missing) or principal diagnosis (DX1 =missing)
• transferring to another short-term hospital (DISP=2)
• MDC 14 (pregnancy, childbirth, and puerperium)

2a.10 Denominator Exclusion Details (*All information required to collect exclusions to the denominator, including all codes, logic, and definitions***):**
Exclude cases:
• missing discharge disposition (DISP=missing), gender (SEX=missing), age (AGE=missing), quarter (DQTR=missing), year (YEAR=missing) or principal diagnosis (DX1 =missing)
• transferring to another short-term hospital (DISP=2)

• MDC 14 (pregnancy, childbirth, and puerperium)

2a.11 Stratification Details/Variables (*All information required to stratify the measure including the stratification variables, all codes, logic, and definitions***):**
Gender, age (5-year age groups), race / ethnicity, primary payer, custom

Stratify the measure by endovascular and open repairs and stratify by ruptured vs. un-ruptured aneurysm; however, additional methodological development will be required to ensure the measures have adequate reliability; b) the risk stratification model is specified below; c) the model has been validated on the State Inpatient Databases (SID), which consists of hospital discharge data from 40 states (constituting about 90% of hospital discharges in the U.S) for the years 2001-2008

2a.12-13 Risk Adjustment Type: Risk adjustment method widely or commercially available

2a.14 Risk Adjustment Methodology/Variables (*List risk adjustment variables and describe conceptual models, statistical models, or other aspects of model or method***):**
The predicted value for each case is computed using a hierarchical model (logistic regression with hospital random effect) and covariates for gender, age in years (in 5-year age groups), All Patient Refined-Diagnosis Related Group (APR-DRG) and APR-DRG risk-of-mortality subclass. The reference population used in the model is the universe of discharges for states that participate in the HCUP State Inpatient Databases (SID) for the year 2007 (updated annually), a database consisting of 43 states and approximately 30 million adult discharges. The expected rate is computed as the sum of the predicted value for each case divided by the number of cases for the unit of analysis of interest (i.e., hospital, state, and region). The risk adjusted rate is computed using indirect standardization as the observed rate divided by the expected rate, multiplied by the reference population rate.Risk adjustment factors: sex
age 18-24; age 25-29; age 30-34; age 35-39; age 40-44; age 45-49; age 50-54; age 55-59; age 60-64; age 65-69; age 70-74; age 75-79; age 80-84; age 85+
each age category*female
ADRG 1731 (other vascular procedures-minor)
ADRG 1732 (other vascular procedures-moderate)
ADRG 1733 (other vascular procedures-major)
ADRG 1734 (other vascular procedures-extreme)
ADRG 1691 (major thoracic and abdominal vascular procedures-minor)
ADRG 1692 (major thoracic and abdominal vascular procedures-moderate)
ADRG 1693 (major thoracic and abdominal vascular procedures-major)
ADRG 1694 (major thoracic and abdominal vascular procedures-extreme
ADRG 9999 (other)

2a.15-17 Detailed risk model available Web page URL or attachment: URL None
http://qualityindicators.ahrq.gov/downloads/iqi/IQI_Risk_Adjustment_Tables_(Version_4_2).pdf

2a.18-19 Type of Score: Rate/proportion
2a.20 Interpretation of Score: Better quality = Lower score
2a.21 Calculation Algorithm (*Describe the calculation of the measure as a flowchart or series of steps***):**
Each indicator is expressed as a rate, is defined as outcome of interest / population at risk or numerator / denominator. The AHRQ Quality Indicators (AHRQ QI) software performs five steps to produce the rates. 1) Discharge-level data is used to mark inpatient records containing the outcome of interest and 2) the population at risk. For provider indicators, the population at risk is also derived from hospital discharge records; for area indicators, the population at risk is derived from U.S. Census data. 3) Calculate observed rates. Using output from steps 1 and 2, rates are calculated for user-specified combinations of stratifiers. 4) Calculate expected rates. Regression coefficients from a reference population database are applied to the discharge records and aggregated to the provider or area level. 5) Calculate risk-adjusted rate. Use the indirect standardization to account for case-mix. 6) Calculate smoothed rate. A Univariate shrinkage factor is applied to the risk-adjusted rates. The shrinkage estimate reflects a reliability adjustment unique to each indicator. Full information on calculation algorithms and specifications can be found at http://qualityindicators.ahrq.gov/IQI_download.htm

2a.22 Describe the method for discriminating performance *(e.g., significance testing)***:**
Significance testing is not prescribed by the software. Users may calculate a confidence interval for the risk-adjusted rates and a posterior probability interval for the smoothed rates at a 95% or 99% level. Users may

define the relevant benchmark and the methods of discriminating performance according to their application.

2a.23 Sampling (Survey) Methodology *If measure is based on a sample (or survey), provide instructions for obtaining the sample, conducting the survey and guidance on minimum sample size (response rate)*:
Not applicable.

2a.24 Data Source (*Check the source(s) for which the measure is specified and tested)*
Administrative claims

2a.25 Data source/data collection instrument (*Identify the specific data source/data collection instrument, e.g. name of database, clinical registry, collection instrument, etc.***):**
The data source is hospital discharge data such as the HCUP State Inpatient Databases (SID) or equivalent using UB-04 coding standards. The data collection instrument is public-use AHRQ QI software available in SAS or Windows versions

2a.26-28 Data source/data collection instrument reference web page URL or attachment: URL None
http://www.qualityindicators.ahrq.gov/software.htm

2a.29-31 Data dictionary/code table web page URL or attachment: URL None
http://www.qualityindicators.ahrq.gov/downloads/winqi/AHRQ_QI_Windows_Software_Documentation_V41a.pdf

2a.32-35 Level of Measurement/Analysis (*Check the level(s) for which the measure is specified and tested)*
Facility

2a.36-37 Care Settings (*Check the setting(s) for which the measure is specified and tested)*
Hospital/Acute Care Facility

2a.38-41 Clinical Services (*Healthcare services being measured, check all that apply*)
Clinicians: Physicians (MD/DO)

TESTING/ANALYSIS

2b. Reliability testing

2b.1 Data/sample *(description of data/sample and size)*: AHRQ 2007 State Inpatient Databases (SID) with 4,000 hospitals and 30 million adult discharges

2b.2 Analytic Method *(type of reliability & rationale, method for testing)*:
Literature summary, expert panels and empirical analysis

2b.3 Testing Results *(reliability statistics, assessment of adequacy in the context of norms for the test conducted)*:
The relatively small number of AAA resections performed by each hospital suggests that mortality rates at the hospital level are likely to be unreliable. Empirical evidence shows that his indicator is precise, with a raw provider level mean of 21.5% and a substantial standard deviation of 26.8%.87
Relative to other indicators, a higher percentage of the variation occurs at the provider level, rather than the discharge level. The signal ratio (i.e., the proportion of the total variation across providers that is truly related to systematic differences in provider performance rather than random variation) is low, at 30.7%, indicating that some of the observed differences in provider performance.

2. The signal to noise ratio is the ratio of the between hospital variance (signal) to the within hospital variance (noise). The formula is signal / (signal + noise). The ratio itself is only a diagnostic for the degree of variance in the risk-adjusted rate systematically associated with the provider. Therefore, what matters is the magnitude of the variance in the "smoothed" rate (that is, the variance in the risk-adjusted rate after the application of the univariate shrinkage estimator based on the signal ratio). What the data demonstrate is systematic variation in the provider level rate of 2.6 to 7.6 per 100 from the 5th to 95th percentile after a signal ratio of 0.307 is applied as the shrinkage estimator (that is, after accounting for variation due to random factors).

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Table 3. Risk Adjustment Coefficients for IQI #11— AAA Repair Mortality

Parameter	Label	DF	Estimate	Standard Error	Wald Chi-Square	Pr > Chi-Square
Intercept		1	-6.6044	0.1713	1486.04	0.0000
Sex	Female	1	0.4539	0.0747	36.95	0.0000
Age	65 to 74	1	0.4879	0.1072	20.72	0.0000
Age	75 to 79	1	0.8737	0.1201	52.97	0.0000
Age	80 to 84	1	1.1092	0.1200	85.50	0.0000
Age	85+	1	1.4440	0.1359	112.97	0.0000
APR-DRG	'1691' to '1692'	1	1.6789	0.1623	107.05	0.0000
APR-DRG	'1693' to '1694'	1	3.9127	0.1523	659.72	0.0000
APR-DRG	'1733' to '1734'	1	3.1568	0.1676	354.55	0.0000
MDC	5	1	2.6400	0.1483	316.85	0.0000
MDC	Other	1	2.9536	0.2252	172.05	0.0000
RUPTURED		1	2.0565	0.0808	647.42	0.0000
c-statistic	0.937					

2c. Validity testing

2c.1 Data/sample *(description of data/sample and size)*: AHRQ 2007 State Inpatient Databases (SID) with 4,000 hospitals and 30 million adult discharges surgery, has been identified as the most important predictor of mortality after elective AAA repair.93
Empirical evidence shows that AAA repair mortality is positively related to other post-procedural mortality measures, such as craniotomy (r=.28, p<.0001) and coronary artery bypass graft (CABG) (r=.17, p<.01).94

Veterans Integrated Service Networks´ (VISNs); and VA versus non-VA (Nationwide Inpatient Sample) using VA inpatient data (2004-2007). [1]

A survey of hospital and system leaders (presidents/chief executive officers (CEOs)) that was conducted in the first six months of 2006 with a total of 562 respondents. Hospital-level data for these composite measures were produced by applying the IQI to the State Inpatient Databases (SID) of the Healthcare Cost and Utilization Project (HCUP) sponsored by AHRQ. The SID includes all-payer data on inpatient stays from virtually all community hospitals in each participating state. [2]

We used 100 percent national analytic files from the CMS for the calendar years 2003 through 2006. Medicare Provider Analysis and Review (MEDPAR) files, which contain hospital discharge abstracts for all fee-for-service acute care hospitalizations of all U.S. Medicare recipients, were used to create our main analytical datasets. The Medicare denominator file was used to assess patient vital status at 30 days. Using appropriate procedure codes fiom the International Classification of Diseases, version 9 (ICD-9 codes), we identified all patients aged 65-99 undergoing elective AAA repair and pancreatectomy. [3]

2c.2 Analytic Method *(type of validity & rationale, method for testing)*:
Literature summary, expert panels and empirical analysis

VA-and VISN-level IQI observed rates, risk-adjusted rates, and observed to expected ratios (O/Es). We examined the trends in VA-and VISN-level rates using weighted linear regression, variation in VISN-level O/Es, and compared VA to non-VA trends. [1]

A t-test was used to determine the significance of differences in quality measures. [2]

We first estimated risk-adjusted hospital mortality rates during 2003-2004. We defined mortality as death within 30 days of operation or before hospital discharge. We adjusted for patient age, gender, race, urgency of operation, median ZIP-code income, and coexisting medical conditions. Using logistic regression, we estimated the expected number of deaths in each hospital and then divided the observed deaths by this expected number of deaths to obtain the ratio of observed to expected mortality (O/E ratio). We then multiplied the O/E ratio by the average mortality rate to obtain a risk-adjusted mortality rate for each hospital. We next used hierarchical modeling techniques to adjust these mortality estimates for reliability. Using random effects logistic regression models, we generated empirical Bayes predictions of mortality for each hospital. [3]

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2c.3 Testing Results *(statistical results, assessment of adequacy in the context of norms for the test conducted)*:
The correlation between hospital or physician characteristics and in-hospital mortality in most studies supports the validity of in-hospital mortality as a measure of quality.[1, 2] Finally, excessive blood loss, which is a potentially preventable complication of surgery, has been identified as the most important predictor of mortality after elective AAA repair.[3]
Empirical evidence shows that AAA repair mortality is positively related to other post-procedural mortality measures, such as craniotomy (r=.28, p<.0001) and coronary artery bypass graft (CABG) (r=.17, p<.01).94
References:
[1] WH, Parker MA, Feinglass J, et al. The importance of surgeon volume and training in outcomes for vascular surgical procedures. J Vasc Surg 1999;29(5):768-76.

[2] Rutledge R, Oller DW, Meyer AA, et al. A statewide, population-based time-series analysis of the outcome of
ruptured abdominal aortic aneurysm. Ann Surg 1996;223(5):492-502.

[3]Pilcher DB, Davis JH, Ashikaga T, et al. Treatment of abdominal aortic aneurysm in an entire state over 7½ years. Am J Surg 1980;139(4):487-94.

[4]Nationwide Inpatient Sample.
VA in-hospital mortality rates for Abdominal Aortic Aneurysm (AAA) Repair Mortality were unchanged over time. The IQIs are easily applied to VA administrative data. They can be useful to tracks rate trends over time, reveal variation between sites, and for trend comparisons with other healthcare systems. [1]

The existence of a board quality committee was associated with higher likelihoods of adopting various oversight practices and lower mortality rates for abdominal aortic aneurysm repair measured by the Agency for Healthcare Research and Quality´s Inpatient Quality Indicators and the State Inpatient Databases. [2]

In assessing the ability of hospital mortality rankings to predict future performance, reliability adjustment was particularly important for pancreatic resection and AAA repair, hospital rankings based on reliability-adjusted mortality were superior at identifying hospitals likely to have the lowest future mortality. Without reliability adjustment, hospitals in the "best" quintile (2003-2004) with pancreatic resection had
a mortality of 7.6 percent in 2005-2006; with reliability adjustment, the "best" hospital quintile had a mortality of 2.7 percent in 2003-2006. Similarly, without reliability adjustment, hospitals in the "best" quintile (2003-2004) with AAA repair had a mortality of 4.0 percent in 2005-2006; with reliability adjustment, the "best" hospital quintile had a mortality of 3.2 percent in 2005-2006. [3]

References
[1] Borzecki AM, Christiansen CL, Loveland S, Chew P, Rosen AK. Trends in the inpatient quality indicators: the Veterans Health Administration experience. Med Care. 2010 Aug;48(8):694-702.
[2] Jiang, H. Joanna; Lockee, Carlin; Bass, Karma; Fraser, Irene; Kiely, Robert. (2008). Board engagement in quality: findings of a survey of hospital and system leaders. Journal of Healthcare Management, 53, 2, 121(15)
[3] Dimick, Justin B.; Staiger, Douglas O.; Birkmeyer, John D. Ranking hospitals on surgical mortality: the importance of reliability adjustment. Health Serv Res. 2010 Dec;45(6 Pt 1):1614-29. doi: 10.1111/j.1475-6773.2010.01158.x. Epub 2010 Aug 16.

2d. Exclusions Justified

2d.1 Summary of Evidence supporting exclusion(s):
Exclusions remove cases where the outcome of interest is less likely to be preventable or more likely to be preventable or with no or very low risk

2d.2 Citations for Evidence:
Updated citations will be presented in the May Steering Committee meeting

Refinement of the HCUP Quality Indicators (Technical Review), May 2001
http://qualityindicators.ahrq.gov/downloads/technical/qi_technical_review.zip

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N☐
NA☐

2d.3 Data/sample *(description of data/sample and size)*: AHRQ 2007 State Inpatient Databases (SID) with 4,000 hospitals and 30 million adult discharges

2d.4 Analytic Method *(type analysis & rationale)*:
Expert panel and descriptive analyses stratified by exclusion categories

2d.5 Testing Results *(e.g., frequency, variability, sensitivity analyses)*:
Refinement of the HCUP Quality Indicators (Technical Review), May 2001
http://qualityindicators.ahrq.gov/downloads/technical/qi_technical_review.zip

2e. Risk Adjustment for Outcomes/ Resource Use Measures

2e.1 Data/sample *(description of data/sample and size)*: AHRQ 2007 State Inpatient Databases (SID) with 4,000 hospitals and 30 million adult discharges

2e.2 Analytic Method *(type of risk adjustment, analysis, & rationale)*:
Risk-adjustment models use a standard set of categories based on readily available classification systems for demographics, severity of illness and comorbidities. Within each category, covariates are initially selected based on a minimum of 30 cases in the outcome of interest. Then a stepwise regression process on a development sample is used to select a parsimonious set of covariates where p<.05. Model is then tested on a validation sample

2e.3 Testing Results *(risk model performance metrics)*:
c 0.909

2e.4 If outcome or resource use measure is not risk adjusted, provide rationale: Not applicable

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NA☐

2f. Identification of Meaningful Differences in Performance

2f.1 Data/sample from Testing or Current Use *(description of data/sample and size)*: AHRQ 2007 State Inpatient Databases (SID) with 4,000 hospitals and 30 million adult discharges

2f.2 Methods to identify statistically significant and practically/meaningfully differences in performance *(type of analysis & rationale)*:
Posterior probability distribution parameterized using the Gamma distribution

2f.3 Provide Measure Scores from Testing or Current Use *(description of scores, e.g., distribution by quartile, mean, median, SD, etc.; identification of statistically significant and meaningfully differences in performance)*:

5th	25th	Median	75th	95th
0.025908	0.036333	0.045065	0.055099	0.071948

2f
C☐
P☐
M☐
N☐

2g. Comparability of Multiple Data Sources/Methods

2g.1 Data/sample *(description of data/sample and size)*: Not applicable

2g.2 Analytic Method *(type of analysis & rationale)*:
Not applicable

2g.3 Testing Results *(e.g., correlation statistics, comparison of rankings)*:
Not applicable

2g
C☐
P☐
M☐
N☐
NA☐

2h. Disparities in Care

2h.1 If measure is stratified, provide stratified results *(scores by stratified categories/cohorts)*: Information on results are noted below. Also 1b2 provides results by age, gender, micropolitian and metropolitian and payer.

Median income of patient´s ZIP code:

2h
C☐
P☐
M☐
N☐
NA☐

1) Estimate 2) Standard error 3) P-value: Relative to marked group-c 4) P-value:
2007 relative to 2006
First quartile (lowest income) 59.088 2.445 0.242 0.002
Second quartile 54.793 2.336 0.966 0.011
Third quartile 58.174 2.397 0.357 0.085
Fourth quartile (highest income)c 54.942 2.561 0.060

From previous testing, known predictors of in-hospital mortality include whether the aneurysm is intact or ruptured, age, female gender, admission through an emergency room, various comorbidities such as renal failure and dysrhythmias, and Charlson's comorbidity index.[1, 2, 3]
References:
[1] Manheim LM, Sohn MW, Feinglass J, et al. Hospital vascular surgery volume and procedure mortality rates in California, 1982-1994. J Vasc Surg 1998;28(1):45-56.
[2] Hannan EL, Kilburn H, Jr., O'Donnell JF, et al. A longitudinal analysis of the relationship between in-hospital mortality in New York state and the volume of abdominal aortic aneurysm surgeries performed. Health Serv Res 1992;27(4):517-42.
[3] Wen SW, Simunovic M, Williams JI, et al. Hospital volume, calendar age, and short term outcomes in patients undergoing repair of abdominal aortic aneurysm: the Ontario experience, 1988-92. J Epidemiol Community Health 1996;50(2):207-13.

RACE/ETHNICITY	Rate per 100
White	4.52
Black	5.48
Hispanic	5.40
Asian NH/PI	5.33
Amer Indian/AN	4.58
Other	4.66

Source: 2008 State Inpatient Databases (SID) (N=39,963)

2h.2 If disparities have been reported/identified, but measure is not specified to detect disparities, provide follow-up plans:
Users may stratify based on gender and race/ethnicity

TAP/Workgroup: What are the strengths and weaknesses in relation to the subcriteria for *Scientific Acceptability of Measure Properties?*

2

Steering Committee: Overall, to what extent was the criterion, *Scientific Acceptability of Measure Properties*, met?
Rationale:

2
C ☐
P ☐
M ☐
N ☐

3. USABILITY

Extent to which intended audiences (e.g., consumers, purchasers, providers, policy makers) can understand the results of the measure and are likely to find them useful for decision making. (evaluation criteria)

Eval Rating

3a. Meaningful, Understandable, and Useful Information

3a.1 Current Use: In use

3a.2 Use in a public reporting initiative (disclosure of performance results to the public at large) (*If used in a public reporting initiative, provide name of initiative(s), locations, Web page URL(s). If not publicly reported, state the plans to achieve public reporting within 3 years*)**:**
California (state)
Hospital Inpatient Mortality Indicators for California
http://www.oshpd.ca.gov/HID/Products/PatDischargeData/AHRQ/iqi-imi_overview.html

3a
C ☐
P ☐
M ☐
N ☐

Florida (state)
Florida Health Finder
http://www.floridahealthfinder.gov/

Kentucky (Norton Healthcare, a hospital system)
Norton Healthcare Quality Report
http://www.nortonhealthcare.com/body.cfm?id=157

Kentucky (state hospital association)
Kentucky Hospital Association Quality Data
http://info.kyha.com/QualityData/IQISite/

Maine (state)
Maine Health Data Organization
http://gateway.maine.gov/mhdo2008Monahrq/home.html

Massachusetts (state)
My HealthCare Options
http://www.mass.gov/healthcareqc

Minnesota (Minnesota Community Measurement)
Minnesota Health Scores
www.mnhealthscores.org

New Jersey (state)
Find and Compare Quality Care in NJ Hospitals
http://www.nj.gov/health/healthcarequality/

New York (health care coalition)
New York State Hospital Report Card
http://www.myhealthfinder.com/

Oregon (state)
Oregon Hospital Quality Indicators
http://www.oregon.gov/OHPPR/HQ/

Texas (state)
Reports on Hospital Performance
http://www.dshs.state.tx.us/thcic/

Vermont (state)
Dept of Banking, Insurance, Securities & Health Care Administration Comparison Report
http://www.bishca.state.vt.us/health-care/hospitals-health-care-practitioners/2009-vermont-hospital-report-card

Washington (health care coalition)
Washington State Hospital Report Card
http://www.myhealthfinder.com/wa09/index.php

Wisconsin (state hospital association)
CheckPoint
http://www.wicheckpoint.org/index.aspx

The measure is also reported on HCUPnet:
http://hcupnet.ahrq.gov/HCUPnet.jsp?Id=EB57801381F71C41&Form=MAINSEL&JS=Y&Action=%3E%3ENext%3E%3E&_MAINSEL=AHRQ%20Quality%20Indicators

This measure is used in the MONAHRQ system that is provided for public reporting and quality improvement throughout the United States: http://monahrq.ahrq.gov/

3a.3 If used in other programs/initiatives (*If used in quality improvement or other programs/initiatives, name of initiative(s), locations, Web page URL(s). If not used for QI, state the plans to achieve use for QI within 3 years***):**
University Healthcare Consortium - An alliance of 103 academic medical centers and 219 of their affiliated hospitals. Reporting the AHRQ QIs to their member hospitals. (see www.uhc.edu. Note: measure results reported to hospitals; not reported on site).

Dallas Fort Worth Hospital Council – Reporting on measure results to over 70 hospitals in Texas (see www.dfwhc.ord. Note: measure results reported to hospitals; not reported on site).

Norton Healthcare - a multi-hospital system in Kentucky (see http://www.nortonhealthcare.com/about/Our_Performance/index.aspx)

Ministry Health Care - a multi-hospital system in Wisconsin (see http://ministryhealth.org/display/router.aspx. Note: measure results reported to hospitals; not reported on site).

Minnesota Hospital Association
http://www.mnhospitals.org/ Note: measure used in quality improvement. Not reported publicly by the association)

Premier - Premier´s "Quality Advisor" tool provides performance reports to approximately 650 hospitals for their use in monitoring and improving quality. Hospitals receive facility specific reports on this measure in Quality Advisor.

This measure is used in the MONAHRQ system that is provided for public reporting and quality improvement throughout the United States: http://monahrq.ahrq.gov/

Testing of Interpretability (*Testing that demonstrates the results are understood by the potential users for public reporting and quality improvement*)
3a.4 Data/sample *(description of data/sample and size)***:** AHRQ 2007 State Inpatient Databases (SID) with 4,000 hospitals and 30 million adult discharge

3a.5 Methods *(e.g., focus group, survey, QI project)***:**
A research team from the School of Public Affairs, Baruch College, under contracts with the Department of Public Health, Weill Medical College and Battelle, Inc., has developed a pair of Hospital Quality Model Reports at the request of the Agency for Healthcare Research & Quality (AHRQ). These reports are designed specifically to report comparative information on hospital performance based on the AHRQ Quality Indicators (QIs). The work was done in close collaboration with AHRQ staff and the AHRQ Quality Indicators team.
The Model Reports (discussed immediately above) are based on:
• Extensive search and analysis of the literature on hospital quality measurement and reporting, as well as public reporting on health care quality more broadly;
• Interviews with quality measurement and reporting experts, purchasers, staff of purchasing coalitions, and executives of integrated health care delivery systems who are responsible for quality in their facilities;
• Two focus groups with chief medical officers of hospitals and/or systems and two focus groups with quality managers from a broad mix of hospitals;
• Four focus groups with members of the public who had recently experienced a hospital admission; and
• Four rounds of cognitive interviews (a total of 62 interviews) to test draft versions of the two Model Reports with members of the public with recent hospital experience, basic computer literacy but widely varying levels of education.

3a.6 Results *(qualitative and/or quantitative results and conclusions)***:**
Given the above review of the literature and original research that was conducted, a Model report was the result that could help sponsors use the best evidence on public reports so they are most likely to have the desired effects on quality.

3b/3c. Relation to other NQF-endorsed measures **3b.1 NQF # and Title of similar or related measures:** Leapfrog survival predicator	
(for NQF staff use) **Notes on similar/related endorsed or submitted measures:**	
3b. Harmonization If this measure is related to measure(s) already endorsed by NQF (e.g., same topic, but different target population/setting/data source or different topic but same target population): **3b.2 Are the measure specifications harmonized? If not, why?** The Leapfrog measure is based on the AHRQ specification, but is not risk-adjusted	**3b** C☐ P☐ M☐ N☐ NA ☐
3c. Distinctive or Additive Value **3c.1 Describe the distinctive, improved, or additive value this measure provides to existing NQF-endorsed measures:** The AHRQ indicator is risk-adjusted and maintained annually **5.1 If this measure is similar to measure(s) already endorsed by NQF (i.e., on the same topic and the same target population), Describe why it is a more valid or efficient way to measure quality:** The AHRQ indicator is paired with a volume indicator, is included in a composite, and is risk-adjusted	**3c** C☐ P☐ M☐ N☐ NA ☐
TAP/Workgroup: What are the strengths and weaknesses in relation to the subcriteria for *Usability?*	**3**
Steering Committee: Overall, to what extent was the criterion, *Usability*, met? **Rationale:**	**3** C☐ P☐ M☐ N☐
4. FEASIBILITY	
Extent to which the required data are readily available, retrievable without undue burden, and can be implemented for performance measurement. (evaluation criteria)	Eval Rating
4a. Data Generated as a Byproduct of Care Processes **4a.1-2 How are the data elements that are needed to compute measure scores generated?** Coding/abstraction performed by someone other than person obtaining original information (E.g., DRG, ICD-9 codes on claims, chart abstraction for quality measure or registry)	**4a** C☐ P☐ M☐ N☐
4b. Electronic Sources **4b.1 Are all the data elements available electronically?** (*elements that are needed to compute measure scores are in defined, computer-readable fields, e.g., electronic health record, electronic claims*) Yes **4b.2 If not, specify the near-term path to achieve electronic capture by most providers.**	**4b** C☐ P☐ M☐ N☐
4c. Exclusions **4c.1 Do the specified exclusions require additional data sources beyond what is required for the numerator and denominator specifications?** No **4c.2 If yes, provide justification.**	**4c** C☐ P☐ M☐ N☐ NA ☐
4d. Susceptibility to Inaccuracies, Errors, or Unintended Consequences **4d.1 Identify susceptibility to inaccuracies, errors, or unintended consequences of the measure and**	**4d** C☐ P☐

describe how these potential problems could be audited. If audited, provide results. Coding professionals follow detailed guidelines, are subject to training and credentialing requirements, peer review and audit.	**M☐ N☐**
4e. Data Collection Strategy/Implementation **4e.1 Describe what you have learned/modified as a result of testing and/or operational use of the measure regarding data collection, availability of data/missing data, timing/frequency of data collection, patient confidentiality, time/cost of data collection, other feasibility/ implementation issues:** None **4e.2 Costs to implement the measure** (*costs of data collection, fees associated with proprietary measures*)**:** Administrative data are collected as part of the routine operations. Some staff time is required to download and execute the software from the AHRQ webs site, which is available at no cost. **4e.3 Evidence for costs:** Administrative data are collected as part of the routine operations. Some staff time is required to download and execute the software from the AHRQ webs site, which is available at no cost. **4e.4 Business case documentation:** Administrative data are collected as part of the routine operations. Some staff time is required to download and execute the software from the AHRQ webs site, which is available at no cost.	**4e** **C☐ P☐ M☐ N☐**
TAP/Workgroup: What are the strengths and weaknesses in relation to the subcriteria for *Feasibility?*	**4**
Steering Committee: Overall, to what extent was the criterion, *Feasibility*, met? **Rationale:**	**4** **C☐ P☐ M☐ N☐**
RECOMMENDATION	
(for NQF staff use) **Check if measure is untested and only eligible for time-limited endorsement.**	**Time-limited ☐**
Steering Committee: Do you recommend for endorsement? **Comments:**	**Y☐ N☐ A☐**
CONTACT INFORMATION	
Co.1 Measure Steward (Intellectual Property Owner) **Co.1 Organization** Agency for Healthcare Research and Quality, 540 Gaither Road, Rockville, Maryland, 20850 **Co.2 Point of Contact** John, Bott, MSSW, MBA, John.Bott@AHRQ.hhs.gov, 301-427-1317-	
Measure Developer If different from Measure Steward **Co.3 Organization** Agency for Healthcare Research and Quality, 540 Gaither Road, Rockville, Maryland, 20850 **Co.4 Point of Contact** John, Bott, MSSW, MBA, John.Bott@AHRQ.hhs.gov, 301-427-1317-	
Co.5 Submitter If different from Measure Steward POC John, Bott, MSSW, MBA, John.Bott@AHRQ.hhs.gov, 301-427-1317-, Agency for Healthcare Research and Quality	
Co.6 Additional organizations that sponsored/participated in measure development	

UC Davis,
Stanford University,
Battelle Memorial Institute

ADDITIONAL INFORMATION

Workgroup/Expert Panel involved in measure development
Ad.1 Provide a list of sponsoring organizations and workgroup/panel members' names and organizations. Describe the members' role in measure development.
None

Ad.2 If adapted, provide name of original measure: None
Ad.3-5 If adapted, provide original specifications URL or attachment

Measure Developer/Steward Updates and Ongoing Maintenance
Ad.6 Year the measure was first released: 2001
Ad.7 Month and Year of most recent revision: 10, 2010
Ad.8 What is your frequency for review/update of this measure? Annual
Ad.9 When is the next scheduled review/update for this measure? 05, 2011

Ad.10 Copyright statement/disclaimers: The AHRQ QI software is publicly available; no copyright disclaimers

Ad.11 -13 Additional Information web page URL or attachment: URL
http://www.qualityindicators.ahrq.gov/downloads/technical/qi_technical_review.zip

Date of Submission (*MM/DD/YY*)**:** 06/14/2011

NATIONAL QUALITY FORUM

Measure Evaluation 4.1
December 2009

This form contains the measure information submitted by stewards. Blank fields indicate no information was provided. Attachments also may have been submitted and are provided to reviewers. The subcriteria and most of the footnotes from the evaluation criteria are provided in Word comments within the form and will appear if your cursor is over the highlighted area. Hyperlinks to the evaluation criteria and ratings are provided in each section.

TAP/Workgroup (if utilized)**:** Complete all yellow highlighted areas of the form. Evaluate the extent to which each subcriterion is met. Based on your evaluation, summarize the strengths and weaknesses in each section.

Note: *If there is no TAP or workgroup, the SC also evaluates the subcriteria (yellow highlighted areas).*

Steering Committee: Complete all pink highlighted areas of the form. Review the workgroup/TAP assessment of the subcriteria, noting any areas of disagreement; then evaluate the extent to which each major criterion is met; and finally, indicate your recommendation for the endorsement. Provide the rationale for your ratings.

Evaluation ratings of the extent to which the criteria are met
C = Completely (unquestionably demonstrated to meet the criterion)
P = Partially (demonstrated to partially meet the criterion)
M = Minimally (addressed BUT demonstrated to only minimally meet the criterion)
N = Not at all (NOT addressed; OR incorrectly addressed; OR demonstrated to NOT meet the criterion)
NA = Not applicable (only an option for a few subcriteria as indicated)

(for NQF staff use) **NQF Review #:** 1523 **NQF Project:** Surgery Endorsement Maintenance 2010

MEASURE DESCRIPTIVE INFORMATION
De.1 **Measure Title:** In-hospital mortality following elective open repair of small AAAs
De.2 **Brief description of measure:** Percentage of aymptomatic patients undergoing open repair of small abdominal aortic aneurysms (AAA)who die while in hospital. This measure is proposed for both hospitals and individual providers.
1.1-2 **Type of Measure:** Outcome De.3 **If included in a composite or paired with another measure, please identify composite or paired measure** Submitted SVS measure: In-hospital mortality following elective endovascular repair of small AAAs
De.4 **National Priority Partners Priority Area:** Population health, Safety, Overuse De.5 **IOM Quality Domain**: Effectiveness, Efficiency, Safety De.6 **Consumer Care Need:** Staying healthy

CONDITIONS FOR CONSIDERATION BY NQF	
Four conditions must be met before proposed measures may be considered and evaluated for suitability as voluntary consensus standards:	NQF Staff
A. The measure is in the public domain or an intellectual property (measure steward agreement) is signed. *Public domain only applies to governmental organizations. All non-government organizations must sign a measure steward agreement even if measures are made publicly and freely available.* A.1 **Do you attest that the measure steward holds intellectual property rights to the measure and the right to use aspects of the measure owned by another entity (e.g., risk model, code set)?** Yes A.2 **Indicate if Proprietary Measure** (*as defined in measure steward agreement*)**:** A.3 **Measure Steward Agreement:** Agreement will be signed and submitted prior to or at the time of measure submission A.4 **Measure Steward Agreement attached:** Agreement With Measure Stewards_Agreement Between_National Quality Forum (12-6-2010)-634272342848701938.pdf	A Y☐ N☐

B. The measure owner/steward verifies there is an identified responsible entity and process to maintain and update the measure on a schedule that is commensurate with the rate of clinical innovation, but at least every 3 years. Yes, information provided in contact section	**B** Y☐ N☐
C. The intended use of the measure includes both public reporting and quality improvement. ►**Purpose:** Payment Program	**C** Y☐ N☐
D. The requested measure submission information is complete. Generally, measures should be fully developed and tested so that all the evaluation criteria have been addressed and information needed to evaluate the measure is provided. Measures that have not been tested are only potentially eligible for a time-limited endorsement and in that case, measure owners must verify that testing will be completed within 12 months of endorsement. D.1**Testing:** Yes, fully developed and tested D.2 **Have NQF-endorsed measures been reviewed to identify if there are similar or related measures?** Yes	**D** Y☐ N☐
(for NQF staff use) **Have all conditions for consideration been met?** **Staff Notes to Steward** (*if submission returned*)**:**	**Met** Y☐ N☐
Staff Notes to Reviewers (*issues or questions regarding any criteria*)**:**	
Staff Reviewer Name(s):	

TAP/Workgroup Reviewer Name:	
Steering Committee Reviewer Name:	
1. IMPORTANCE TO MEASURE AND REPORT	
Extent to which the specific measure focus is important to making significant gains in health care quality (safety, timeliness, effectiveness, efficiency, equity, patient-centeredness) and improving health outcomes for a specific high impact aspect of healthcare where there is variation in or overall poor performance. ***Measures must be judged to be important to measure and report*** *in order to be evaluated against the remaining criteria.* (evaluation criteria) **1a. High Impact**	**Eval Rating**
(for NQF staff use) **Specific NPP goal**:	
1a.1 **Demonstrated High Impact Aspect of Healthcare:** Affects large numbers, Frequently performed procedure, Leading cause of morbidity/mortality, High resource use, Severity of illness, Patient/societal consequences of poor quality 1a.2 1a.3 **Summary of Evidence of High Impact:** An international population-based study found that an aneurysm was present in 8.9% of men and 2.2% women (p < 0.001).(1) In the United States, ruptured AAAs are the 15th leading casue of death overall and the 10th leading casue of death in males over 55 years, a rate than has held steady for the past 2 decades. (2) Ruptured aneurysms are fatal in about 80% of cases. (3) 1a.4 **Citations for Evidence of High Impact:** (1) Singh K et al. Am. J. Epidemiol. (2001) 154 (3): 236-244. (2) Fillinger M. (2010) Abdominal Aortic Aneurysms: Evaluation and Decision Making. In J. Cronenewett & KW. Johnston (Eds.), Rutherford´s Vascular Surgery (1928-1948) Saunders Elsevier. Philadelphia. (3) May J, White GH, Stephen MS, Harris JP. J Vasc Surg. 2004 Nov;40(5):860-6.	**1a** C☐ P☐ M☐ N☐
1b. Opportunity for Improvement 1b.1 **Benefits (improvements in quality) envisioned by use of this measure:** Elective AAA repair is offered to prolong life by avoiding AAA rupture, which is fatal in more than 85% of cases. Rupture risk is primarily assess by AAA diameter, with larger AAAs more prone to rupture. Surgical treatment carries risk, however, of mortality and morbidity, which must be balanced against the risk of rupture in order to determine which	**1b** C☐ P☐ M☐ N☐

patients will benefit from elective repair.

Based on the UK small aneurysm trial, the accepted diameter threshold for elective AAA repair is 5.5 cm, although women have a slightly higher risk than men, so a threshold of 5 cm is usually recommended for women. The key concept of this proposed measure is that patients who are at low risk for AAA rupture (<6cm dia in men and <5.5 cm dia in women) should ONLY be offered elective AAA repair if their predicted operative mortality is low. This concept avoids the need for risk adjustment, since this is implicit in the decision to offer elective repair of small AAAs. This measure will highlight variation in proper patient selection by reporting unadjusted mortality rates for surgery in patients with small AAAs in whom this rate should be universally low. Providers or hospitals with high mortality rates are either not performing safe surgery or are not properly selecting low risk patients. The measure specifically excludes patients with larger AAAs because risk adjustment would be needed for such cases, and accepted risk adjustment algorithms are not available.

1b.2 Summary of data demonstrating performance gap (variation or overall poor performance) across providers:
There is significant regional variation in rates of open AAA repair, indicating a performance gap. In 27 hospital referral regions, rates of AAA repair were at least 30% higher than the United States average of 1.0 per 1,000 Medicare
enrollees. In 44 hospital referral regions, rates were more than
25% lower than the national average.(1)

Where these data have been monitored and reported to providers in VSGNE since 2003, among 12 centers and 55 providers treating 1289 patients with small AAAs the median mortality rate for men and women with small AAAs as defined above is 0%, but the range is 0-10%, indicating both a perfomance gap and opportunity for further improvement.

1b.3 Citations for data on performance gap:
(1)Dartmouth-CMS-FDA Collaborative, "Trends and Regional Variation in Abdmonial Aortic Anweurysm Repair, February 1, 2006.

1b.4 Summary of Data on disparities by population group:
Such data will become available if this measure is adopted for reporting and used by more centers with more varied population demographics than found in the New England region.

1b.5 Citations for data on Disparities:
not available

1c. Outcome or Evidence to Support Measure Focus

1c.1 Relationship to Outcomes (*For non-outcome measures, briefly describe the relationship to desired outcome. For outcomes, describe why it is relevant to the target population*)**:** discussed above

1c.2-3. Type of Evidence: Cohort study, Expert opinion, Meta-analysis

1c.4 Summary of Evidence (*as described in the criteria; for outcomes, summarize any evidence that healthcare services/care processes influence the outcome*)**:**
The endpoint of inhospital mortality is the accepted primary endpoint for both elective AAA repair. Variation in outcome has been established in randomized trials,cohort studies and meta analyses. This outcome measure has face validity among all providers of this service. Studies cited above have shown substantial variation in outcomes by provider when elective AAA repair is performed in patients with small AAAs.

1c.5 Rating of strength/quality of evidence (*also provide narrative description of the rating and by whom*)**:**
Motality is the reporting standard recommended by the Society for Vascular Surgery, and has been used in multiple RCTs.

1c.6 Method for rating evidence: Expert opinion.

1c
C☐
P☐
M☐
N☐

1c.7 Summary of Controversy/Contradictory Evidence: None **1c.8 Citations for Evidence (*other than guidelines*):** Fillinger M. (2010) Abdominal Aortic Aneurysms: Evaluation and Decision Making. In J. Cronenewett & KW. Johnston (Eds.), Rutherford´s Vascular Surgery (1928-1948) Saunders Elsevier. Philadelphia. **1c.9 Quote the Specific guideline recommendation (*including guideline number and/or page number*):** None **1c.10 Clinical Practice Guideline Citation:** None **1c.11 National Guideline Clearinghouse or other URL:** None **1c.12 Rating of strength of recommendation (*also provide narrative description of the rating and by whom*):** N/A **1c.13 Method for rating strength of recommendation** (*If different from USPSTF system, also describe rating and how it relates to USPSTF)*: N/A **1c.14 Rationale for using this guideline over others:** Mortality is the accepted endpoint used in all trials. Restricting the AAA risk by confining the analysis to small AAAs is explained above.	
TAP/Workgroup: What are the strengths and weaknesses in relation to the subcriteria for *Importance to Measure and Report?*	**1**
Steering Committee: Was the threshold criterion, *Importance to Measure and Report*, met? **Rationale:**	**1** **Y☐** **N☐**
2. SCIENTIFIC ACCEPTABILITY OF MEASURE PROPERTIES	
Extent to which the measure, as specified, produces consistent (reliable) and credible (valid) results about the quality of care when implemented. (evaluation criteria)	**Eval Rating**
2a. MEASURE SPECIFICATIONS	
S.1 Do you have a web page where current detailed measure specifications can be obtained? **S.2 If yes, provide web page URL:** **2a. Precisely Specified**	
2a.1 Numerator Statement (*Brief, text description of the numerator - what is being measured about the target population, e.g. target condition, event, or outcome*): Mortality following elective open repair of asymptomatic AAAs in men with < 6 cm dia and women with < 5.5 cm dia AAAs **2a.2 Numerator Time Window (*The time period in which cases are eligible for inclusion in the numerator*):** Since hospitals have sufficient annual volume to generate accurate reporting levels, these are proposed for reporting every 12 months for hospital. Since surgeons have lower individual volume, we recommend annual reporting of the last 50 consecutive procedures, which may span more than one year, with suppression if < 10 procedures (ie, reported as too low volume to report). **2a.3 Numerator Details (*All information required to collect/calculate the numerator, including all codes, logic, and definitions*):** ANY registry that includes hospitalization details, AAA diameter and discharge status is required to identify patients for numerator inclusion. The Society for Vascular Surgery Vascular Quality Initiative (SVS VQI) and the Vascular Study Group of New England (VSGNE) are examples of registries that record such information,	**2a-specs** **C☐** **P☐** **M☐** **N☐**

but the measure is not limited to these registries. Patients who died in hospital following elective open infrarenal AAA repair if their aneurysm was asymptomatic and small (< 6cm dia in men, <5.5 cm dia in women, judged by preoperative imaging (CT, MR or ultrasound)).

2a.4 **Denominator Statement (***Brief, text description of the denominator - target population being measured***):**
All elective open repairs of asymptomatic AAAs in men with < 6 cm dia and women with < 5.5 cm dia AAAs

2a.5 **Target population gender:** Female, Male
2a.6 **Target population age range:** 18 years or older

2a.7 **Denominator Time Window (***The time period in which cases are eligible for inclusion in the denominator***):**
Since hospitals have sufficient annual volume to generate accurate reporting levels, these are proposed for reporting every 12 months for hospital. Since surgeons have lower individual volume, we recommend annual reporting of the last 50 consecutive procedures, which may span more than one year, with suppression if < 10 procedures (ie, reported as too low volume to report).

2a.8 **Denominator Details (***All information required to collect/calculate the denominator - the target population being measured - including all codes, logic, and definitions***):**
ANY registry that includes hospitalization details, AAA diameter and discharge status is required to identify patients for denominator inclusion. The Society for Vascular Surgery Vascular Quality Initiative (SVS VQI) and the Vascular Study Group of New England (VSGNE) are examples of registries that record such information, but the measure is not limited to these registries. Patients who underwent elective open AAA repair are included if their aneurysm was asymptomatic and small (< 6cm dia in men, <5.5 cm dia in women, judged by preoperative imaging(CT, MR or ultrasound)).

2a.9 **Denominator Exclusions (***Brief text description of exclusions from the target population***):** > 6 cm minor diameter - men
> 5.5 cm minor diameter - women
Symptomatic AAAs that required urgent/emergent (non-elective) repair

2a.10 **Denominator Exclusion Details (***All information required to collect exclusions to the denominator, including all codes, logic, and definitions***):**
Patients undergoing non-elective open repair of symptomatic AAAs or those with AAAs larger than the diameters noted above.

2a.11 **Stratification Details/Variables (***All information required to stratify the measure including the stratification variables, all codes, logic, and definitions***):**
Not required

2a.12-13 **Risk Adjustment Type:** No risk adjustment necessary

2a.14 **Risk Adjustment Methodology/Variables (***List risk adjustment variables and describe conceptual models, statistical models, or other aspects of model or method***):**
See "Scientific Acceptablility" section for rationale

2a.15-17 **Detailed risk model available Web page URL or attachment:**

2a.18-19 **Type of Score:** Rate/proportion
2a.20 **Interpretation of Score:** Better quality = Lower score
2a.21 **Calculation Algorithm (***Describe the calculation of the measure as a flowchart or series of steps***):**
Identify denominator, exclude non-elective repair of symptomatic or ruptured patients and men with AAA >6 cm, and women with AAA >5.5, find number of deaths
Outcome = deaths/ # cases

2a.22 **Describe the method for discriminating performance** *(e.g., significance testing)***:**
Standard statistical comparison of rates to provide confidence levels to discriminate meaningful differences from the mean.

2a.23 **Sampling (Survey) Methodology** *If measure is based on a sample (or survey), provide instructions for obtaining the sample, conducting the survey and guidance on minimum sample size (response rate)*:

N/A

2a.24 Data Source (*Check the source(s) for which the measure is specified and tested)*
Electronic Clinical Data : Registry

2a.25 Data source/data collection instrument (*Identify the specific data source/data collection instrument, e.g. name of database, clinical registry, collection instrument, etc.***):**
Society for Vascular Surgery Vascular Quality Initiative Registry
Vascular Study Group of New England Registry

2a.26-28 Data source/data collection instrument reference web page URL or attachment: Attachment Open_AAA_Repair_v1.9.xlsx

2a.29-31 Data dictionary/code table web page URL or attachment: Attachment OPEN AAA defs v.01.09.doc

2a.32-35 Level of Measurement/Analysis (*Check the level(s) for which the measure is specified and tested)*
Clinician : Group/Practice, Clinician : Individual, Facility

2a.36-37 Care Settings (*Check the setting(s) for which the measure is specified and tested)*
Hospital/Acute Care Facility

2a.38-41 Clinical Services (*Healthcare services being measured, check all that apply*)
Clinicians: Physicians (MD/DO)

TESTING/ANALYSIS

2b. Reliability testing

2b.1 Data/sample *(description of data/sample and size)*: A random sample of 100 patient records representing 5 procedures relevant to the measure from 5 different hospitals based on data collected during the past 2 years. In addition, in-hospital mortality was examined by claims based analysis of 7,205 patients discharged and recorded in the VSGNE registry between 2003 to 2007.

2b.2 Analytic Method *(type of reliability & rationale, method for testing)*:
A nurse abstractor completed a form based on medical record review for the variables relevant to this measure. The results of this chart review were then compared with the original registry data. The Kappa statistic was used to judge reliability of the data. For mortality validation, claims data from each of 12 hospitals were matched to patient identified data within the VSGNE registry to compare discharge status (alive vs. dead). Any discrepencies were then further evaluated based on a medical record audit.

2b.3 Testing Results *(reliability statistics, assessment of adequacy in the context of norms for the test conducted)*:
The key variables for this measure and testing results were:

1. Correct procedure (open infrarenal AAA repair) performed. Kappa =1.0
2. AAA diameter: Based on 60 measurement, the mean diameter was 56.7 mm in the registry, 56.6 mm in the chart audit, no significant difference. Further, in on cases was the category of size based on the cut points of 6 cm in men and 5.5 cm in women different, Kappa = 1.0 for these categories.
3. Hospital mortality: Kappa = .91 (SE .01)
4. Elective(vs urgent or emergent); Kappa=1.0

2b C☐ P☐ M☐ N☐

2c. Validity testing

2c.1 Data/sample *(description of data/sample and size)*: See reliability testing

2c.2 Analytic Method *(type of validity & rationale, method for testing)*:
comparison of rates with published literature

2c C☐ P☐ M☐ N☐

2c.3 Testing Results *(statistical results, assessment of adequacy in the context of norms for the test conducted)*:
In VSGNE, in hospital mortality for open AAA repair is 4-8%, and shows appropriate variation among hospitals, using this measure. This corresponds well to the published literature for elective AAA repair.

2d. Exclusions Justified

2d.1 Summary of Evidence supporting exclusion(s):
Large clinical trials have demonstrated the relative safety of observation AAAs with a minimum diameter of less than 5.5 cm.(1) Most of these data were from men, and the same studies show that for women, AAAs rupture risk is higher, such that a minimum 5 cm threshold for women is generally recommended (1). In this measure, we are proposing that elective open AAA repair in men with AAAs < 6 cm dia and women with AAAs < 5.5 cm dia should only be recommended when the operative risk is low, because the AAA rupture risk is low (at a size less than 0.5 greater than the minimum rupture risk). This means that risk adjustment is considered as part of the surgical decision making, and does not need to be otherwise controlled for, as discussed further in 2.e.1.

2d.2 Citations for Evidence:
(1) Fillinger M. (2010) Abdominal Aortic Aneurysms: Evaluation and Decision Making. In J. Cronenewett & KW. Johnston (Eds.), Rutherford´s Vascular Surgery (1928-1948) Saunders Elsevier. Philadelphia.

2d.3 Data/sample *(description of data/sample and size)*: 1201 patients undergoing open elective AAA repair in VSGNE, all patients (ie, all AAA diameters treated), 2003-2010. 886 men, 315 women

2d.4 Analytic Method *(type analysis & rationale)*:
rate calculation based on AAA dia size. AAAs were analyzed with 6 cm dia cutpoint in men and a 5.5 cm dia cutpoint in women, as described below.

2d.5 Testing Results *(e.g., frequency, variability, sensitivity analyses)*:
Men, < 6cm AAA, mdn 0% mortality, range 0-4.1% among 10 centers
Men, >= 6 cm dia, mdn 0% mortality, range 0-10.4% among 10 centers

Women, < 5.5 cm dia AAAs, mdn mortality 0%, range 0-10% among 9 centers
Women, >= 5.5 cm dia AAAs, mdn mortality 1.1%, range 0-20% among 9 centers

2d C☐ P☐ M☐ N☐ NA☐

2e. Risk Adjustment for Outcomes/ Resource Use Measures

2e.1 Data/sample *(description of data/sample and size)*: This measure was designed to avoid the need for risk adjustment, because risk adjustment is complex for AAA repair, and accepted algorithms do not yet exist. In patients with small AAAs, with low rupture risk, it is incumbent on the surgeon to factor in the risk-benefit of elective, prophylactic repair, since a high operative mortality will eliminate any benefit of AAA repair. Women have higher rupture risk than men, so by focusing this measure on AAAs < 5.5 cm in women and < 6 cm in men, the non-risk-adjusted mortality is a fair comparison of surgical outcome in the opinion of the sponsor, the Society for Vascular Surgery, and it represents a very important outcome to measure.

2e.2 Analytic Method *(type of risk adjustment, analysis, & rationale)*:
N/A

2e.3 Testing Results *(risk model performance metrics)*:
N/A

2e.4 If outcome or resource use measure is not risk adjusted, provide rationale: N/A

2e C☐ P☐ M☐ N☐ NA☐

2f. Identification of Meaningful Differences in Performance

2f.1 Data/sample from Testing or Current Use *(description of data/sample and size)*: see section 1.b.3 and above 2,d,5

2f.2 Methods to identify statistically significant and practically/meaningfully differences in performance

2f C☐ P☐ M☐ N☐

(type of analysis & rationale): Standard statistial analysis to determine 95% confidence interval for hospitals and providers to determine practical difference from mean 2f.3 **Provide Measure Scores from Testing or Current Use** *(description of scores, e.g., distribution by quartile, mean, median, SD, etc.; identification of statistically significant and meaningfully differences in performance)*:	
2g. Comparability of Multiple Data Sources/Methods 2g.1 **Data/sample** *(description of data/sample and size)*: no other data sources available 2g.2 **Analytic Method** *(type of analysis & rationale)*: 2g.3 **Testing Results** *(e.g., correlation statistics, comparison of rankings)*:	**2g** C☐ P☐ M☐ N☐ NA☐
2h. Disparities in Care 2h.1 **If measure is stratified, provide stratified results** *(scores by stratified categories/cohorts)*: NA 2h.2 **If disparities have been reported/identified, but measure is not specified to detect disparities, provide follow-up plans:** Disparities have not been reported.	**2h** C☐ P☐ M☐ N☐ NA☐
TAP/Workgroup: What are the strengths and weaknesses in relation to the subcriteria for *Scientific Acceptability of Measure Properties?*	**2**
Steering Committee: Overall, to what extent was the criterion, *Scientific Acceptability of Measure Properties*, met? **Rationale:**	***2*** C☐ P☐ M☐ N☐
3. USABILITY	
Extent to which intended audiences (e.g., consumers, purchasers, providers, policy makers) can understand the results of the measure and are likely to find them useful for decision making. (evaluation criteria)	Eval Rating
3a. Meaningful, Understandable, and Useful Information 3a.1 **Current Use:** In use 3a.2 **Use in a public reporting initiative (disclosure of performance results to the public at large)** *(If used in a public reporting initiative, provide name of initiative(s), locations, Web page URL(s). If not publicly reported, state the plans to achieve public reporting within 3 years)*: Data from SVS VQI and VSGNE are reported to each hospital and provider in a format that can be transmitted to an appropriate public reporting mechanism. 3a.3 **If used in other programs/initiatives (***If used in quality improvement or other programs/initiatives, name of initiative(s), locations, Web page URL(s). If not used for QI, state the plans to achieve use for QI within 3 years***):** Vascular Study Group of New England www.vsgne.org Data have been successfully collected in this quality registry since 2003, and reports provided to participating physicians and hospitals about their rates of outcomes. These results are used by the regional quality group to provide benchmark reporting, and to stimulate regional quality improvement projects. **Testing of Interpretability** (*Testing that demonstrates the results are understood by the potential users for public reporting and quality improvement*) 3a.4 **Data/sample** *(description of data/sample and size)*: VSGNE samples previously described	**3a** C☐ P☐ M☐ N☐

3a.5 Methods *(e.g., focus group, survey, QI project)*: Semi-annual meetings of providers in VSGNE **3a.6 Results** *(qualitative and/or quantitative results and conclusions)*: Benchamrk reports of this outcome measure have been provided to VSGNE member physician and hospitals since 2003, and discussed at semi-annual meetings. There have been no questions about interpretability.	
3b/3c. Relation to other NQF-endorsed measures **3b.1 NQF # and Title of similar or related measures:**	
(for NQF staff use) **Notes on similar/related endorsed or submitted measures:**	
3b. Harmonization If this measure is related to measure(s) already endorsed by NQF (e.g., same topic, but different target population/setting/data source or different topic but same target population): **3b.2 Are the measure specifications harmonized? If not, why?**	**3b** C☐ P☐ M☐ N☐ NA☐
3c. Distinctive or Additive Value **3c.1 Describe the distinctive, improved, or additive value this measure provides to existing NQF-endorsed measures:** **5.1 If this measure is similar to measure(s) already endorsed by NQF (i.e., on the same topic and the same target population), Describe why it is a more valid or efficient way to measure quality:**	**3c** C☐ P☐ M☐ N☐ NA☐
TAP/Workgroup: What are the strengths and weaknesses in relation to the subcriteria for *Usability?*	**3**
Steering Committee: Overall, to what extent was the criterion, *Usability*, met? **Rationale:**	**3** C☐ P☐ M☐ N☐
4. FEASIBILITY	
Extent to which the required data are readily available, retrievable without undue burden, and can be implemented for performance measurement. (evaluation criteria)	Eval Rating
4a. Data Generated as a Byproduct of Care Processes **4a.1-2 How are the data elements that are needed to compute measure scores generated?** Data generated as byproduct of care processes during care delivery (Data are generated and used by healthcare personnel during the provision of care, e.g., blood pressure, lab value, medical condition), Coding/abstraction performed by someone other than person obtaining original information (E.g., DRG, ICD-9 codes on claims, chart abstraction for quality measure or registry)	**4a** C☐ P☐ M☐ N☐
4b. Electronic Sources **4b.1 Are all the data elements available electronically?** (*elements that are needed to compute measure scores are in defined, computer-readable fields, e.g., electronic health record, electronic claims*) Yes **4b.2 If not, specify the near-term path to achieve electronic capture by most providers.**	**4b** C☐ P☐ M☐ N☐
4c. Exclusions **4c.1 Do the specified exclusions require additional data sources beyond what is required for the**	**4c** C☐ P☐

numerator and denominator specifications? No **4c.2 If yes, provide justification.**	**M☐ N☐ NA☐**
4d. Susceptibility to Inaccuracies, Errors, or Unintended Consequences **4d.1 Identify susceptibility to inaccuracies, errors, or unintended consequences of the measure and describe how these potential problems could be audited. If audited, provide results.** Small size measurements of AAA should not significantly impact the measure, and symptom status is easily validated during chart review. We have not found inaccuracy in this measure.	**4d C☐ P☐ M☐ N☐**
4e. Data Collection Strategy/Implementation **4e.1 Describe what you have learned/modified as a result of testing and/or operational use of the measure regarding data collection, availability of data/missing data, timing/frequency of data collection, patient confidentiality, time/cost of data collection, other feasibility/ implementation issues:** In the VSGNE experience which has been tracking hosptital mortality as a major endpoint since 2003, we have not experienced any difficulty with obtaining data related to this endpoint. Our percent missing for this variable has been less than 1%. **4e.2 Costs to implement the measure** (*costs of data collection, fees associated with proprietary measures*)**:** In the context of the VSGNE and SVS VQI registries, there is no additional cost as all of these data are already collected. **4e.3 Evidence for costs:** **4e.4 Business case documentation:**	**4e C☐ P☐ M☐ N☐**
TAP/Workgroup: What are the strengths and weaknesses in relation to the subcriteria for *Feasibility?*	**4**
Steering Committee: Overall, to what extent was the criterion, *Feasibility*, met? **Rationale:**	**4 C☐ P☐ M☐ N☐**
RECOMMENDATION	
(for NQF staff use) **Check if measure is untested and only eligible for time-limited endorsement.**	**Time-limited ☐**
Steering Committee: Do you recommend for endorsement? **Comments:**	**Y☐ N☐ A☐**
CONTACT INFORMATION	
Co.1 Measure Steward (Intellectual Property Owner) **Co.1 Organization** Society for Vascular Surgery, 633 N. St. Clair, 24th floor, Chicago, Illinois, 60611 **Co.2 Point of Contact** Sarah, Murphy, Staff, smurphy@vascularsociety.org, 312-334-2305-	
Measure Developer If different from Measure Steward **Co.3 Organization**	

Society for Vascular Surgery, 633 N. St. Clair, 24th floor, Chicago, Illinois, 60611 Co.4 **Point of Contact** Sarah, Murphy, Staff, smurphy@vascularsociety.org, 312-334-2305-
Co.5 **Submitter If different from Measure Steward POC** Sarah, Murphy, Staff, smurphy@vascularsociety.org, 312-334-2305-, Society for Vascular Surgery
Co.6 **Additional organizations that sponsored/participated in measure development**
ADDITIONAL INFORMATION
Workgroup/Expert Panel involved in measure development Ad.1 **Provide a list of sponsoring organizations and workgroup/panel members' names and organizations. Describe the members' role in measure development.**
Ad.2 **If adapted, provide name of original measure:** Ad.3-5 **If adapted, provide original specifications URL or attachment**
Measure Developer/Steward Updates and Ongoing Maintenance Ad.6 **Year the measure was first released:** 2010 Ad.7 **Month and Year of most recent revision:** 12, 2010 Ad.8 **What is your frequency for review/update of this measure?** Ad.9 **When is the next scheduled review/update for this measure?**
Ad.10 **Copyright statement/disclaimers:**
Ad.11 -13 **Additional Information web page URL or attachment:**
Date of Submission (*MM/DD/YY*)**:** 06/13/2011

NATIONAL QUALITY FORUM

Measure Evaluation 4.1
December 2009

This form contains the measure information submitted by stewards. Blank fields indicate no information was provided. Attachments also may have been submitted and are provided to reviewers. The subcriteria and most of the footnotes from the evaluation criteria are provided in Word comments within the form and will appear if your cursor is over the highlighted area. Hyperlinks to the evaluation criteria and ratings are provided in each section.

TAP/Workgroup (if utilized)**:** Complete all yellow highlighted areas of the form. Evaluate the extent to which each subcriterion is met. Based on your evaluation, summarize the strengths and weaknesses in each section.

Note: *If there is no TAP or workgroup, the SC also evaluates the subcriteria (yellow highlighted areas).*

Steering Committee: Complete all pink highlighted areas of the form. Review the workgroup/TAP assessment of the subcriteria, noting any areas of disagreement; then evaluate the extent to which each major criterion is met; and finally, indicate your recommendation for the endorsement. Provide the rationale for your ratings.

Evaluation ratings of the extent to which the criteria are met
C = Completely (unquestionably demonstrated to meet the criterion)
P = Partially (demonstrated to partially meet the criterion)
M = Minimally (addressed BUT demonstrated to only minimally meet the criterion)
N = Not at all (NOT addressed; OR incorrectly addressed; OR demonstrated to NOT meet the criterion)
NA = Not applicable (only an option for a few subcriteria as indicated)

(for NQF staff use) **NQF Review #:** 1534 **NQF Project:** Surgery Endorsement Maintenance 2010

MEASURE DESCRIPTIVE INFORMATION

De.1 **Measure Title:** In-hospital mortality following elective EVAR of small AAAs

De.2 **Brief description of measure:** Percentage of patients undergoing elective endovascular repair of small asymptomatic abdominal aortic aneurysms (AAA) who die while in hospital. This measure is proposed for both hospitals and individual providers.

1.1-2 **Type of Measure:** Outcome
De.3 **If included in a composite or paired with another measure, please identify composite or paired measure**
Submitted SVS measure: In-hospital mortality following elective open repair of small AAAs

De.4 **National Priority Partners Priority Area:** Population health, Safety, Overuse
De.5 **IOM Quality Domain**: Effectiveness, Efficiency, Safety
De.6 **Consumer Care Need:** Staying healthy

CONDITIONS FOR CONSIDERATION BY NQF	
Four conditions must be met before proposed measures may be considered and evaluated for suitability as voluntary consensus standards:	NQF Staff
A. The measure is in the public domain or an intellectual property (measure steward agreement) is signed. *Public domain only applies to governmental organizations. All non-government organizations must sign a measure steward agreement even if measures are made publicly and freely available.* A.1 **Do you attest that the measure steward holds intellectual property rights to the measure and the right to use aspects of the measure owned by another entity (e.g., risk model, code set)?** Yes A.2 **Indicate if Proprietary Measure** (*as defined in measure steward agreement*)**:** A.3 **Measure Steward Agreement:** Agreement will be signed and submitted prior to or at the time of measure submission A.4 **Measure Steward Agreement attached:** Agreement With Measure Stewards_Agreement Between_National Quality Forum (12-6-2010).pdf	A Y☐ N☐

B. The measure owner/steward verifies there is an identified responsible entity and process to maintain and update the measure on a schedule that is commensurate with the rate of clinical innovation, but at least every 3 years. Yes, information provided in contact section	**B** Y☐ N☐
C. The intended use of the measure includes both public reporting and quality improvement. ►**Purpose:** Payment Program	**C** Y☐ N☐
D. The requested measure submission information is complete. Generally, measures should be fully developed and tested so that all the evaluation criteria have been addressed and information needed to evaluate the measure is provided. Measures that have not been tested are only potentially eligible for a time-limited endorsement and in that case, measure owners must verify that testing will be completed within 12 months of endorsement. D.1**Testing:** Yes, fully developed and tested D.2 **Have NQF-endorsed measures been reviewed to identify if there are similar or related measures?** Yes	**D** Y☐ N☐
(for NQF staff use) **Have all conditions for consideration been met?** **Staff Notes to Steward** (*if submission returned*)**:**	**Met** Y☐ N☐
Staff Notes to Reviewers (*issues or questions regarding any criteria*)**:**	
Staff Reviewer Name(s):	

TAP/Workgroup Reviewer Name:	
Steering Committee Reviewer Name:	
1. IMPORTANCE TO MEASURE AND REPORT	
Extent to which the specific measure focus is important to making significant gains in health care quality (safety, timeliness, effectiveness, efficiency, equity, patient-centeredness) and improving health outcomes for a specific high impact aspect of healthcare where there is variation in or overall poor performance. ***Measures must be judged to be important to measure and report*** *in order to be evaluated against the remaining criteria.* (evaluation criteria) **1a. High Impact**	**Eval Rating**
(for NQF staff use) **Specific NPP goal**:	
1a.1 **Demonstrated High Impact Aspect of Healthcare:** Affects large numbers, Frequently performed procedure, Leading cause of morbidity/mortality, High resource use, Severity of illness, Patient/societal consequences of poor quality 1a.2 1a.3 **Summary of Evidence of High Impact:** An international population-based study found that an aneurysm was present in 8.9% of men and 2.2% women (p < 0.001).(1) In the United States, ruptured AAAs are the 15th leading casue of death overall and the 10th leading casue of death in males over 55 years, a rate than has held steady for the past 2 decades. (2) Ruptured aneurysms are fatal in about 80% of cases. (3) 1a.4 **Citations for Evidence of High Impact:** (1) Singh K et al. Am. J. Epidemiol. (2001) 154 (3): 236-244. (2) Fillinger M. (2010) Abdominal Aortic Aneurysms: Evaluation and Decision Making. In J. Cronenewett & KW. Johnston (Eds.), Rutherford´s Vascular Surgery (1928-1948) Saunders Elsevier. Philadelphia. (3) May J, White GH, Stephen MS, Harris JP. J Vasc Surg. 2004 Nov;40(5):860-6.	**1a** C☐ P☐ M☐ N☐
1b. Opportunity for Improvement 1b.1 **Benefits (improvements in quality) envisioned by use of this measure:** Elective AAA repair is offered to prolong life by avoiding AAA rupture, which is fatal in more than 85% of cases. Rupture risk is primarily assess by AAA diameter, with larger AAAs more prone to rupture. Surgical treatment carries risk, however, of mortality and morbidity, which must be balanced against the risk of rupture in order to determine which	**1b** C☐ P☐ M☐ N☐

patients will benefit from elective repair.

Based on the UK small aneurysm trial, the accepted diameter threshold for elective AAA repair is 5.5 cm, although women have a slightly higher risk than men, so a threshold of 5 cm is usually recommended for women. The key concept of this proposed measure is that patients who are at low risk for AAA rupture (<6cm dia in men and <5.5 cm dia in women) should ONLY be offered elective AAA repair if their predicted operative mortality is low. This concept avoids the need for risk adjustment, since this is implicit in the decision to offer elective repair of small AAAs. This measure will highlight variation in proper patient selection by reporting unadjusted mortality rates for surgery in patients with small AAAs in whom this rate should be universally low. Providers or hospitals with high mortality rates are either not performing safe surgery or are not properly selecting low risk patients. The measure specifically excludes patients with larger AAAs because risk adjustment would be needed for such cases, and accepted risk adjustment algorithms are not available.

1b.2 Summary of data demonstrating performance gap (variation or overall poor performance) across providers:
There is significant regional variation in rates of AAA repair, indicating a performance gap. In 27 hospital referral regions, rates of AAA repair were at least 30% higher than the United States average of 1.0 per 1,000 Medicare enrollees. In 44 hospital referral regions, rates were more than 25% lower than the national average.(1)

Where these data have been monitored and reported to providers in VSGNE since 2003, among 11 centers and 48 providers treating 1380 patients since 2003, the median mortality rate for men and women with small AAAs as defined above is 0%, but the range is 0-6%, indicating both a perfomance gap and opportunity for further improvement.

1b.3 Citations for data on performance gap:
(1)Dartmouth-CMS-FDA Collaborative, "Trends and Regional Variation in Abdominal Aortic Aneurysm Repair, February 1, 2006.

1b.4 Summary of Data on disparities by population group:
Such data will become available if this measure is adopted for reporting and used by more centers with more varied population demographics than found in the New England region.

1b.5 Citations for data on Disparities:
not available

1c. Outcome or Evidence to Support Measure Focus

1c.1 Relationship to Outcomes (*For non-outcome measures, briefly describe the relationship to desired outcome. For outcomes, describe why it is relevant to the target population*)**:** discussed above

1c.2-3. Type of Evidence: Cohort study, Expert opinion, Meta-analysis

1c.4 Summary of Evidence (*as described in the criteria; for outcomes, summarize any evidence that healthcare services/care processes influence the outcome*)**:**
The endpoint of inhospital mortality is the accepted primary endpoint for both elective AAA repair. Variation in outcome has been established in randomized trials,cohort studies and meta analyses. This outcome measure has face validity among all providers of this service. Studies cited above have shown substantial variation in outcomes by provider when elective AAA repair is performed in patients with small AAAs.

1c.5 Rating of strength/quality of evidence (*also provide narrative description of the rating and by whom***):**
Motality is the reporting standard recommended by the Society for Vascular Surgery, and has been used in multiple trials.

1c.6 Method for rating evidence: Expert opinion.

1c
C ☐
P ☐
M ☐
N ☐

1c.7 Summary of Controversy/Contradictory Evidence: None **1c.8 Citations for Evidence (*other than guidelines*):** (2) Fillinger M. (2010) Abdominal Aortic Aneurysms: Evaluation and Decision Making. In J. Cronenewett & KW. Johnston (Eds.), Rutherford´s Vascular Surgery (1928-1948) Saunders Elsevier. Philadelphia. **1c.9 Quote the Specific guideline recommendation (*including guideline number and/or page number*):** None **1c.10 Clinical Practice Guideline Citation:** None **1c.11 National Guideline Clearinghouse or other URL:** None **1c.12 Rating of strength of recommendation (*also provide narrative description of the rating and by whom*):** N/A **1c.13 Method for rating strength of recommendation** (*If different from USPSTF system, also describe rating and how it relates to USPSTF)*: N/A **1c.14 Rationale for using this guideline over others:** Mortality is the accepted endpoint used in all trials. Restricting the AAA risk by confining the analysis to small AAAs is explained above.	
TAP/Workgroup: What are the strengths and weaknesses in relation to the subcriteria for *Importance to Measure and Report?*	**1**
Steering Committee: Was the threshold criterion, *Importance to Measure and Report*, met? **Rationale:**	**1** **Y☐** **N☐**
2. SCIENTIFIC ACCEPTABILITY OF MEASURE PROPERTIES	
Extent to which the measure, as specified, produces consistent (reliable) and credible (valid) results about the quality of care when implemented. (evaluation criteria)	**Eval Rating**
2a. MEASURE SPECIFICATIONS	
S.1 Do you have a web page where current detailed measure specifications can be obtained? **S.2 If yes, provide web page URL:** **2a. Precisely Specified**	
2a.1 Numerator Statement (*Brief, text description of the numerator - what is being measured about the target population, e.g. target condition, event, or outcome*): Mortality following elective endovascular AAA repair of asymptomatic AAAs in men with < 6 cm dia and women with < 5.5 cm dia AAAs **2a.2 Numerator Time Window (*The time period in which cases are eligible for inclusion in the numerator*):** Since hospitals have sufficient annual volume to generate accurate reporting levels, these are proposed for reporting every 12 months for hospital. Since surgeons have lower individual volume, we recommend annual reporting of the last 50 consecutive procedures, which may span more than one year, with suppression if < 10 procedures (ie, reported as too low volume to report). **2a.3 Numerator Details (*All information required to collect/calculate the numerator, including all codes, logic, and definitions*):** ANY registry that includes hospitalization details, AAA diameter and discharge status is required to identify patients for numerator inclusion. The Society for Vascular Surgery Vascular Quality Initiative (SVS VQI) and the Vascular Study Group of New England (VSGNE) are examples of registries that record such information, but the measure is not limited to these registries. Patients who died in hospital following elective	**2a-specs** **C☐** **P☐** **M☐** **N☐**

endovascular infrarenal AAA repair if their aneurysm was asymptomatic and small (< 6cm dia in men, <5.5 cm dia in women, judged by preoperative imaging (CT, MR or ultrasound)).

2a.4 Denominator Statement (*Brief, text description of the denominator - target population being measured***):**
All elective endovascular repairs of asymptomatic AAAs in men with < 6 cm dia and women with < 5.5 cm dia AAAs

2a.5 Target population gender: Female, Male
2a.6 Target population age range: 18 years or older

2a.7 Denominator Time Window (*The time period in which cases are eligible for inclusion in the denominator***):**
Since hospitals have sufficient annual volume to generate accurate reporting levels, these are proposed for reporting every 12 months for hospital. Since surgeons have lower individual volume, we recommend annual reporting of the last 50 consecutive procedures, which may span more than one year, with suppression if < 10 procedures (ie, reported as too low volume to report).

2a.8 Denominator Details (*All information required to collect/calculate the denominator - the target population being measured - including all codes, logic, and definitions***):**
ANY registry that includes hospitalization details, AAA diameter and discharge status is required to identify patients for denominator inclusion. The Society for Vascular Surgery Vascular Quality Initiative (SVS VQI) and the Vascular Study Group of New England (VSGNE) are examples of registries that record such information, but the measure is not limited to these registries. Patients who died in hospital following elective endovascular infrarenal AAA repair if their aneurysm was asymptomatic and small (< 6cm dia in men, <5.5 cm dia in women, judged by preoperative imaging (CT, MR or ultrasound)).

2a.9 Denominator Exclusions (*Brief text description of exclusions from the target population***):** > 6 cm diameter - men
> 5.5 cm diameter – women
Symptomatic AAAs that required urgent/emergent (non-elective) repair

2a.10 Denominator Exclusion Details (*All information required to collect exclusions to the denominator, including all codes, logic, and definitions***):**
Patients undergoing non-elective open repair of symptomatic AAAs or those with AAAs larger than the diameters noted above.

2a.11 Stratification Details/Variables (*All information required to stratify the measure including the stratification variables, all codes, logic, and definitions***):**
NA

2a.12-13 Risk Adjustment Type: No risk adjustment necessary

2a.14 Risk Adjustment Methodology/Variables (*List risk adjustment variables and describe conceptual models, statistical models, or other aspects of model or method***):**
See "Scientific Acceptablility" section for rationale

2a.15-17 Detailed risk model available Web page URL or attachment:

2a.18-19 Type of Score: Rate/proportion
2a.20 Interpretation of Score: Better quality = Lower score
2a.21 Calculation Algorithm (*Describe the calculation of the measure as a flowchart or series of steps***):**
Identify denominator, exclude non-elective repair of symptomatic or ruptured patients and men with AAA >6 cm, and women with AAA >5.5, find number of deaths
Outcome = deaths/ # cases

2a.22 Describe the method for discriminating performance *(e.g., significance testing)***:**
Standard statistical comparison of rates to provide confidence levels to discriminate meaningful differences from the mean.

2a.23 Sampling (Survey) Methodology *If measure is based on a sample (or survey), provide instructions for obtaining the sample, conducting the survey and guidance on minimum sample size (response rate)*:

N/A

2a.24 Data Source (*Check the source(s) for which the measure is specified and tested)*
Electronic Clinical Data : Registry

2a.25 Data source/data collection instrument (*Identify the specific data source/data collection instrument, e.g. name of database, clinical registry, collection instrument, etc.***):**
«data_source_instrument»

2a.26-28 Data source/data collection instrument reference web page URL or attachment: Attachment Endo_AAA_Repair_v1.9.xls

2a.29-31 Data dictionary/code table web page URL or attachment: Attachment EVAR defs v.01.09.doc

2a.32-35 Level of Measurement/Analysis (*Check the level(s) for which the measure is specified and tested)*
Clinician : Group/Practice, Clinician : Individual, Facility

2a.36-37 Care Settings (*Check the setting(s) for which the measure is specified and tested)*
Hospital/Acute Care Facility

2a.38-41 Clinical Services (*Healthcare services being measured, check all that apply*)
Clinicians: Physicians (MD/DO)

TESTING/ANALYSIS

2b. Reliability testing

2b.1 Data/sample *(description of data/sample and size)***:** A random sample of 100 patient records representing 5 procedures relevant to the measure from 5 different hospitals based on data collected during the past 2 years. In addition, in-hospital mortality was examined by claims based analysis of 7,205 patients discharged and recorded in the VSGNE registry between 2003 to 2007.

2b.2 Analytic Method *(type of reliability & rationale, method for testing)***:**
A nurse abstractor completed a form based on medical record review for the variables relevant to this measure. The results of this chart review were then compared with the original registry data. The Kappa statistic was used to judge reliability of the data. For mortality validation, claims data from each of 12 hospitals were matched to patient identified data within the VSGNE registry to compare discharge status (alive vs. dead). Any discrepencies were then further evaluated based on a medical record audit.

2b.3 Testing Results *(reliability statistics, assessment of adequacy in the context of norms for the test conducted)***:**
The key variables for this measure and testing results were:

1. Correct procedure (endovascular infrarenal AAA repair) performed. Kappa =1.0
2. AAA diameter: Based on 60 measurement, the mean diameter was 56.7 mm in the registry, 56.6 mm in the chart audit, no significant difference. Further, in on cases was the category of size based on the cut points of 6 cm in men and 5.5 cm in women different, Kappa = 1.0 for these categories.
3. Hospital mortality: Kappa = .91 (SE .01)
4. Elective(vs urgent or emergent); Kappa=1.0

2b C☐ P☐ M☐ N☐

2c. Validity testing

2c.1 Data/sample *(description of data/sample and size)***:** See reliability testing

2c.2 Analytic Method *(type of validity & rationale, method for testing)***:**
comparison of rates with published literature

2c.3 Testing Results *(statistical results, assessment of adequacy in the context of norms for the test conducted)***:**

2c C☐ P☐ M☐ N☐

In VSGNE, in hospital mortality for EVAR is 2-5%, and shows appropriate variation among hospitals, using this measure. This corresponds well to the published literature for elective AAA repair.	
2d. Exclusions Justified **2d.1 Summary of Evidence supporting exclusion(s):** Large clinical trials have demonstrated the relative safety of observation AAAs with a minimum diameter of less than 5.5 cm.(1) Most of these data were from men, and the same studies show that for women, AAAs rupture risk is higher, such that a minimum 5 cm threshold for women is generally recommended (1). In this measure, we are proposing that elective open AAA repair in men with AAAs < 6 cm dia and women with AAAs < 5.5 cm dia should only be recommended when the operative risk is low, because the AAA rupture risk is low (at a size less than 0.5 greater than the minimum rupture risk). This means that risk adjustment is considered as part of the surgical decision making, and does not need to be otherwise controlled for, as discussed further in 2.e.1. **2d.2 Citations for Evidence:** (1) Fillinger M. (2010) Abdominal Aortic Aneurysms: Evaluation and Decision Making. In J. Cronenewett & KW. Johnston (Eds.), Rutherford´s Vascular Surgery (1928-1948) Saunders Elsevier. Philadelphia. **2d.3 Data/sample** *(description of data/sample and size)*: 1380 patients undergoing elective EVAR in VSGNE, all patients, 2003-2010. 1120 men, 260 women **2d.4 Analytic Method** *(type analysis & rationale)*: rate calculation based on AAA dia size. AAAs were analyzed with 6 cm dia cutpoint in men and a 5.5 cm dia cutpoint in women, as described below. **2d.5 Testing Results** *(e.g., frequency, variability, sensitivity analyses)*: Men, < 6cm AAA, mdn 0% mortality, range 0-5.5% among 12 centers Men, >= 6 cm dia, mdn 0% mortality, range 0-9.5% among 12 centers Women, < 5.5 cm dia AAAs, mdn mortality 0%, range 0-5.3% among 11 centers Women, >= 5.5 cm dia AAAs, mdn mortality 0.9%, range 0-9.4% among 11 centers	**2d** C☐ P☐ M☐ N☐ NA☐
2e. Risk Adjustment for Outcomes/ Resource Use Measures **2e.1 Data/sample** *(description of data/sample and size)*: This measure was designed to avoid the need for risk adjustment, because risk adjustment is complex for AAA repair, and accepted algorithms do not yet exist. In patients with small AAAs, with low rupture risk, it is incumbent on the surgeon to factor in the risk-benefit of elective, prophylactic repair, since a high operative mortality will eliminate any benefit of AAA repair. Women have higher rupture risk than men, so by focusing this measure on AAAs < 5.5 cm in women and < 6 cm in men, the non-risk-adjusted mortality is a fair comparison of surgical outcome in the opinion of the sponsor, the Society for Vascular Surgery, and it represents a very important outcome to measure **2e.2 Analytic Method** *(type of risk adjustment, analysis, & rationale)*: N/A **2e.3 Testing Results** *(risk model performance metrics)*: N/A **2e.4 If outcome or resource use measure is not risk adjusted, provide rationale:** N/A	**2e** C☐ P☐ M☐ N☐ NA☐
2f. Identification of Meaningful Differences in Performance **2f.1 Data/sample from Testing or Current Use** *(description of data/sample and size)*: see section 1.b.3 and above 2,d,5 **2f.2 Methods to identify statistically significant and practically/meaningfully differences in performance** *(type of analysis & rationale)*: Standard statistial analysis to determine 95% confidence interval for hospitals and providers to determine	**2f** C☐ P☐ M☐ N☐

practical difference from mean 2f.3 **Provide Measure Scores from Testing or Current Use** *(description of scores, e.g., distribution by quartile, mean, median, SD, etc.; identification of statistically significant and meaningfully differences in performance)*:	
2g. Comparability of Multiple Data Sources/Methods 2g.1 **Data/sample** *(description of data/sample and size)*: no other data sources available 2g.2 **Analytic Method** *(type of analysis & rationale)*: N/A 2g.3 **Testing Results** *(e.g., correlation statistics, comparison of rankings)*: N/A	**2g** C☐ P☐ M☐ N☐ NA☐
2h. Disparities in Care 2h.1 **If measure is stratified, provide stratified results** *(scores by stratified categories/cohorts)*: N/A 2h.2 **If disparities have been reported/identified, but measure is not specified to detect disparities, provide follow-up plans:** Disparities have not been reported.	**2h** C☐ P☐ M☐ N☐ NA☐
TAP/Workgroup: What are the strengths and weaknesses in relation to the subcriteria for *Scientific Acceptability of Measure Properties?*	**2**
Steering Committee: Overall, to what extent was the criterion, *Scientific Acceptability of Measure Properties*, met? **Rationale:**	***2*** C☐ P☐ M☐ N☐
3. USABILITY	
Extent to which intended audiences (e.g., consumers, purchasers, providers, policy makers) can understand the results of the measure and are likely to find them useful for decision making. (evaluation criteria)	Eval Rating
3a. Meaningful, Understandable, and Useful Information 3a.1 **Current Use:** In use 3a.2 **Use in a public reporting initiative (disclosure of performance results to the public at large)** (*If used in a public reporting initiative, provide name of initiative(s), locations, Web page URL(s). If not publicly reported, state the plans to achieve public reporting within 3 years*): Data from SVS VQI and VSGNE are reported to each hospital and provider in a format that can be transmitted to an appropriate public reporting mechanism. 3a.3 **If used in other programs/initiatives (***If used in quality improvement or other programs/initiatives, name of initiative(s), locations, Web page URL(s). If not used for QI, state the plans to achieve use for QI within 3 years*): Vascular Study Group of New England www.vsgne.org Data have been successfully collected in this quality registry since 2003, and reports provided to participating physicians and hospitals about their rates of outcomes. These results are used by the regional quality group to provide benchmark reporting, and to stimulate regional quality improvement projects. **Testing of Interpretability** (*Testing that demonstrates the results are understood by the potential users for public reporting and quality improvement*) 3a.4 **Data/sample** *(description of data/sample and size)*: VSGNE samples previously described 3a.5 **Methods** *(e.g., focus group, survey, QI project)*: Semi-annual meetings of providers in VSGNE	**3a** C☐ P☐ M☐ N☐

3a.6 Results *(qualitative and/or quantitative results and conclusions)*: Benchamrk reports of this outcome measure have been provided to VSGNE member physician and hospitals since 2003, and discussed at semi-annual meetings. There have been no questions about interpretability.	
3b/3c. Relation to other NQF-endorsed measures **3b.1 NQF # and Title of similar or related measures:**	
(for NQF staff use) **Notes on similar/related endorsed or submitted measures:**	
3b. Harmonization If this measure is related to measure(s) already endorsed by NQF (e.g., same topic, but different target population/setting/data source or different topic but same target population): **3b.2 Are the measure specifications harmonized? If not, why?**	**3b** C☐ P☐ M☐ N☐ NA☐
3c. Distinctive or Additive Value **3c.1 Describe the distinctive, improved, or additive value this measure provides to existing NQF-endorsed measures:** **5.1 If this measure is similar to measure(s) already endorsed by NQF (i.e., on the same topic and the same target population), Describe why it is a more valid or efficient way to measure quality:**	**3c** C☐ P☐ M☐ N☐ NA☐
TAP/Workgroup: What are the strengths and weaknesses in relation to the subcriteria for *Usability?*	**3**
Steering Committee: Overall, to what extent was the criterion, *Usability*, met? **Rationale:**	**3** C☐ P☐ M☐ N☐
4. FEASIBILITY	
Extent to which the required data are readily available, retrievable without undue burden, and can be implemented for performance measurement. (evaluation criteria)	**Eval Rating**
4a. Data Generated as a Byproduct of Care Processes **4a.1-2 How are the data elements that are needed to compute measure scores generated?** Data generated as byproduct of care processes during care delivery (Data are generated and used by healthcare personnel during the provision of care, e.g., blood pressure, lab value, medical condition), Coding/abstraction performed by someone other than person obtaining original information (E.g., DRG, ICD-9 codes on claims, chart abstraction for quality measure or registry)	**4a** C☐ P☐ M☐ N☐
4b. Electronic Sources **4b.1 Are all the data elements available electronically?** (*elements that are needed to compute measure scores are in defined, computer-readable fields, e.g., electronic health record, electronic claims*) Yes **4b.2 If not, specify the near-term path to achieve electronic capture by most providers.**	**4b** C☐ P☐ M☐ N☐
4c. Exclusions **4c.1 Do the specified exclusions require additional data sources beyond what is required for the numerator and denominator specifications?** No	**4c** C☐ P☐ M☐ N☐

4c.2 **If yes, provide justification.**	NA☐
4d. Susceptibility to Inaccuracies, Errors, or Unintended Consequences 4d.1 **Identify susceptibility to inaccuracies, errors, or unintended consequences of the measure and describe how these potential problems could be audited. If audited, provide results.** Small size measurements of AAA should not significantly impact the measure, and symptom status is easily validated during chart review. We have not found inaccuracy in this measure.	4d C☐ P☐ M☐ N☐
4e. Data Collection Strategy/Implementation 4e.1 **Describe what you have learned/modified as a result of testing and/or operational use of the measure regarding data collection, availability of data/missing data, timing/frequency of data collection, patient confidentiality, time/cost of data collection, other feasibility/ implementation issues:** In the VSGNE experience which has been tracking hosptital mortality as a major endpoint since 2003, we have not experienced any difficulty with obtaining data related to this endpoint. Our percent missing for this variable has been less than 1%. 4e.2 **Costs to implement the measure** (*costs of data collection, fees associated with proprietary measures*)**:** In the context of the VSGNE and SVS VQI registries, there is no additional cost as all of these data are already collected. 4e.3 **Evidence for costs:** N/A 4e.4 **Business case documentation:** N/A	4e C☐ P☐ M☐ N☐
TAP/Workgroup: What are the strengths and weaknesses in relation to the subcriteria for *Feasibility?*	4
Steering Committee: Overall, to what extent was the criterion, *Feasibility*, met? **Rationale:**	4 C☐ P☐ M☐ N☐
RECOMMENDATION	
(for NQF staff use) **Check if measure is untested and only eligible for time-limited endorsement.**	Time-limited ☐
Steering Committee: Do you recommend for endorsement? **Comments:**	Y☐ N☐ A☐
CONTACT INFORMATION	
Co.1 **Measure Steward (Intellectual Property Owner)** Co.1 **Organization** Society for Vascular Surgery, 633 N. St. Clair, 22nd Floor, Chicago, Illinois, 60611 Co.2 **Point of Contact** Sarah, Murphy, Staff, smurphy@vascularsociety.org, 312-334-2305-	
Measure Developer If different from Measure Steward Co.3 **Organization** Society for Vascular Surgery, 633 N. St. Clair, 22nd Floor, Chicago, Illinois, 60611	

Co.4 **Point of Contact** Sarah, Murphy, Staff, smurphy@vascularsociety.org, 312-334-2305-
Co.5 **Submitter If different from Measure Steward POC** Sarah, Murphy, Staff, smurphy@vascularsociety.org, 312-334-2305-, Society for Vascular Surgery
Co.6 **Additional organizations that sponsored/participated in measure development**
ADDITIONAL INFORMATION
Workgroup/Expert Panel involved in measure development Ad.1 **Provide a list of sponsoring organizations and workgroup/panel members' names and organizations. Describe the members' role in measure development.** N/A
Ad.2 **If adapted, provide name of original measure:** Ad.3-5 **If adapted, provide original specifications URL or attachment**
Measure Developer/Steward Updates and Ongoing Maintenance Ad.6 **Year the measure was first released:** 2010 Ad.7 **Month and Year of most recent revision:** 12, 2010 Ad.8 **What is your frequency for review/update of this measure?** Ad.9 **When is the next scheduled review/update for this measure?**
Ad.10 **Copyright statement/disclaimers:** N/A
Ad.11 -13 **Additional Information web page URL or attachment:**
Date of Submission (*MM/DD/YY*)**:** 06/13/2011

NATIONAL QUALITY FORUM

Measure Evaluation 4.1
December 2009

This form contains the measure information submitted by stewards. Blank fields indicate no information was provided. Attachments also may have been submitted and are provided to reviewers. The subcriteria and most of the footnotes from the evaluation criteria are provided in Word comments within the form and will appear if your cursor is over the highlighted area. Hyperlinks to the evaluation criteria and ratings are provided in each section.

TAP/Workgroup (if utilized)**:** Complete all yellow highlighted areas of the form. Evaluate the extent to which each subcriterion is met. Based on your evaluation, summarize the strengths and weaknesses in each section.

Note: *If there is no TAP or workgroup, the SC also evaluates the subcriteria (yellow highlighted areas).*

Steering Committee: Complete all pink highlighted areas of the form. Review the workgroup/TAP assessment of the subcriteria, noting any areas of disagreement; then evaluate the extent to which each major criterion is met; and finally, indicate your recommendation for the endorsement. Provide the rationale for your ratings.

Evaluation ratings of the extent to which the criteria are met
C = Completely (unquestionably demonstrated to meet the criterion)
P = Partially (demonstrated to partially meet the criterion)
M = Minimally (addressed BUT demonstrated to only minimally meet the criterion)
N = Not at all (NOT addressed; OR incorrectly addressed; OR demonstrated to NOT meet the criterion)
NA = Not applicable (only an option for a few subcriteria as indicated)

(for NQF staff use) **NQF Review #:** 1540 **NQF Project:** Surgery Endorsement Maintenance 2010
MEASURE DESCRIPTIVE INFORMATION
De.1 **Measure Title:** Postoperative Stroke or Death in Asymptomatic Patients undergoing Carotid Endarterectomy
De.2 **Brief description of measure:** Percentage of patients age 18 or older without carotid territory neurologic or retinal symptoms within the one year immediately preceding carotid endarterectomy (CEA) who experience stroke or death following surgery while in the hospital. This measure is proposed for both hospitals and individual surgeons.
1.1-2 **Type of Measure:** Outcome De.3 **If included in a composite or paired with another measure, please identify composite or paired measure** Submitted SVS measure: Postoperative Stroke or Death in Asymptomatic Patients undergoing Carotid Artery Stenting
De.4 **National Priority Partners Priority Area:** Population health, Safety, Overuse De.5 **IOM Quality Domain**: Effectiveness, Efficiency, Safety De.6 **Consumer Care Need:** Staying healthy

CONDITIONS FOR CONSIDERATION BY NQF	
Four conditions must be met before proposed measures may be considered and evaluated for suitability as voluntary consensus standards:	NQF Staff
A. The measure is in the public domain or an intellectual property (measure steward agreement) is signed. *Public domain only applies to governmental organizations. All non-government organizations must sign a measure steward agreement even if measures are made publicly and freely available.* A.1 **Do you attest that the measure steward holds intellectual property rights to the measure and the right to use aspects of the measure owned by another entity (e.g., risk model, code set)?** Yes A.2 **Indicate if Proprietary Measure** (*as defined in measure steward agreement*)**:** A.3 **Measure Steward Agreement:** Agreement will be signed and submitted prior to or at the time of measure submission	**A** Y☐ N☐

A.4 **Measure Steward Agreement attached:** Agreement With Measure Stewards_Agreement Between_National Quality Forum (12-6-2010)-634273349246562246.pdf	
B. The measure owner/steward verifies there is an identified responsible entity and process to maintain and update the measure on a schedule that is commensurate with the rate of clinical innovation, but at least every 3 years. Yes, information provided in contact section	**B** Y☐ N☐
C. The intended use of the measure includes both public reporting and quality improvement. ►**Purpose:** Payment Program	**C** Y☐ N☐
D. The requested measure submission information is complete. Generally, measures should be fully developed and tested so that all the evaluation criteria have been addressed and information needed to evaluate the measure is provided. Measures that have not been tested are only potentially eligible for a time-limited endorsement and in that case, measure owners must verify that testing will be completed within 12 months of endorsement. D.1**Testing:** Yes, fully developed and tested D.2 **Have NQF-endorsed measures been reviewed to identify if there are similar or related measures?** Yes	**D** Y☐ N☐
(for NQF staff use) **Have all conditions for consideration been met?** **Staff Notes to Steward** (*if submission returned*)**:**	**Met** Y☐ N☐
Staff Notes to Reviewers (*issues or questions regarding any criteria*)**:**	
Staff Reviewer Name(s):	

TAP/Workgroup Reviewer Name:	
Steering Committee Reviewer Name:	
1. IMPORTANCE TO MEASURE AND REPORT	
Extent to which the specific measure focus is important to making significant gains in health care quality (safety, timeliness, effectiveness, efficiency, equity, patient-centeredness) and improving health outcomes for a specific high impact aspect of healthcare where there is variation in or overall poor performance. ***Measures must be judged to be important to measure and report*** *in order to be evaluated against the remaining criteria.* (evaluation criteria) **1a. High Impact**	**Eval Rating**
(for NQF staff use) **Specific NPP goal**:	
1a.1 **Demonstrated High Impact Aspect of Healthcare:** Affects large numbers, Frequently performed procedure, Leading cause of morbidity/mortality, High resource use, Severity of illness, Patient/societal consequences of poor quality 1a.2 1a.3 **Summary of Evidence of High Impact:** Stroke or death following CEA has been the primary clinical endpoint for multiple randomized trials of CEA (Ref 1-3). Although this is sometimes reported after 30 days, most postoperative strokes or deaths occur in hospital following CEA for asymptomatic patients (Ref 1). This endpoint is easy to capture from claims data and registries. This outcome is particularly important for asymptomatic patients undergoing CEA, since this is a prophylactic operation being proposed to prevent future stroke. As such, guidelines from the American Heart Association recommend CEA for such patients only if the risk of surgical death or stroke combined is less than 3% (Ref 4). This is based on Level I evidence from randomized trials which established the benefit of CEA in asymptomatic patients with at least 60% internal carotid artery (ICA) stenosis, but only if the surgical risk is appropriately low, since the subsequent stroke risk with medical management is not high (Ref 1-2). This contrasts with symptomatic patients with severe ICA stenosis where the stroke risk under medical therapy is high, and justifies CEA even when stroke risks are higher. Stroke is defined as an acute neurological deficit due to an occlusive or hemorrhagic brain lesion that	**1a** C☐ P☐ M☐ N☐

persists more than 24 hours. It can be substantiated by a new stroke seen on brain imaging, but this is not a requirement, i.e., clinical symptoms alone is sufficient. Both minor and major strokes will be counted, as long as the symptoms persist more than 24 hours. Stroke in either carotid distribution, or vertebrobasilar stroke is included, i.e., any postoperative new neurologic deficit attributed to an occlusive or hemorrhagic brain lestion lasting more than 24 hours. From an operational standpoint, post-operative new stroke is defined by medical record coding, ICD-9-CM 997.02.

While stroke or death following CEA is an appropriate quality measure for either symptomatic or asymptomatic patients, we believe that the former group would require risk adjustment to allow fair comparisons, while we do not believe this is necessary for asymptomatic patients. The rationale for this is as follows. Factors such as atrial fibrillation, congestive heart failure, contralateral carotid occlusion and diabetes have been shown to increase stroke risk following CEA, in addition to symptom status, and could be used to justify risk stratification (Ref 9). However, for asymptomatic patients, it is incumbent upon the surgeon to select only those patients of low perioperative risk to benefit from CEA. In fact, the recommendations of the AHA are that this surgery should not be done if risk is high (>3%), without risk adjustment in asymptomatic patients (Ref 4).

We propose that the denominator for this measure should be patients who have never been symptomatic in either the cerebral hemisphere ipsilateral to the carotid lesion, the contralateral hemisphere or the vertebrobasilar circulation(dizziness or lightheadedness alone are not considered symptoms). This group has the lowest risk of stroke with carotid intervention and also the lowest risk of stroke with medical therapy alone.

Adopting this outcome measure would likely have immediate impact on improving quality. Regional data have shown that feedback of the key outcome of stroke and death, in addition to some process measures after CEA reduced this outcome from 5.6% to 5.0% and in asymptomatic patients from 4.1% to 3.8% (Ref 5). The reporting time frame for hospitals should be on a yearly basis. The time frame for surgeons should be cumulative over their career.

This is an important quality measure, since it is suspected that a number of surgeons and centers performing CEAs do not meet the high standards of the randomized trials which established the benefit of such treatment. It has been shown that mortality following CEA in Medicare patients was 1.4% in hospitals participating in randomized trials, 1.7% in high volume non-trial hospitals, 1.9% in average volume hospitals and fully 2.5% in low volume hospitals (Ref 5). Given that the stroke rate is generally 3 times the mortality rate, this means that some surgeons/centers are likely not achieving optimal results. A recent survey in Canada found that 45% of hospitals are not meeting published guidelines (Ref 7). Adoption of this outcome measure in the United States would likely disclose similar results and lead to quality improvement. The VSGNNE has shown that regional results are good for CEA outcomes, but significant variation does exist between surgeons and centers (Ref 8). This would be the first true outcome measure for vascular surgery, and it would apply to the most frequently performed vascular operation.

1a.4 **Citations for Evidence of High Impact:**

1. Endarterectomy for asymptomatic carotid artery stenosis. Executive Committee for the Asymptomatic Carotid Atherosclerosis Study. Jama 1995;273(18):1421-8.
2. Halliday A, Mansfield A, Marro J, et al. Prevention of disabling and fatal strokes by successful carotid endarterectomy in patients without recent neurological symptoms: randomised controlled trial. Lancet 2004;363(9420):1491-502.
3. North American Symptomatic Carotid Endarterectomy Trial Collaborators. Beneficial effect of carotid endarterectomy in symptomatic patients with high-grade carotid stenosis. N Engl J Med 1991; 325: 445–53.
4. Biller J, Feinberg WM, Castaldo JE, et al. Guidelines for carotid endarterectomy: a statement for healthcare professionals from a special writing group of the Stroke Council, American Heart Association. Stroke; a journal of cerebral circulation 1998;29(2):554-62.
5. Kresowik TF, Bratzler DW, Kresowik RA, et al. Multistate improvement in process and outcomes of carotid endarterectomy. J Vasc Surg 2004;39(2):372-80.
6. Wennberg DE, Lucas FL, Birkmeyer JD, Bredenberg CE, Fisher ES. Variation in carotid endarterectomy mortality in the Medicare population: trial hospitals, volume, and patient characteristics. Jama 1998;279(16):1278-81.
7. Feasby TE, Kennedy J, Quan H, Girard L, Ghali WA. Real-world replication of randomized controlled

trial results for carotid endarterectomy. Archives of neurology 2007;64(10):1496-500.
8. Cronenwett JL, Likosky DS, Russell MT, Eldrup-Jorgensen J, Stanley AC, Nolan BW. A regional registry for quality assurance and improvement: The Vascular Study Group of Northern New England (VSGNNE). J Vasc Surg 2007.
9. Tu J, Wang H, Bowyer B, Green L, Fang J, Kucey D. Risk Factors for Death or Stroke After Carotid Endarterectomy: Observations From the Ontario Carotid Endarterectomy Registry. Stroke. 2003;34:2568-2575.

1b. Opportunity for Improvement

1b.1 **Benefits (improvements in quality) envisioned by use of this measure:** Numerous manuscripts have noted variation in the combined endpoint of stroke or death following carotid endarterectomy. In the Medicare population, the outcome has been shown to vary substantially as a function of hospital volume. This is an important consideration, since it is widely recognized that many surgeons and centers performing CEAs do not meet the high standards of the randomized trials which established the benefit of such treatment. It has been shown that mortality following CEA in Medicare patients was 1.4% in hospitals participating in randomized trials, 1.7% in high volume non-trial hospitals, 1.9% in average volume hospitals and fully 2.5% in low volume hospitals (Ref 6). Given that the stroke rate is generally 3 times the mortality rate, this suggests that some centers/surgeons are not achieving optimal results. A recent survey in Canada found that 45% of hospitals are not meeting published guidelines (Ref 7). Adoption of this outcome measure in the United States would likely disclose similar results and lead to quality improvement when this information was provided to surgeons and centers. This effect has been demonstrated in a midwest regional study by Kresowik et al where stroke and death rate after CEA improved after providing outcome data (Ref 5). The VSGNNE has shown that regional results are good for CEA outcomes, but significant variation does exist between surgeons and centers (Ref 8). Postoperative stroke or death is the accepted outcome paramenter for this surgery, and its measurement and reporting would demonstrate variation and opportunity for improvement

1b.2 **Summary of data demonstrating performance gap (variation or overall poor performance) across providers:**
It has been shown that mortality following CEA in Medicare patients was 1.4% in hospitals participating in randomized trials, 1.7% in high volume non-trial hospitals, 1.9% in average volume hospitals and fully 2.5% in low volume hospitals (Ref 6). Given that the stroke rate is generally 3 times the mortality rate, this means that many ill advised operations are likely being performed. A recent survey in Canada found that 45% of hospitals are not meeting published guidelines (Ref 7).

For this measure propsal we reviewed 4,613 CEAs performed for asymptomatic patients in VSGNE between 2003 to 2010. Among 17 hosptials, the variation in postoperative stroke or death rate was as follows: The 25th quartile was 0%. The 75th quartile was 1.5%. The median was 0.6%. The range across centers was 0% to 6.4%. Similarly, among 89 individual surgeons the rates were as follows: The 25th quartile was 0%. The 75th quartile was 0.8%. The median was 0%. The range across surgeons was 0% to 25%. This demonstrates substantial variability and performance gap even though the regional average outcome was excellent.

1b.3 **Citations for data on performance gap:**
See list in 1a.4 above

1b.4 **Summary of Data on disparities by population group:**
Such data will become available if this measure is adopted for reporting and used by more centers with more varied population demographics than found in the New England region.

1b.5 **Citations for data on Disparities:**
not available

1b
C☐
P☐
M☐
N☐

1c. Outcome or Evidence to Support Measure Focus

1c.1 **Relationship to Outcomes** (*For non-outcome measures, briefly describe the relationship to desired outcome. For outcomes, describe why it is relevant to the target population*)**:** discussed above

1c.2-3. **Type of Evidence:** Cohort study, Expert opinion, Meta-analysis

1c
C☐
P☐
M☐
N☐

1c.4 Summary of Evidence (*as described in the criteria; for outcomes, summarize any evidence that healthcare services/care processes influence the outcome*)**:**
The combined endpoint of stroke/death is the accepted primary endpoint for carotid endarterectomy. Variation in outcome has been established in randomized trials,cohort studies and meta analyses. This outcome measure has face validity among all providers of this service. Studies cited above have shown substantial variation in outcomes by provider when CEA is performed in asymptomatic patients.

1c.5 Rating of strength/quality of evidence (*also provide narrative description of the rating and by whom***):**
Stroke/death after CAS is the reporting standard recommended by the Society for Vascular Surgery, and has been used in multiple RCTs.

1c.6 Method for rating evidence: Expert opinion.

1c.7 Summary of Controversy/Contradictory Evidence: None

1c.8 Citations for Evidence (*other than guidelines***):** 1.Endarterectomy for asymptomatic carotid artery stenosis. Executive Committee for the Asymptomatic Carotid Atherosclerosis Study. Jama 1995;273(18):1421-8.
2. Halliday A, Mansfield A, Marro J, et al. Prevention of disabling and fatal strokes by successful carotid endarterectomy in patients without recent neurological symptoms: randomised controlled trial. Lancet 2004;363(9420):1491-502.
3. North American Symptomatic Carotid Endarterectomy Trial Collaborators. Beneficial effect of carotid endarterectomy in symptomatic patients with high-grade carotid stenosis. N Engl J Med 1991; 325: 445–53.
4. Biller J, Feinberg WM, Castaldo JE, et al. Guidelines for carotid endarterectomy: a statement for healthcare professionals from a special writing group of the Stroke Council, American Heart Association. Stroke; a journal of cerebral circulation 1998;29(2):554-62.
5. Kresowik TF, Bratzler DW, Kresowik RA, et al. Multistate improvement in process and outcomes of carotid endarterectomy. J Vasc Surg 2004;39(2):372-80.
6. Wennberg DE, Lucas FL, Birkmeyer JD, Bredenberg CE, Fisher ES. Variation in carotid endarterectomy mortality in the Medicare population: trial hospitals, volume, and patient characteristics. Jama 1998;279(16):1278-81.
7. Feasby TE, Kennedy J, Quan H, Girard L, Ghali WA. Real-world replication of randomized controlled trial results for carotid endarterectomy. Archives of neurology 2007;64(10):1496-500.
8. Cronenwett JL, Likosky DS, Russell MT, Eldrup-Jorgensen J, Stanley AC, Nolan BW. A regional registry for quality assurance and improvement: The Vascular Study Group of Northern New England (VSGNNE). J Vasc Surg 2007.
9. Tu J, Wang H, Bowyer B, Green L, Fang J, Kucey D. Risk Factors for Death or Stroke After Carotid Endarterectomy: Observations From the Ontario Carotid Endarterectomy Registry. Stroke. 2003;34:2568-2575.

1c.9 Quote the Specific guideline recommendation (*including guideline number and/or page number***):**
Biller J, Feinberg WM, Castaldo JE, et al. Guidelines for carotid endarterectomy: a statement for healthcare professionals from a special writing group of the Stroke Council, American Heart Association. Stroke; a journal of cerebral circulation 1998;29(2):554-62.

1c.10 Clinical Practice Guideline Citation: Biller J, Feinberg WM, Castaldo JE, et al. Guidelines for carotid endarterectomy: a statement for healthcare professionals from a special writing group of the Stroke Council, American Heart Association. Stroke; a journal of cerebral circulation 1998;29(2):554-62.
1c.11 National Guideline Clearinghouse or other URL: N/A

1c.12 Rating of strength of recommendation (*also provide narrative description of the rating and by whom***):**
Level 1

1c.13 Method for rating strength of recommendation (*If different from USPSTF system, also describe*

rating and how it relates to USPSTF): AHA 1c.14 **Rationale for using this guideline over others:** Universally accepted	
TAP/Workgroup: What are the strengths and weaknesses in relation to the subcriteria for *Importance to Measure and Report?*	**1**
Steering Committee: Was the threshold criterion, *Importance to Measure and Report*, met? **Rationale:**	**1** **Y☐** **N☐**
2. SCIENTIFIC ACCEPTABILITY OF MEASURE PROPERTIES	
Extent to which the measure, as specified, produces consistent (reliable) and credible (valid) results about the quality of care when implemented. (evaluation criteria)	**Eval Rating**
2a. MEASURE SPECIFICATIONS	
S.1 **Do you have a web page where current detailed measure specifications can be obtained?** S.2 **If yes, provide web page URL:** **2a. Precisely Specified**	
2a.1 **Numerator Statement (***Brief, text description of the numerator - what is being measured about the target population, e.g. target condition, event, or outcome***):** Patients age 18 or older without preoperative carotid territory neurologic or retinal sympotoms within the one year immediately preceding CEA who experience stroke or death during their hospitalization following carotid endarterectomy 2a.2 **Numerator Time Window (***The time period in which cases are eligible for inclusion in the numerator***):** Since hospitals have sufficient annual volume to generate accurate reporting levels, these are proposed for reporting every 12 months for hospital. Since surgeons have lower individual volume, we recommend annual reporting of the last 50 consecutive procedures, which may span more than one year, with suppression if < 10 procedures (ie, reported as too low volume to report). 2a.3 **Numerator Details (***All information required to collect/calculate the numerator, including all codes, logic, and definitions***):** ANY registry that includes hospitalization details and symptom status within 120 days is required to identify patients for numerator inclusion. The Society for Vascular Surgery Vascular Quality Initiative (SVS VQI) and the Vascular Study Group of New England (VSGNE) are examples of registries that record such information, but the measure is not limited to these registries. Patients who were asymptomatic within one year of the CEA(CPT code 37215) who died or experienced postoperative inhospital stroke are included.	
2a.4 **Denominator Statement (***Brief, text description of the denominator - target population being measured***):** Asymptomatic patients (based on NASCET criteria) on the within one year of CEA 2a.5 **Target population gender:** Female, Male 2a.6 **Target population age range:** 18 years or older 2a.7 **Denominator Time Window (***The time period in which cases are eligible for inclusion in the denominator***):** Since hospitals have sufficient annual volume to generate accurate reporting levels, these are proposed for reporting every 12 months for hospital. Since surgeons have lower individual volume, we recommend annual reporting of the last 50 consecutive procedures, which may span more than one year, with suppression if < 10 procedures (ie, reported as too low volume to report). 2a.8 **Denominator Details (***All information required to collect/calculate the denominator - the target*	**2a-specs** **C☐** **P☐** **M☐** **N☐**

population being measured - including all codes, logic, and definitions):
ANY registry that includes hospitalization details and symptom status within 120 days is required to identify patients for denominator inclusion. The Society for Vascular Surgery Vascular Quality Initiative (SVS VQI) and the Vascular Study Group of New England (VSGNE) are examples of registries that record such information, but the measure is not limited to these registries. Patients who were asymptomatic within one year of the CAS (CPT code 37215)are included.

2a.9 **Denominator Exclusions (***Brief text description of exclusions from the target population***):** Patients with neurologic symptoms within one year of surgery

2a.10 **Denominator Exclusion Details (***All information required to collect exclusions to the denominator, including all codes, logic, and definitions***):**
Patients with NASCET criteria neurologic symptoms (transient ischemic attack, amaurosis, or stroke) within the one year immediately proceeding CEA

2a.11 **Stratification Details/Variables (***All information required to stratify the measure including the stratification variables, all codes, logic, and definitions***):**
Not required

2a.12-13 **Risk Adjustment Type:** No risk adjustment necessary

2a.14 **Risk Adjustment Methodology/Variables (***List risk adjustment variables and describe conceptual models, statistical models, or other aspects of model or method***):**
See "Scientific Acceptablility" section for rationale

2a.15-17 **Detailed risk model available Web page URL or attachment:**

2a.18-19 **Type of Score:** Rate/proportion
2a.20 **Interpretation of Score:** Better quality = Lower score
2a.21 **Calculation Algorithm (***Describe the calculation of the measure as a flowchart or series of steps***):**
Asymptomatic patients undergoing CEA who experience inhospital stroke or death/all asymptomatic patients undergoing CEA

2a.22 **Describe the method for discriminating performance** *(e.g., significance testing)*:
Standard statistical comparison of rates to provide confidence levels to discriminate meaningful differences from the mean.

2a.23 **Sampling (Survey) Methodology** *If measure is based on a sample (or survey), provide instructions for obtaining the sample, conducting the survey and guidance on minimum sample size (response rate)*:
N/A

2a.24 **Data Source (***Check the source(s) for which the measure is specified and tested)*
Electronic Clinical Data : Registry

2a.25 **Data source/data collection instrument (***Identify the specific data source/data collection instrument, e.g. name of database, clinical registry, collection instrument, etc.***):**
«data_source_instrument»

2a.26-28 **Data source/data collection instrument reference web page URL or attachment:** Attachment Carotid_Endarterectomy_CB_v1.9.xlsx

2a.29-31 **Data dictionary/code table web page URL or attachment:** Attachment CEA defs v.01.09.doc

2a.32-35 **Level of Measurement/Analysis** (*Check the level(s) for which the measure is specified and tested)*
Clinician : Group/Practice, Clinician : Individual, Facility

2a.36-37 **Care Settings (***Check the setting(s) for which the measure is specified and tested)*
Hospital/Acute Care Facility

2a.38-41 **Clinical Services** (*Healthcare services being measured, check all that apply*)
Clinicians: Physicians (MD/DO)

TESTING/ANALYSIS	
2b. Reliability testing **2b.1 Data/sample** *(description of data/sample and size)*: A random sample of 100 patient records representing 5 procedures relevant to the measure from 5 different hospitals based on data collected during the past 2 years. In addition, in-hospital mortality was examined by claims based analysis of 7,205 patients discharged and recorded in the VSGNE registry between 2003 to 2007. **2b.2 Analytic Method** *(type of reliability & rationale, method for testing)*: A nurse abstractor completed a form based on medical record review for the variables relevant to this measure. The results of this chart review were then compared with the original registry data. The Kappa statistic was used to judge reliability of the data. For mortality validation, claims data from each of 12 hospitals were matched to patient identified data within the VSGNE registry to compare discharge status (alive vs. dead). Any discrepencies were then further evaluated based on a medical record audit. **2b.3 Testing Results** *(reliability statistics, assessment of adequacy in the context of norms for the test conducted)*: The key variables for this measure and testing results were: 1. Correct procedure (carotid endarterectomy) performed. Kappa =1.0 2. Hospital mortality: Kappa = .91 (SE .01) 3. Hospital stroke: Kappa = 1.0 4. Asymptomatic 120 days pre-Rx: Kappa = .90 (SE .07)	**2b** C☐ P☐ M☐ N☐
2c. Validity testing **2c.1 Data/sample** *(description of data/sample and size)*: see reliability testing **2c.2 Analytic Method** *(type of validity & rationale, method for testing)*: Comparison of results with expected results from literature. **2c.3 Testing Results** *(statistical results, assessment of adequacy in the context of norms for the test conducted)*: The percentage of asymptomatic patients being treated with CEA in VSGNE of 68% corresponds to published data on this cohort. The postop stroke or death rate of 1.5% also correponds to published results for asymptomatic patients.	**2c** C☐ P☐ M☐ N☐
2d. Exclusions Justified **2d.1 Summary of Evidence supporting exclusion(s):** Symptomatic patients are excluded because they would require complex risk adjustment that is not available. In such patients, treatment is more often indicated despite risk of treatment. However, for asymptomatic patients, complication rate must be low, less than 3% to justify intervention. **2d.2 Citations for Evidence:** Biller J, Feinberg WM, Castaldo JE, et al. Guidelines for carotid endarterectomy: a statement for healthcare professionals from a special writing group of the Stroke Council, American Heart Association. Stroke; a journal of cerebral circulation 1998;29(2):554-62. **2d.3 Data/sample** *(description of data/sample and size)*: SVS Vascular Registry 862 asymptomatic patients undergoing elective CEA **2d.4 Analytic Method** *(type analysis & rationale)*: measure calculation **2d.5 Testing Results** *(e.g., frequency, variability, sensitivity analyses)*: Death rate 0.7%, stroke rate 1.28% among 287 provider in 58 centers Interquartile range was 0.2-7.6% for the combined endpoint	**2d** C☐ P☐ M☐ N☐ NA☐

2e. Risk Adjustment for Outcomes/ Resource Use Measures **2e.1 Data/sample** *(description of data/sample and size)*: See "Scientific Acceptablility" section for rationale. Risk adjustment is implicit within this quality measure as judged by the sponsor, the Society for Vascular Surgery, for the following reason. CEA in an asymptomatic patients is a prophylactic procedure designed to prevent future stroke. The decision to perform such a procedure requires the interventionist to calculate the patient´s risk-benefit ratio, in order to avoid post-CEA stroke or death that eliminate the benefit of the procedure. Risk adjustment based on patient factors should not be applied, since high risk patients should not undergo this prophylactic procedure, and using risk adjustment would reward interventionists who selected high risk patients for treatment. **2e.2 Analytic Method** *(type of risk adjustment, analysis, & rationale)*: **2e.3 Testing Results** *(risk model performance metrics)*: **2e.4 If outcome or resource use measure is not risk adjusted, provide rationale:**	**2e** C☐ P☐ M☐ N☐ NA☐
2f. Identification of Meaningful Differences in Performance **2f.1 Data/sample from Testing or Current Use** *(description of data/sample and size)*: see section 1.b.3 and above 2,d,5 **2f.2 Methods to identify statistically significant and practically/meaningfully differences in performance** *(type of analysis & rationale)*: Standard statistial analysis to determine 95% confidence interval for hospitals and providers to determine practical difference from mean **2f.3 Provide Measure Scores from Testing or Current Use** *(description of scores, e.g., distribution by quartile, mean, median, SD, etc.; identification of statistically significant and meaningfully differences in performance)*:	**2f** C☐ P☐ M☐ N☐
2g. Comparability of Multiple Data Sources/Methods **2g.1 Data/sample** *(description of data/sample and size)*: other sample not available **2g.2 Analytic Method** *(type of analysis & rationale)*: **2g.3 Testing Results** *(e.g., correlation statistics, comparison of rankings)*:	**2g** C☐ P☐ M☐ N☐ NA☐
2h. Disparities in Care **2h.1 If measure is stratified, provide stratified results** *(scores by stratified categories/cohorts)*: N/A **2h.2 If disparities have been reported/identified, but measure is not specified to detect disparities, provide follow-up plans:** Disparities have not been reported.	**2h** C☐ P☐ M☐ N☐ NA☐
TAP/Workgroup: What are the strengths and weaknesses in relation to the subcriteria for *Scientific Acceptability of Measure Properties?*	**2**
Steering Committee: Overall, to what extent was the criterion, *Scientific Acceptability of Measure Properties*, met? **Rationale:**	**2** C☐ P☐ M☐ N☐
3. USABILITY	

Extent to which intended audiences (e.g., consumers, purchasers, providers, policy makers) can understand the results of the measure and are likely to find them useful for decision making. (evaluation criteria)	Eval Rating
3a. Meaningful, Understandable, and Useful Information **3a.1 Current Use:** In use **3a.2 Use in a public reporting initiative (disclosure of performance results to the public at large)** (*If used in a public reporting initiative, provide name of initiative(s), locations, Web page URL(s). If not publicly reported, state the plans to achieve public reporting within 3 years*)**:** Data from SVS VQI and VSGNE are reported to each hospital and provider in a format that can be transmitted to an appropriate public reporting mechanism. **3a.3 If used in other programs/initiatives (***If used in quality improvement or other programs/initiatives, name of initiative(s), locations, Web page URL(s). If not used for QI, state the plans to achieve use for QI within 3 years***):** Vascular Study Group of New England www.vsgne.org Real time reports of outcome measures are provided to practitioners online. These are then used in regional quality improvement programs. **Testing of Interpretability** (*Testing that demonstrates the results are understood by the potential users for public reporting and quality improvement*) **3a.4 Data/sample** *(description of data/sample and size)***:** VSGNE samples previously described **3a.5 Methods** *(e.g., focus group, survey, QI project)***:** Semi-annual meetings of providers in VSGNE **3a.6 Results** *(qualitative and/or quantitative results and conclusions)***:** Benchamrk reports of this outcome measure have been provided to VSGNE member physician and hospitals since 2003, and discussed at semi-annual meetings. There have been no questions about interpretability.	**3a** C☐ P☐ M☐ N☐
3b/3c. Relation to other NQF-endorsed measures **3b.1 NQF # and Title of similar or related measures:**	
(for NQF staff use) **Notes on similar/related endorsed or submitted measures:**	
3b. Harmonization If this measure is related to measure(s) already endorsed by NQF (e.g., same topic, but different target population/setting/data source or different topic but same target population): **3b.2 Are the measure specifications harmonized? If not, why?**	**3b** C☐ P☐ M☐ N☐ NA☐
3c. Distinctive or Additive Value **3c.1 Describe the distinctive, improved, or additive value this measure provides to existing NQF-endorsed measures:** **5.1 If this measure is similar to measure(s) already endorsed by NQF (i.e., on the same topic and the same target population), Describe why it is a more valid or efficient way to measure quality:**	**3c** C☐ P☐ M☐ N☐ NA☐
TAP/Workgroup: What are the strengths and weaknesses in relation to the subcriteria for *Usability?*	**3**
Steering Committee: Overall, to what extent was the criterion, *Usability*, met? **Rationale:**	**3** C☐ P☐ M☐ N☐

4. FEASIBILITY	
Extent to which the required data are readily available, retrievable without undue burden, and can be implemented for performance measurement. (evaluation criteria)	Eval Rating
4a. Data Generated as a Byproduct of Care Processes 4a.1-2 **How are the data elements that are needed to compute measure scores generated?** Data generated as byproduct of care processes during care delivery (Data are generated and used by healthcare personnel during the provision of care, e.g., blood pressure, lab value, medical condition), Coding/abstraction performed by someone other than person obtaining original information (E.g., DRG, ICD-9 codes on claims, chart abstraction for quality measure or registry)	4a C☐ P☐ M☐ N☐
4b. Electronic Sources 4b.1 **Are all the data elements available electronically?** (*elements that are needed to compute measure scores are in defined, computer-readable fields, e.g., electronic health record, electronic claims*) Yes 4b.2 **If not, specify the near-term path to achieve electronic capture by most providers.**	4b C☐ P☐ M☐ N☐
4c. Exclusions 4c.1 **Do the specified exclusions require additional data sources beyond what is required for the numerator and denominator specifications?** No 4c.2 **If yes, provide justification.**	4c C☐ P☐ M☐ N☐ NA☐
4d. Susceptibility to Inaccuracies, Errors, or Unintended Consequences 4d.1 **Identify susceptibility to inaccuracies, errors, or unintended consequences of the measure and describe how these potential problems could be audited. If audited, provide results.** Data definitions regarding asymptomatic status based on NASCET criteria have eliminated confusion about symtoms. Death is an accurate endpoint. Stroke has been accurately collected as judged by chart audits and comparison to claims data that has been done within VSGNE.	4d C☐ P☐ M☐ N☐
4e. Data Collection Strategy/Implementation 4e.1 **Describe what you have learned/modified as a result of testing and/or operational use of the measure regarding data collection, availability of data/missing data, timing/frequency of data collection, patient confidentiality, time/cost of data collection, other feasibility/ implementation issues:** In the VSGNE experience which has been tracking stroke or death as a major endpoint since 2003, we have not experienced any difficulty with obtaining data related to this endpoint. Our percent missing for this variable has been less than 1%. 4e.2 **Costs to implement the measure** (*costs of data collection, fees associated with proprietary measures*)**:** In the context of the VSGNE and SVS VQI registries, there is no additional cost as all of these data are already collected. 4e.3 **Evidence for costs:** 4e.4 **Business case documentation:**	4e C☐ P☐ M☐ N☐
TAP/Workgroup: What are the strengths and weaknesses in relation to the subcriteria for *Feasibility?*	4

Steering Committee: Overall, to what extent was the criterion, *Feasibility*, met? Rationale:	4 C☐ P☐ M☐ N☐
RECOMMENDATION	
(for NQF staff use) Check if measure is untested and only eligible for time-limited endorsement.	Time-limited ☐
Steering Committee: Do you recommend for endorsement? Comments:	Y☐ N☐ A☐

CONTACT INFORMATION

Co.1 Measure Steward (Intellectual Property Owner)
Co.1 Organization
Society for Vascular Surgery, 633 N. St. Clair, 22nd St., Chicago, Illinois, 60611

Co.2 Point of Contact
Sarah, Murphy, Staff, smurphy@vascularsociety.org, 312-334-2305-

Measure Developer If different from Measure Steward
Co.3 Organization
Society for Vascular Surgery, 633 N. St. Clair, 22nd St., Chicago, Illinois, 60611

Co.4 Point of Contact
Sarah, Murphy, Staff, smurphy@vascularsociety.org, 312-334-2305-

Co.5 Submitter If different from Measure Steward POC
Sarah, Murphy, Staff, smurphy@vascularsociety.org, 312-334-2305-, Society for Vascular Surgery

Co.6 Additional organizations that sponsored/participated in measure development

ADDITIONAL INFORMATION

Workgroup/Expert Panel involved in measure development
Ad.1 Provide a list of sponsoring organizations and workgroup/panel members' names and organizations. Describe the members' role in measure development.

Ad.2 If adapted, provide name of original measure:
Ad.3-5 If adapted, provide original specifications URL or attachment

Measure Developer/Steward Updates and Ongoing Maintenance
Ad.6 Year the measure was first released: 2010
Ad.7 Month and Year of most recent revision: 12, 2010
Ad.8 What is your frequency for review/update of this measure?
Ad.9 When is the next scheduled review/update for this measure?

Ad.10 Copyright statement/disclaimers:

Ad.11 -13 Additional Information web page URL or attachment:

Date of Submission (*MM/DD/YY*): 06/13/2011

NATIONAL QUALITY FORUM

Measure Evaluation 4.1
December 2009

This form contains the measure information submitted by stewards. Blank fields indicate no information was provided. Attachments also may have been submitted and are provided to reviewers. The subcriteria and most of the footnotes from the evaluation criteria are provided in Word comments within the form and will appear if your cursor is over the highlighted area. Hyperlinks to the evaluation criteria and ratings are provided in each section.

TAP/Workgroup (if utilized)**:** Complete all yellow highlighted areas of the form. Evaluate the extent to which each subcriterion is met. Based on your evaluation, summarize the strengths and weaknesses in each section.

Note: *If there is no TAP or workgroup, the SC also evaluates the subcriteria (yellow highlighted areas).*

Steering Committee: Complete all pink highlighted areas of the form. Review the workgroup/TAP assessment of the subcriteria, noting any areas of disagreement; then evaluate the extent to which each major criterion is met; and finally, indicate your recommendation for the endorsement. Provide the rationale for your ratings.

Evaluation ratings of the extent to which the criteria are met
C = Completely (unquestionably demonstrated to meet the criterion)
P = Partially (demonstrated to partially meet the criterion)
M = Minimally (addressed BUT demonstrated to only minimally meet the criterion)
N = Not at all (NOT addressed; OR incorrectly addressed; OR demonstrated to NOT meet the criterion)
NA = Not applicable (only an option for a few subcriteria as indicated)

(for NQF staff use) **NQF Review #:** 1543 **NQF Project:** Surgery Endorsement Maintenance 2010
MEASURE DESCRIPTIVE INFORMATION
De.1 **Measure Title:** Postoperative Stroke or Death in Asymptomatic Patients undergoing Carotid Artery Stenting (CAS)
De.2 **Brief description of measure:** Percentage of patients 18 years of age or older without carotid territory neurologic or retinal symptoms within 120 days immediately proceeding carotid angioplasty and stent (CAS) placement who experience stroke or death during their hospitalization for this procedure. This measure is proposed for both hospitals and individual interventionalists.
1.1-2 **Type of Measure:** Outcome De.3 **If included in a composite or paired with another measure, please identify composite or paired measure** Submitted SVS measure: Postoperative Stroke or Death in Asymptomatic Patients undergoing Carotid Endarterectomy
De.4 **National Priority Partners Priority Area:** Population health, Safety, Overuse De.5 **IOM Quality Domain**: Effectiveness, Efficiency, Safety De.6 **Consumer Care Need:** Staying healthy

CONDITIONS FOR CONSIDERATION BY NQF	
Four conditions must be met before proposed measures may be considered and evaluated for suitability as voluntary consensus standards:	NQF Staff
A. The measure is in the public domain or an intellectual property (measure steward agreement) is signed. *Public domain only applies to governmental organizations. All non-government organizations must sign a measure steward agreement even if measures are made publicly and freely available.* A.1 **Do you attest that the measure steward holds intellectual property rights to the measure and the right to use aspects of the measure owned by another entity (e.g., risk model, code set)?** Yes A.2 **Indicate if Proprietary Measure** (*as defined in measure steward agreement*)**:** A.3 **Measure Steward Agreement:** Agreement will be signed and submitted prior to or at the time of	A Y☐ N☐

measure submission A.4 **Measure Steward Agreement attached:** Agreement With Measure Stewards_Agreement Between_National Quality Forum (12-6-2010)-634274164751404870.pdf	
B. The measure owner/steward verifies there is an identified responsible entity and process to maintain and update the measure on a schedule that is commensurate with the rate of clinical innovation, but at least every 3 years. Yes, information provided in contact section	**B** Y☐ N☐
C. The intended use of the measure includes both public reporting and quality improvement. ►**Purpose:** Payment Program	**C** Y☐ N☐
D. The requested measure submission information is complete. Generally, measures should be fully developed and tested so that all the evaluation criteria have been addressed and information needed to evaluate the measure is provided. Measures that have not been tested are only potentially eligible for a time-limited endorsement and in that case, measure owners must verify that testing will be completed within 12 months of endorsement. D.1**Testing:** Yes, fully developed and tested D.2 **Have NQF-endorsed measures been reviewed to identify if there are similar or related measures?** Yes	**D** Y☐ N☐
(for NQF staff use) **Have all conditions for consideration been met?** **Staff Notes to Steward** (*if submission returned*)**:**	**Met** Y☐ N☐
Staff Notes to Reviewers (*issues or questions regarding any criteria*)**:**	
Staff Reviewer Name(s):	

TAP/Workgroup Reviewer Name:	
Steering Committee Reviewer Name:	
1. IMPORTANCE TO MEASURE AND REPORT	
Extent to which the specific measure focus is important to making significant gains in health care quality (safety, timeliness, effectiveness, efficiency, equity, patient-centeredness) and improving health outcomes for a specific high impact aspect of healthcare where there is variation in or overall poor performance. ***Measures must be judged to be important to measure and report*** *in order to be evaluated against the remaining criteria.* (evaluation criteria) **1a. High Impact**	**Eval Rating**
(for NQF staff use) **Specific NPP goal**:	
1a.1 **Demonstrated High Impact Aspect of Healthcare:** Affects large numbers, Frequently performed procedure, Leading cause of morbidity/mortality, High resource use, Severity of illness, Patient/societal consequences of poor quality 1a.2 1a.3 **Summary of Evidence of High Impact:** Percutaneous carotid intervention is a rapidly emerging field. Published trial results have established carotid stenting (CAS) in high risk surgical patients to be an effective alternative to carotid endarterectomy (CEA). It is well established that CEA benefits patients with asymptomatic >60% stenosis only if performed with a high degree of technical proficiency on appropriately selected patients. The same is proposed to hold true for CAS. This is particularly important when considering an asymptomatic population where the relative risk reduction with intervention is narrow when compared to medical management. Numerous publications have noted variation in the combined endpoint of stroke and death following carotid angioplasty and stent placement with embolic protection (5). Adoption of this outcome measure in the United States would likely disclose disperate results between hospitals and between providers, and lead to quality improvement when this information was provided to individual providers and participating centers. The SVS Vascular Registry has shown that outcome results are good for CAS, but variations exist between interventionalists and centers (8). Postoperative stroke or death is the accepted outcome parameter for this procedure, and its measurement and reporting would demonstrate	**1a** C☐ P☐ M☐ N☐

variation and opportunity for improvemement. CAS is an elective procedure in nearly all cases. Patients can be referred or transferred to a center with the personnel and experience to perform this procedure with a high level of competence and any procedure that has "stroke" as a potential risk should be performed only by individuals with appropriate training and experience. (1)

1a.4 Citations for Evidence of High Impact: 1.) Carotid Artery Angioplasty and Stent Placement: Quality Improvement Guidelines to Ensure Stroke Risk Reduction, J Vasc Interv Radiol 2003;14;S317-9. 2.) Executive Committee for the Asymptomatic Carotid Atherosclerosis Study. Endarterectomy for asymptomatic carotid artery stenosis, JAMA 1995;273:1421-8. 3.) Management of Atherosclerotic Carotid Artery Disease: Clinical Practice Guidelines of the Society for Vascular Surgery, J Vasc Surg 2008;48:480-6. 4.) Clinical Competence Statement on Carotid Stenting: Training and Credentialing for Carotid Stenting-Multispecialty Consensus Recommendations, J Vasc Surg 2005;41:160-8. 5.) Percutaneous Transluminal Angioplasty and Stenting for Carotid Artery Stenosis, Cochrane Database Syst Rev 2007;(4):CD000515. 6.) Endarterectomy vs Stenting for Carotid Artery Stenosis: A Systematic Review and Meta-analysis, J Vasc Surg 2008;48:487-93. 7.) Carotid Stenting and Angioplasty, Circulation 1998;97:121-3. 8. Risk-adjusted 30-day outcomes of carotid stenting and endarterectomy: Results from the SVS Vascular Registry, J Vasc Surg 2008.

1b. Opportunity for Improvement

1b.1 Benefits (improvements in quality) envisioned by use of this measure: Better patient selection to avoid treating high risk patients who will likely experience stroke or death after CAS for asymptomatic patients which eliminates any benefit of the procedure.

1b.2 Summary of data demonstrating performance gap (variation or overall poor performance) across providers:
Stroke or death following CAS has been the primary clinical endpoint for a number of clinical CAS trials. Stroke or death within 30 days following intervention is captured in the SVS Registry. This endpoint is easy to capture from claims data and registries. This outcome is particularly important for asymptomatic patients undergoing CAS, since this is a prophylactic procedure being proposed to prevent future stroke. Guidelines from the American Heart Association recommend CEA for such patients only if the risk of surgical death or stroke combined is less than 3%. While there is no similar level published as a guideline, the same clinical threshold of 3% can be used for asymptomatic patients undergoing CAS. Cochrane Database analysis of stroke or death within 30 days of CAS for asymptomatic carotid stenosis showed no difference between CEA and CAS in all patients as well for a subset of patients deemed "not suitable for surgery" (CEA). Similarly, two large industry-sponsored carotid stent trials, CAPTURE-2 and EXACT, both demonstrated outcomes for CAS in asymptomatic patients that were "comparable to those established by the AHA for patients treated with CEA".

Stroke is defined as an acute neurological deficit due to an occlusive or hemorrhagic brain lesion that persists more than 24 hours. It can be substantiated by a new stroke seen on brain imaging, but this is not a requirement, i.e., clinical symptoms alone are sufficient. Both minor and major strokes will be counted, as long as the symptoms persist more than 24 hours. Stroke in either carotid distribution, or vertebrobasilar stroke is included, i.e., any postprocedural new neurologic deficit attributed to an occlusive or hemorrhagic brain lestion lasting more than 24 hours.

While stroke or death following CAS is an appropriate quality measure for either symptomatic or asymptomatic patients, we believe that the former group would require risk adjustment to allow fair comparisons, while we do not believe this is necessary for asymptomatic patients. For asymptomatic patients, it is incumbent upon the interventionalist to select only those patients of low periprocedural risk to benefit from CAS.

We propose that the denominator for this measure should be patients who have never been symptomatic in either the cerebral hemisphere ipsilateral to the carotid lesion, the contralateral hemisphere or the vertebrobasilar circulation(dizziness or lightheadedness alone are not considered symptoms). This group has the lowest risk of stroke with carotid intervention and also the lowest risk of stroke with medical therapy alone.

Adopting this outcome measure would likely have immediate impact on improving quality. Regional data have shown that feedback of the key outcome of stroke and death, in addition to some process measures

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after carotid endarterectomy reduced this outcome from 5.6% to 5.0% and in asymptomatic patients from 4.1% to 3.8%. The same is likely to hold true for CAS. Reporting time frame for hospitals should be on a yearly basis. The time frame for interventionalists should be cumulative over their career.

1b.3 Citations for data on performance gap:
To date, there is no strong evidence that CAS for asymptomatic carotid stenosis provides a significant benefit to patients over best medical therapy. Nevertheless, CAS is being performed for the treatment of asymptomatic stenosis in multiple centers in the US. The results of controlled randomized trials are pending and should soon provide the Level 1 evidence required.

Although CAS is not approved for reimbursement by CMS for asymptomatic patients, this procedure is performed for asymptomatic patients in 65% of patients in VSGNE undergoing CAS. We suspect overuse in many of these patients.

1b.4 Summary of Data on disparities by population group:
Such data will become available if this measure is adopted for reporting and used by more centers with more varied population demographics than found in the New England region.

1b.5 Citations for data on Disparities:
not available

1c. Outcome or Evidence to Support Measure Focus

1c.1 Relationship to Outcomes (*For non-outcome measures, briefly describe the relationship to desired outcome. For outcomes, describe why it is relevant to the target population*)**:** discussed above

1c.2-3. Type of Evidence: Cohort study, Expert opinion, Meta-analysis

1c.4 Summary of Evidence (*as described in the criteria; for outcomes, summarize any evidence that healthcare services/care processes influence the outcome*)**:**
The combined endpoint of stroke/death is the accepted primary endpoint for both CAS and carotid endarterectomy. Variation in outcome has been established in randomized trials,cohort studies and meta analyses. This outcome measure has face validity among all providers of this service. Studies cited above have shown substantial variation in outcomes by provider when CEA is performed in asymptomatic patients. While such data does not yet exist for CAS, similar findings are expected due to the same patient population being treated.

1c.5 Rating of strength/quality of evidence (*also provide narrative description of the rating and by whom***):**
Stroke/death after CAS is the reporting standard recommended by the Society for Vascular Surgery.

1c.6 Method for rating evidence: Expert opinion.

1c.7 Summary of Controversy/Contradictory Evidence: The endpoint of stroke, death or myocardial infarction is a frequent endpoint in CAS studies. However, this is seldom used in CEA studies, and recent studies have shown that the impact of MI is much less than the impact of stroke after CAS. Thus, we favor stroke/death as the primary endpoint for this measure.

1c.8 Citations for Evidence (*other than guidelines***):** 1.) Carotid Artery Angioplasty and Stent Placement: Quality Improvement Guidelines to Ensure Stroke Risk Reduction, J Vasc Interv Radiol 2003;14;S317-9. 2.) Executive Committee for the Asymptomatic Carotid Atherosclerosis Study. Endarterectomy for asymptomatic carotid artery stenosis, JAMA 1995;273:1421-8. 3.) Management of Atherosclerotic Carotid Artery Disease: Clinical Practice Guidelines of the Society for Vascular Surgery, J Vasc Surg 2008;48:480-6. 4.) Clinical Competence Statement on Carotid Stenting: Training and Credentialing for Carotid Stenting-Multispecialty Consensus Recommendations, J Vasc Surg 2005;41:160-8. 5.) Percutaneous Transluminal Angioplasty and Stenting for Carotid Artery Stenosis, Cochrane Database Syst Rev 2007;(4):CD000515. 6.) Endarterectomy vs Stenting for Carotid Artery Stenosis: A Systematic Review and Meta-analysis, J Vasc Surg 2008;48:487-93. 7.) Carotid Stenting and Angioplasty, Circulation 1998;97:121-3. 8. Risk-adjusted 30-day outcomes of carotid stenting and endarterectomy: Results from the SVS Vascular Registry, J Vasc Surg 2008.

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1c.9 Quote the Specific guideline recommendation (*including guideline number and/or page number*): Presently there is no published guideline that places a threshold for acceptable stroke and death rates following CAS for the treatment of asymptomatic carotid stenosis. There is, however, an acceptable and published threshold of 3% for patients treated with the established surgical alternative, CEA. The AHA has determined that CEA in particular should only be performed for asymptomatic carotid stenosis if the risk of the procedure was les than 3% stroke and/or death (2). It has been suggested that this is fairly generalizable to any form of intervention (1) **1c.10 Clinical Practice Guideline Citation:** Risk-adjusted 30-day outcomes of carotid stenting and endarterectomy: Results from the SVS Vascular Registry, J Vasc Surg 2008. **1c.11 National Guideline Clearinghouse or other URL:** NA **1c.12 Rating of strength of recommendation (*also provide narrative description of the rating and by whom*):** NA **1c.13 Method for rating strength of recommendation (*If different from USPSTF system, also describe rating and how it relates to USPSTF)*:** NA **1c.14 Rationale for using this guideline over others:**	
TAP/Workgroup: What are the strengths and weaknesses in relation to the subcriteria for *Importance to Measure and Report?*	**1**
Steering Committee: Was the threshold criterion, *Importance to Measure and Report*, met? **Rationale:**	**1** **Y☐** **N☐**
2. SCIENTIFIC ACCEPTABILITY OF MEASURE PROPERTIES	
Extent to which the measure, as specified, produces consistent (reliable) and credible (valid) results about the quality of care when implemented. (evaluation criteria)	**Eval Rating**
2a. MEASURE SPECIFICATIONS	
S.1 Do you have a web page where current detailed measure specifications can be obtained? **S.2 If yes, provide web page URL:** **2a. Precisely Specified**	
2a.1 Numerator Statement (*Brief, text description of the numerator - what is being measured about the target population, e.g. target condition, event, or outcome*): Patients over age 18 without preoperative carotid territory neurologic or retinal sympotoms within one year of their procedure who experience stroke or death during their hospitalization following elective carotid artery angioplasty and stent placement **2a.2 Numerator Time Window (*The time period in which cases are eligible for inclusion in the numerator*):** Since hospitals have sufficient annual volume to generate accurate reporting levels, these are proposed for reporting every 12 months for hospital. Since surgeons have lower individual volume, we recommend annual reporting of the last 50 consecutive procedures, which may span more than one year, with suppression if < 10 procedures (ie, reported as too low volume to report). **2a.3 Numerator Details (*All information required to collect/calculate the numerator, including all codes, logic, and definitions*):** ANY registry that includes hospitalization details and symptom status within 120 days is required to identify patients for numerator inclusion. The Society for Vascular Surgery Vascular Quality Initiative (SVS VQI) and the Vascular Study Group of New England (VSGNE) are examples of registries that record such information,	**2a-specs** **C☐** **P☐** **M☐** **N☐**

but the measure is not limited to these registries. Patients who were asymptomatic within one year of the CAS (CPT code 37215) who died or had a stroke recorded in the registry during that admission.

2a.4 **Denominator Statement (***Brief, text description of the denominator - target population being measured***):**
Patients over age 18 without preoperative carotid territory neurologic or retinal symptoms within one year immediately preceding carotid artery stenting

2a.5 **Target population gender:** Female, Male
2a.6 **Target population age range:** Over 18

2a.7 **Denominator Time Window (***The time period in which cases are eligible for inclusion in the denominator***):**
Since hospitals have sufficient annual volume to generate accurate reporting levels, these are proposed for reporting every 12 months for hospital. Since surgeons have lower individual volume, we recommend annual reporting of the last 50 consecutive procedures, which may span more than one year, with suppression if < 10 procedures (ie, reported as too low volume to report).

2a.8 **Denominator Details (***All information required to collect/calculate the denominator - the target population being measured - including all codes, logic, and definitions***):**
ANY registry that includes hospitalization details and symptom status within one year is required to identify patients for numerator inclusion. The Society for Vascular Surgery Vascular Quality Initiative (SVS VQI) and the Vascular Study Group of New England (VSGNE) are examples of registries that record such information, but the measure is not limited to these registries. Patients who were asymptomatic within one year of the CAS (CPT code 37215) are included.

2a.9 **Denominator Exclusions (***Brief text description of exclusions from the target population***):** Exclude patients with neurologic symptoms within one year of procedure

2a.10 **Denominator Exclusion Details (***All information required to collect exclusions to the denominator, including all codes, logic, and definitions***):**
Patients with NASCET criteria neurologic symptoms (transient ischemic attack, amaurosis, or stroke) within the one year immediately proceeding CAS

2a.11 **Stratification Details/Variables (***All information required to stratify the measure including the stratification variables, all codes, logic, and definitions***):**
Not required

2a.12-13 **Risk Adjustment Type:** No risk adjustment necessary

2a.14 **Risk Adjustment Methodology/Variables (***List risk adjustment variables and describe conceptual models, statistical models, or other aspects of model or method***):**
See "Scientific Acceptablility" section for rationale

2a.15-17 **Detailed risk model available Web page URL or attachment:**

2a.18-19 **Type of Score:** Rate/proportion
2a.20 **Interpretation of Score:** Better quality = Lower score
2a.21 **Calculation Algorithm (***Describe the calculation of the measure as a flowchart or series of steps***):**
Number of asymptomatic patients undergoing CAS who have in hospital stroke or death / Number of asymptomatic patients undergoing CAS

2a.22 **Describe the method for discriminating performance** *(e.g., significance testing)*:
Standard statistical comparison of rates to provide confidence levels to discriminate meaningful differences from the mean.

2a.23 **Sampling (Survey) Methodology** *If measure is based on a sample (or survey), provide instructions for obtaining the sample, conducting the survey and guidance on minimum sample size (response rate)*:

2a.24 **Data Source (***Check the source(s) for which the measure is specified and tested)*
Electronic Clinical Data : Registry

2a.25 Data source/data collection instrument (*Identify the specific data source/data collection instrument, e.g. name of database, clinical registry, collection instrument, etc.***):**
«data_source_instrument»

2a.26-28 Data source/data collection instrument reference web page URL or attachment: Attachment Carotid_Artery_Stent_CB_v_1.9.xlsx

2a.29-31 Data dictionary/code table web page URL or attachment: Attachment CAS defs v.01.09.doc

2a.32-35 Level of Measurement/Analysis (*Check the level(s) for which the measure is specified and tested)*
Clinician : Group/Practice, Clinician : Individual, Facility

2a.36-37 Care Settings (*Check the setting(s) for which the measure is specified and tested)*
Hospital/Acute Care Facility

2a.38-41 Clinical Services (*Healthcare services being measured, check all that apply*)
Clinicians: Physicians (MD/DO)

TESTING/ANALYSIS

2b. Reliability testing

2b.1 Data/sample *(description of data/sample and size)***:** A random sample of 100 patient records representing 5 procedures relevant to the measure from 5 different hospitals based on data collected during the past 2 years. In addition, in-hospital mortality was examined by claims based analysis of 7,205 patients discharged and recorded in the VSGNE registry between 2003 to 2007.

2b.2 Analytic Method *(type of reliability & rationale, method for testing)***:**
A nurse abstractor completed a form based on medical record review for the variables relevant to this measure. The results of this chart review were then compared with the original registry data. The Kappa statistic was used to judge reliability of the data. For mortality validation, claims data from each of 12 hospitals were matched to patient identified data within the VSGNE registry to compare discharge status (alive vs. dead). Any discrepencies were then further evaluated based on a medical record audit.

2b.3 Testing Results *(reliability statistics, assessment of adequacy in the context of norms for the test conducted)***:**
The key variables for this measure and testing results were:

1. Correct procedure (carotid artery stenting) performed. Kappa =1.0
2. Hospital mortality: Kappa = .91 (SE .01)
3. Hospital stroke: Kappa = 1.0
4. Asymptomatic 120 days pre-Rx: Kappa = .90 (SE .07)

2b C☐ P☐ M☐ N☐

2c. Validity testing

2c.1 Data/sample *(description of data/sample and size)***:** see reliability

2c.2 Analytic Method *(type of validity & rationale, method for testing)***:**
Multiple sources from the medical record were used as the gold standard, and rates compared with literature.

2c.3 Testing Results *(statistical results, assessment of adequacy in the context of norms for the test conducted)***:**
The percentage of asymptomatic patients being treated in VSGNE of 60% corresponds to published data on this cohort. The postop stroke or death rate of 2.2% also correponds to published results for asymptomatic patients.

2c C☐ P☐ M☐ N☐

2d. Exclusions Justified — **2d**

2d.1 Summary of Evidence supporting exclusion(s):
Symptomatic patients are excluded because they would require complex risk adjustment that is not available. In such patients, treatment is more often indicated despite risk of treatment. However, for asymptomatic patients, complication rate must be low, less than 3% to justify intervention.

2d.2 Citations for Evidence:
Biller J, Feinberg WM, Castaldo JE, et al. Guidelines for carotid endarterectomy: a statement for healthcare professionals from a special writing group of the Stroke Council, American Heart Association. Stroke; a journal of cerebral circulation 1998;29(2):554-62.

2d.3 Data/sample *(description of data/sample and size)*: SVS Vascular Registry 805 asymptomatic patients undergoing elective CEA

2d.4 Analytic Method *(type analysis & rationale)*:
measure calculation

2d.5 Testing Results *(e.g., frequency, variability, sensitivity analyses)*:
Death rate 2.0%, stroke rate 2.11% among 287 provider in 58 centers
Interquartile range was 0.3-8.6% for the combined endpoint

C☐ P☐ M☐ N☐ NA☐

2e. Risk Adjustment for Outcomes/ Resource Use Measures

2e.1 Data/sample *(description of data/sample and size)*: See "Scientific Acceptablility" section for rationale. Risk adjustment is implicit within this quality measure as judged by the sponsor, the Society for Vascular Surgery, for the following reason. CAS in an asymptomatic patients is a prophylactic procedure designed to prevent future stroke. The decision to perform such a procedure requires the interventionist to calculate the patient´s risk-benefit ratio, in order to avoid post-CAS stroke or death that eliminate the benefit of the procedure. Risk adjustment based on patient factors should not be applied, since high risk patients should not undergo this prophylactic procedure, and using risk adjustment would reward interventionists who selected high risk patients for treatment.

2e.2 Analytic Method *(type of risk adjustment, analysis, & rationale)*:
N/A

2e.3 Testing Results *(risk model performance metrics)*:
N/A

2e.4 If outcome or resource use measure is not risk adjusted, provide rationale: N/A

2e
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2f. Identification of Meaningful Differences in Performance

2f.1 Data/sample from Testing or Current Use *(description of data/sample and size)*: see section 1.b.3 and above 2,d,5

2f.2 Methods to identify statistically significant and practically/meaningfully differences in performance *(type of analysis & rationale)*:
Standard statistial analysis to determine 95% confidence interval for hospitals and providers to determine practical difference from mean

2f.3 Provide Measure Scores from Testing or Current Use *(description of scores, e.g., distribution by quartile, mean, median, SD, etc.; identification of statistically significant and meaningfully differences in performance)*:

2f
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2g. Comparability of Multiple Data Sources/Methods

2g.1 Data/sample *(description of data/sample and size)*: no other data sources available

2g.2 Analytic Method *(type of analysis & rationale)*:

2g
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2g.3 **Testing Results** *(e.g., correlation statistics, comparison of rankings)*:	NA☐
2h. Disparities in Care 2h.1 **If measure is stratified, provide stratified results** *(scores by stratified categories/cohorts)*: N/A 2h.2 **If disparities have been reported/identified, but measure is not specified to detect disparities, provide follow-up plans:** No disparities have been reported.	**2h** C☐ P☐ M☐ N☐ NA☐
TAP/Workgroup: What are the strengths and weaknesses in relation to the subcriteria for *Scientific Acceptability of Measure Properties?*	**2**
Steering Committee: Overall, to what extent was the criterion, *Scientific Acceptability of Measure Properties*, met? **Rationale:**	***2*** C☐ P☐ M☐ N☐
3. USABILITY	
Extent to which intended audiences (e.g., consumers, purchasers, providers, policy makers) can understand the results of the measure and are likely to find them useful for decision making. (evaluation criteria)	**Eval Rating**
3a. Meaningful, Understandable, and Useful Information 3a.1 **Current Use:** In use 3a.2 **Use in a public reporting initiative (disclosure of performance results to the public at large)** *(If used in a public reporting initiative, provide name of initiative(s), locations, Web page URL(s). If not publicly reported, state the plans to achieve public reporting within 3 years)*: Data from SVS VQI and VSGNE are reported to each hospital and provider in a format that can be transmitted to an appropriate public reporting mechanism. 3a.3 **If used in other programs/initiatives (***If used in quality improvement or other programs/initiatives, name of initiative(s), locations, Web page URL(s). If not used for QI, state the plans to achieve use for QI within 3 years***):** Vascular Study Group of New England www.vsgne.org Data have been successfully collected in this quality registry since 2003, and reports provided to participating physicians and hospitals about their rates of outcomes. These results are used by the regional quality group to provide benchmark reporting, and to stimulate regional quality improvement projects. **Testing of Interpretability** (*Testing that demonstrates the results are understood by the potential users for public reporting and quality improvement*) 3a.4 **Data/sample** *(description of data/sample and size)*: VSGNE samples previously described 3a.5 **Methods** *(e.g., focus group, survey, QI project)*: Semi-annual meetings of providers in VSGNE 3a.6 **Results** *(qualitative and/or quantitative results and conclusions)*: Benchamrk reports of this outcome measure have been provided to VSGNE member physician and hospitals since 2003, and discussed at semi-annual meetings. There have been no questions about interpretability.	**3a** C☐ P☐ M☐ N☐
3b/3c. Relation to other NQF-endorsed measures 3b.1 **NQF # and Title of similar or related measures:**	
(for NQF staff use) **Notes on similar/related endorsed or submitted measures:**	
3b. Harmonization	**3b**

If this measure is related to measure(s) already endorsed by NQF (e.g., same topic, but different target population/setting/data source or different topic but same target population): **3b.2 Are the measure specifications harmonized? If not, why?**	C☐ P☐ M☐ N☐ NA☐
3c. Distinctive or Additive Value **3c.1 Describe the distinctive, improved, or additive value this measure provides to existing NQF-endorsed measures:** N/A **5.1 If this measure is similar to measure(s) already endorsed by NQF (i.e., on the same topic and the same target population), Describe why it is a more valid or efficient way to measure quality:** N/A	**3c** C☐ P☐ M☐ N☐ NA☐
TAP/Workgroup: What are the strengths and weaknesses in relation to the subcriteria for *Usability?*	**3**
Steering Committee: Overall, to what extent was the criterion, *Usability*, met? **Rationale:**	**3** C☐ P☐ M☐ N☐
4. FEASIBILITY	
Extent to which the required data are readily available, retrievable without undue burden, and can be implemented for performance measurement. (evaluation criteria)	**Eval Rating**
4a. Data Generated as a Byproduct of Care Processes **4a.1-2 How are the data elements that are needed to compute measure scores generated?** Data generated as byproduct of care processes during care delivery (Data are generated and used by healthcare personnel during the provision of care, e.g., blood pressure, lab value, medical condition), Coding/abstraction performed by someone other than person obtaining original information (E.g., DRG, ICD-9 codes on claims, chart abstraction for quality measure or registry)	**4a** C☐ P☐ M☐ N☐
4b. Electronic Sources **4b.1 Are all the data elements available electronically?** (*elements that are needed to compute measure scores are in defined, computer-readable fields, e.g., electronic health record, electronic claims*) Yes **4b.2 If not, specify the near-term path to achieve electronic capture by most providers.**	**4b** C☐ P☐ M☐ N☐
4c. Exclusions **4c.1 Do the specified exclusions require additional data sources beyond what is required for the numerator and denominator specifications?** No **4c.2 If yes, provide justification.**	**4c** C☐ P☐ M☐ N☐ NA☐
4d. Susceptibility to Inaccuracies, Errors, or Unintended Consequences **4d.1 Identify susceptibility to inaccuracies, errors, or unintended consequences of the measure and describe how these potential problems could be audited. If audited, provide results.** Data definitions regarding asymptomatic status based on NASCET criteria have eliminated confusion about symtoms. Death is an accurate endpoint. Stroke has been accurately collected as judged by chart audits and comparison to claims data that has been done within VSGNE.	**4d** C☐ P☐ M☐ N☐

4e. Data Collection Strategy/Implementation

4e.1 Describe what you have learned/modified as a result of testing and/or operational use of the measure regarding data collection, availability of data/missing data, timing/frequency of data collection, patient confidentiality, time/cost of data collection, other feasibility/ implementation issues:
In the VSGNE experience which has been tracking stroke or death as a major endpoint since 2005, we have not experienced any difficulty with obtaining data related to this endpoint. Our percent missing for this variable has been less than 1%.

4e.2 Costs to implement the measure (*costs of data collection, fees associated with proprietary measures*)**:**
In the context of the VSGNE and SVS VQI registries, there is no additional cost as all of these data are already collected.

4e.3 Evidence for costs:

4e.4 Business case documentation: N/A

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TAP/Workgroup: What are the strengths and weaknesses in relation to the subcriteria for *Feasibility?*

4

Steering Committee: Overall, to what extent was the criterion, *Feasibility*, met?
Rationale:

4
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RECOMMENDATION

(for NQF staff use) **Check if measure is untested and only eligible for time-limited endorsement.**

Time-limited ☐

Steering Committee: Do you recommend for endorsement?
Comments:

Y☐
N☐
A☐

CONTACT INFORMATION

Co.1 Measure Steward (Intellectual Property Owner)
Co.1 Organization
Society for Vascular Surgery, 633 N. St. Clair, 22nd floor, Chicago, Illinois, 60611

Co.2 Point of Contact
Sarah, Murphy, Staff, smurphy@vascularsociety.org, 312-334-2305-

Measure Developer If different from Measure Steward
Co.3 Organization
Society for Vascular Surgery, 633 N. St. Clair, 22nd floor, Chicago, Illinois, 60611

Co.4 Point of Contact
Sarah, Murphy, Staff, smurphy@vascularsociety.org, 312-334-2305-

Co.5 Submitter If different from Measure Steward POC
Sarah, Murphy, Staff, smurphy@vascularsociety.org, 312-334-2305-, Society for Vascular Surgery

Co.6 Additional organizations that sponsored/participated in measure development

ADDITIONAL INFORMATION

Workgroup/Expert Panel involved in measure development

Ad.1 Provide a list of sponsoring organizations and workgroup/panel members' names and organizations. Describe the members' role in measure development. N/A
Ad.2 If adapted, provide name of original measure: **Ad.3-5 If adapted, provide original specifications URL or attachment**
Measure Developer/Steward Updates and Ongoing Maintenance **Ad.6 Year the measure was first released:** 2010 **Ad.7 Month and Year of most recent revision:** 12, 2010 **Ad.8 What is your frequency for review/update of this measure?** **Ad.9 When is the next scheduled review/update for this measure?**
Ad.10 Copyright statement/disclaimers:
Ad.11 -13 Additional Information web page URL or attachment:
Date of Submission (*MM/DD/YY*)**:** 06/13/2011

NATIONAL QUALITY FORUM

Measure Evaluation 4.1
December 2009

This form contains the measure information submitted by stewards. Blank fields indicate no information was provided. Attachments also may have been submitted and are provided to reviewers. The subcriteria and most of the footnotes from the evaluation criteria are provided in Word comments within the form and will appear if your cursor is over the highlighted area. Hyperlinks to the evaluation criteria and ratings are provided in each section.

TAP/Workgroup (if utilized)**:** Complete all yellow highlighted areas of the form. Evaluate the extent to which each subcriterion is met. Based on your evaluation, summarize the strengths and weaknesses in each section.

Note: *If there is no TAP or workgroup, the SC also evaluates the subcriteria (yellow highlighted areas).*

Steering Committee: Complete all pink highlighted areas of the form. Review the workgroup/TAP assessment of the subcriteria, noting any areas of disagreement; then evaluate the extent to which each major criterion is met; and finally, indicate your recommendation for the endorsement. Provide the rationale for your ratings.

Evaluation ratings of the extent to which the criteria are met
C = Completely (unquestionably demonstrated to meet the criterion)
P = Partially (demonstrated to partially meet the criterion)
M = Minimally (addressed BUT demonstrated to only minimally meet the criterion)
N = Not at all (NOT addressed; OR incorrectly addressed; OR demonstrated to NOT meet the criterion)
NA = Not applicable (only an option for a few subcriteria as indicated)

(for NQF staff use) **NQF Review #:** 1531 **NQF Project:** Surgery Endorsement Maintenance 2010
MEASURE DESCRIPTIVE INFORMATION
De.1 **Measure Title:** Follow-up assessment of stroke or death after carotid revascularization
De.2 **Brief description of measure:** Proportion of patients with carotid revascularization procedures who had follow-up performed for evaluation of death and neurologic assessment with an NIH Stroke Scale (by an examiner who is certified by the American Stroke Association) after the procedure.
1.1-2 **Type of Measure:** Process De.3 **If included in a composite or paired with another measure, please identify composite or paired measure** N/A
De.4 **National Priority Partners Priority Area:** Care coordination, Safety De.5 **IOM Quality Domain**: Effectiveness, Safety, Timeliness De.6 **Consumer Care Need:** Getting better, Staying healthy, Living with illness

CONDITIONS FOR CONSIDERATION BY NQF	
Four conditions must be met before proposed measures may be considered and evaluated for suitability as voluntary consensus standards:	**NQF Staff**
A. The measure is in the public domain or an intellectual property (measure steward agreement) is signed. *Public domain only applies to governmental organizations. All non-government organizations must sign a measure steward agreement even if measures are made publicly and freely available.* A.1 **Do you attest that the measure steward holds intellectual property rights to the measure and the right to use aspects of the measure owned by another entity (e.g., risk model, code set)?** Yes A.2 **Indicate if Proprietary Measure** (*as defined in measure steward agreement*)**:** A.3 **Measure Steward Agreement:** Agreement will be signed and submitted prior to or at the time of measure submission A.4 **Measure Steward Agreement attached:** NQF - signed.pdf	**A** Y☐ N☐

B. The measure owner/steward verifies there is an identified responsible entity and process to maintain and update the measure on a schedule that is commensurate with the rate of clinical innovation, but at least every 3 years. Yes, information provided in contact section	**B** Y☐ N☐
C. The intended use of the measure includes both public reporting and quality improvement. ►**Purpose:** Payment Program, Regulatory and Accreditation Programs	**C** Y☐ N☐
D. The requested measure submission information is complete. Generally, measures should be fully developed and tested so that all the evaluation criteria have been addressed and information needed to evaluate the measure is provided. Measures that have not been tested are only potentially eligible for a time-limited endorsement and in that case, measure owners must verify that testing will be completed within 12 months of endorsement. D.1**Testing:** Yes, fully developed and tested D.2 **Have NQF-endorsed measures been reviewed to identify if there are similar or related measures?** Yes	**D** Y☐ N☐
(for NQF staff use) **Have all conditions for consideration been met?** **Staff Notes to Steward** (*if submission returned*)**:**	**Met** Y☐ N☐
Staff Notes to Reviewers (*issues or questions regarding any criteria*)**:**	
Staff Reviewer Name(s):	

TAP/Workgroup Reviewer Name:	
Steering Committee Reviewer Name:	
1. IMPORTANCE TO MEASURE AND REPORT	
Extent to which the specific measure focus is important to making significant gains in health care quality (safety, timeliness, effectiveness, efficiency, equity, patient-centeredness) and improving health outcomes for a specific high impact aspect of healthcare where there is variation in or overall poor performance. ***Measures must be judged to be important to measure and report*** *in order to be evaluated against the remaining criteria.* (evaluation criteria) **1a. High Impact**	**Eval Rating**
(for NQF staff use) **Specific NPP goal**:	
1a.1 **Demonstrated High Impact Aspect of Healthcare:** Affects large numbers, Frequently performed procedure, Leading cause of morbidity/mortality, High resource use, Severity of illness 1a.2 1a.3 **Summary of Evidence of High Impact:** It is estimated that almost 800,000 people experience a new or recurrent stroke each year. Approximately 610,000 of these are first attacks. Stroke accounted for 1 of every 18 deaths in the US in 2006. The mean lifetime cost of ischemic stroke in the US is estimated at $140,048. Carotid endarterectomy (CAE) and carotid artery stenting (CAS) are effective procedures to prevent stroke. CAE is the most frequently performed surgical procedure to prevent stroke. In 2006, an estimated 99,000 carotid endarterectomy procedures were performed. 1a.4 **Citations for Evidence of High Impact:** American Heart Association. Heart disease and stroke statistics-2010 update: A report of the American Heart Association. Available at: http://circ.ahajournals.org/cgi/content/abstract/CIRCULATIONAHA.109.192667v1. Accessed December 3, 2010.	**1a** C☐ P☐ M☐ N☐
1b. Opportunity for Improvement 1b.1 **Benefits (improvements in quality) envisioned by use of this measure:** This measure is intended to assess rates of follow-up for death or stroke following carotid revascularization in order to allow hospitals to benchmark their rates of follow-up against the registry aggregate so that poor performers can engage in	**1b** C☐ P☐ M☐ N☐

quality improvement efforts to improve performance. Improvement in performance for this measure will improve surveillance for important outcomes, and subsequently allow for improvement in outcomes.

The risk of stroke and death after carotid revascularization are important and can substantially influence the net benefit of the procedure. Assessment and reporting of the "outcome" of stroke for carotid revascularization procedures is not consistent in the absence of a clinical assessment using a standardized stroke scale, or by using claims data. Since all patients have a clinic/office follow-up visits as a follow-up to revascularization procedures, this provides the opportunity for appropriate clinical assessment for key revascularization endpoints, including stroke or death. A process measure that uses a standard assessment of "neurologic evaluation", by an examiner who is certified by the American Stroke Association, is a measure that provides feedback on the ability to clearly and accurately assess for, capture and report the incidence of stroke after carotid revascularization procedures.

When centers that perform carotid revascularization properly assess patients for adverse events (particularly for stroke) after carotid revascularization, they trigger further evaluation, if necessary. If the 30 day NIH stroke scale is (1) changed from baseline; or (2) abnormal in absence of a baseline, pre-procedure exam, then there should be some documentation on whether or not the abnormal stroke scale represents a new clinical neurological event, and should result in an evaluation by a neurologist.

1b.2 Summary of data demonstrating performance gap (variation or overall poor performance) across providers:
Data from CARE registry:
Mean: 20.6
10th percentile: 0
Lower quartile: 0
Median: 11.0%
Upper quartile: 34.1%
90th percentile: 61.4%

Procedural volume varied greatly by tertile of performance:
Tertile 1: 63.1 procedures
Tertile 2: 132.3 procedures
Tertile 3: 101.2

1b.3 Citations for data on performance gap:
Unpublished NCDR data

1b.4 Summary of Data on disparities by population group:
Data from the NCDR CARE registry showed little variation in performance for this measure based on % of white patients, gender, or insurance status (percent of patients with no insurance).

Percent white:
Tertile 1: 93.0
Tertile 2: 90.9
Tertile 3: 91.8
p-value:0.663

Percent female:
Tertile 1: 40.7
Tertile 2: 41.6
Tertile 3: 34.1
p-value: 0.022

Percent with no insurance:
Tertile 1: 4.3
Tertile 2: 4.6
Tertile 3: 4.0

1b.5 Citations for data on Disparities:
Unpublished NCDR data.

1c. Outcome or Evidence to Support Measure Focus

1c.1 Relationship to Outcomes (*For non-outcome measures, briefly describe the relationship to desired outcome. For outcomes, describe why it is relevant to the target population*)**:** This measure is a process measure to assess rates of follow-up for important outcomes related to carotid revascularization.

1c.2-3. Type of Evidence: Evidence-based guideline, Randomized controlled trial

1c.4 Summary of Evidence (*as described in the criteria; for outcomes, summarize any evidence that healthcare services/care processes influence the outcome*)**:**
The risk of stroke and death after carotid revascularization are important and can substantially influence the net benefit of the procedure. Assessment and reporting of the "outcome" of stroke for carotid revascularization procedures is not consistent in the absence of a clinical assessment using a standardized stroke scale, or by using claims data. Since all patients have a clinic/office follow-up visits as a follow-up to revascularization procedures, this provides the opportunity for appropriate clinical assessment for key revascularization endpoints, including stroke or death. A process measure that uses a standard assessment of "neurologic evaluation", by an examiner who is certified by the American Stroke Association, is a measure that provides feedback on the ability to clearly and accurately assess for, capture and report the incidence of stroke after carotid revascularization procedures.

When centers that perform carotid revascularization properly assess patients for adverse events (particularly for stroke) after carotid revascularization, they trigger further evaluation, if necessary. If the 30 day NIH stroke scale is (1) changed from baseline; or (2) abnormal in absence of a baseline, pre-procedure exam, then there should be some documentation on whether or not the abnormal stroke scale represents a new clinical neurological event, and should result in an evaluation by a neurologist.

According to the CARE Registry institutional outcomes reports, the median length of stay for CAS and CEA procedures is one day. This short hospital stay reflects difficulty in reporting "in-hospital" stroke outcomes as a relevant measure. The primary endpoints of major contemporary trials used 30 day events (stroke, MI* or death) and included neurologic evaluation to identify stroke. Based on trial endpoints, 30 day outcomes have greater importance. These trials include:

1. Stenting and Angioplasty with Protection in Patients at High Risk for Endarterectomy (SAPPHIRE) Trial
2. Asymptomatic Carotid Atherosclerosis Study (ACAS) Trial
3. SPACE (stent-protected angioplasty versus carotid endarterectomy in symptomatic patients) trial
4. Endarterectomy versus Stenting in Patients with Symptomatic Severe Carotid Stenosis (EVA-3S) Trial
5. Carotid Revascularization Endarterectomy vs. Stenting (CREST) Trial

1c.5 Rating of strength/quality of evidence (*also provide narrative description of the rating and by whom*)**:**
None specifically relating this practice to outcomes.

1c.6 Method for rating evidence: None

1c.7 Summary of Controversy/Contradictory Evidence: None

1c.8 Citations for Evidence (*other than guidelines*)**:**
1 David C. Costs and cost-effectiveness of carotid stenting vs. endarterectomy for patients at increased surgical risk: Results from the SAPPHIRE trial. Catheter Cardiovasc Interv. 2010;
2 Mantese VA, Timaran CH, Chiu D, et al. The Carotid Revascularization Endarterectomy versus Stenting Trial (CREST): stenting versus carotid endarterectomy for carotid disease. Stroke. 2010;41:S31-S34.
3 Mas JL, Trinquart L, Leys D, et al. Endarterectomy Versus Angioplasty in Patients with Symptomatic Severe Carotid Stenosis (EVA-3S) trial: results up to 4 years from a randomised, multicentre trial. Lancet Neurol. 2008;7:885-92.
4 Mast H, Chambless LE, Mohr JP, et al. [Indications for endarterectomy in asymptomatic stenoses of the internal or common carotid artery--results of the North American ACAS Study]. Zentralbl Chir. 1996;121:1033-5.

1c
C ☐
P ☐
M ☐
N ☐

5. Ringleb PA, Hacke W. [Stent and surgery for symptomatic carotid stenosis. SPACE study results]. Nervenarzt. 2007;78:1130-7.

1c.9 Quote the Specific guideline recommendation (*including guideline number and/or page number***):**
Clinical Competence Statement on Carotid Stenting: Training and Credentialing for Carotid Stenting—Multispecialty Consensus Recommendations:
"Monitoring of outcomes with independent post-procedural neurological assessment using standardized instruments and definitions is critically important to ensure high-quality intervention and patient safety. Institutions offering carotid stent placement must have a quality assurance program specifically designed to assess the results of carotid interventions in their locale. The integrity and accuracy of outcome reporting is reliant on the incorporation of mandatory independent and objective neurologic assessment by a qualified and NIH Stroke Scale-certified individual for all patients undergoing carotid stenting."

The 2010 AHA/ASA Guidelines for the Prevention of Stroke in Patients With Stroke or Transient Ischemic Attack recommend considering risk status in decision-making for CAS and CEA:

1. For patients with recent TIA or ischemic stroke within the past 6 months and ipsilateral severe (70% to 99%) carotid artery stenosis, CEA is recommended if the perioperative morbidity and mortality risk is estimated to be <6% (Class I; Level of Evidence A).
2. For patients with recent TIA or ischemic stroke and ipsilateral moderate (50% to 69%) carotid stenosis, CEA is recommended depending on patient-specific factors, such as age, sex, and comorbidities, if the perioperative morbidity and mortality risk is estimated to be <6% (Class I; Level of Evidence B).
7. CAS in the above setting is reasonable when performed by operators with established periprocedural morbidity and mortality rates of 4% to 6%,similar to those observed in trials of CEA and CAS (Class IIa; Level of Evidence B).

1c.10 Clinical Practice Guideline Citation: 1.Rosenfield K, Babb JD, Cates CU, et al. Clinical competence statement on carotid stenting: training and credentialing for carotid stenting--multispecialty consensus recommendations: a report of the SCAI/SVMB/SVS Writing Committee to develop a clinical competence statement on carotid interventions. JACC. 2005; 45:165-74.
2. Bates, ER, et al. 2007 Clinical Expert Consensus Document on Carotid Stenting A Report of the American College of Cardiology Foundation Task Force on Clinical Expert Consensus Documents (ACCF/SCAI/SVMB/SIR/ASITN Clinical Expert Consensus Document Committee on Carotid Stenting), JACC, 2007 Vol. 49, No. 1, 126-170.

3. Furie KL, Kasner SE, Adams RJ, et al. Guidelines for the Prevention of Stroke in Patients With Stroke or Transient Ischemic Attack. A Guideline for Healthcare Professionals From the American Heart Association/American Stroke Association. Stroke; 2010. Available at: http://stroke.ahajournals.org/cgi/reprint/STR.0b013e3181f7d043v1.

1c.11 National Guideline Clearinghouse or other URL:

1c.12 Rating of strength of recommendation (*also provide narrative description of the rating and by whom***):**
None specifically recommending this practice.

1c.13 Method for rating strength of recommendation (*If different from USPSTF system, also describe rating and how it relates to USPSTF)***:**
None

1c.14 Rationale for using this guideline over others:

TAP/Workgroup: What are the strengths and weaknesses in relation to the subcriteria for *Importance to Measure and Report?*	**1**
Steering Committee: Was the threshold criterion, *Importance to Measure and Report*, met? **Rationale:**	**1** **Y☐** **N☐**

2. SCIENTIFIC ACCEPTABILITY OF MEASURE PROPERTIES	
Extent to which the measure, as specified, produces consistent (reliable) and credible (valid) results about the quality of care when implemented. (evaluation criteria)	Eval Rating
2a. MEASURE SPECIFICATIONS	
S.1 Do you have a web page where current detailed measure specifications can be obtained? **S.2 If yes, provide web page URL:** **2a. Precisely Specified**	
2a.1 Numerator Statement (*Brief, text description of the numerator - what is being measured about the target population, e.g. target condition, event, or outcome*)**:** Patients with documentation of a follow-up assessment between 21 and 60 days after the date of carotid revascularization for both: 1. Neurologic status with an assessment using the NIH Stroke Scale (by an examiner who is certified by the American Stroke Association), AND 2. Vital Status (alive or expired) **2a.2 Numerator Time Window** (*The time period in which cases are eligible for inclusion in the numerator*)**:** 1 year **2a.3 Numerator Details** (*All information required to collect/calculate the numerator, including all codes, logic, and definitions*)**:** Patient status= alive or deceased Follow-up NIH Stroke Scale Administered= yes. Supporting definitions: The NIHSS is a standardized neurological examination for patients with acute ischemic stroke that quantitatively measures the level of stroke severity. Examiner certified= yes Supporting definitions: The Stroke Scale assessment should be conducted by someone other than the operator for the current procedure. Note - NIHSS examiners may become certified through the American Stroke Association. NIH Stroke Scale Certification is currently available online free of charge: http://learn.heart.org/ihtml/application/student/interface.heart2/nihss.html	
2a.4 Denominator Statement (*Brief, text description of the denominator - target population being measured*)**:** Patients with carotid revascularization (surgery or stent) procedures **2a.5 Target population gender:** Female, Male **2a.6 Target population age range:** 18 and over **2a.7 Denominator Time Window** (*The time period in which cases are eligible for inclusion in the denominator*)**:** 1 year **2a.8 Denominator Details** (*All information required to collect/calculate the denominator - the target population being measured - including all codes, logic, and definitions*)**:** Carotid artery stenting or carotid endarterectomy procedure performed.	
2a.9 Denominator Exclusions (*Brief text description of exclusions from the target population*)**:** Patients with pre-procedure conditions of: 1. Acute evolving stroke, or 2. Carotid artery dissection	**2a-specs** C☐ P☐ M☐ N☐

2a.10 Denominator Exclusion Details (*All information required to collect exclusions to the denominator, including all codes, logic, and definitions***):**
1. Acute evolving stroke (ongoing at the time of the procedure)= yes
Supporting definition:
Acute evolving stroke includes all of the following:
- Any sudden development of neurological deficits attributable to cerebral ischemia and/or infarction.
-Onset of symptoms occurring within prior three days and ongoing at time of procedure.
-The event is marked by progressively worsening symptoms.
Note: Possible symptoms include, but are not limited to the following: numbness or weakness of the face or body; difficulty speaking or understanding; blurred or decreased vision; dizziness; or loss of balance and coordination.

2. Procedure indication of spontaneous carotid artery dissection= yes
Supporting definition:
Indicate if the patient has had a spontaneous carotid artery dissection prior to the current procedure.

2a.11 Stratification Details/Variables (*All information required to stratify the measure including the stratification variables, all codes, logic, and definitions***):**
N/A

2a.12-13 Risk Adjustment Type:

2a.14 Risk Adjustment Methodology/Variables (*List risk adjustment variables and describe conceptual models, statistical models, or other aspects of model or method***):**
N/A

2a.15-17 Detailed risk model available Web page URL or attachment:

2a.18-19 Type of Score: Rate/proportion
2a.20 Interpretation of Score: Better quality = Higher score
2a.21 Calculation Algorithm (*Describe the calculation of the measure as a flowchart or series of steps***):**
Denominator calculation:
1. Count of patients with arrival/discharge dates from data submissions that pass NCDR data inclusion thresholds
2. Exclude patients with acute evolving stroke pre-procedure
3. Exclude patients with spontaneous carotid artery dissection pre-procedure

Numerator calculation:
1. From denominator population, count of patients with one of the following:
-Follow-up NIH stroke Scale administered=yes, and "examiner certified"=yes
2. Patient status= deceased or follow-up patient status= alive or deceased

2a.22 Describe the method for discriminating performance *(e.g., significance testing)***:**
Hospital performance for this measure is benchmarked each quarter and annually against the CARE Registry aggregate. These benchmarks identify superior performance and encourage poorer performers to improve. The methodology is a data-driven, peer-group performance feedback used to positively affect outcomes.

2a.23 Sampling (Survey) Methodology *If measure is based on a sample (or survey), provide instructions for obtaining the sample, conducting the survey and guidance on minimum sample size (response rate)*:
N/A

2a.24 Data Source (*Check the source(s) for which the measure is specified and tested***)**
Electronic Clinical Data : Registry

2a.25 Data source/data collection instrument (*Identify the specific data source/data collection instrument, e.g. name of database, clinical registry, collection instrument, etc.***):**
«data_source_instrument»

2a.26-28 Data source/data collection instrument reference web page URL or attachment: URL
http://www.ncdr.com/WebNCDR/CAROTIDSTENT/ELEMENTS.ASPX

2a.29-31 Data dictionary/code table web page URL or attachment: URL
http://www.ncdr.com/WebNCDR/CAROTIDSTENT/ELEMENTS.ASPX

2a.32-35 Level of Measurement/Analysis (*Check the level(s) for which the measure is specified and tested)*
Facility

2a.36-37 Care Settings (*Check the setting(s) for which the measure is specified and tested)*
Ambulatory Care : Clinic/Urgent Care, Ambulatory Care : Clinician Office, Hospital/Acute Care Facility

2a.38-41 Clinical Services (*Healthcare services being measured, check all that apply*)
Clinicians: PA/NP/Advanced Practice Nurse, Clinicians: Physicians (MD/DO)

TESTING/ANALYSIS

2b. Reliability testing

2b.1 Data/sample *(description of data/sample and size)*: Data were compared for 33 hospitals with 30 or more procedures for a 12 month period from January 2009 to December 2009 and from January 2010 and January 2010.

2b.2 Analytic Method *(type of reliability & rationale, method for testing)*:
Results were compared for two proximate time periods: January 2009 to December 2009 and from January 2010 to December 2010. Hospitals were excluded if they did not have data for both time periods, or if they did not perform 30 or more procedures during this time period. A simple scatter plot to assess correlation of follow-up rates for these hospitals for the 2 time periods was developed, as well as a Bland-Altman plot to show the range of hospital change in performance for these two time periods.

2b.3 Testing Results *(reliability statistics, assessment of adequacy in the context of norms for the test conducted)*:
Se supplemental documents. The Pearson correlation coefficient observed was 0.78. The average change in performance was -0.018, with a 95% confidence interval of 0.347 to 0.311, showing very good reliability of data over time.

2b C☐ P☐ M☐ N☐

2c. Validity testing

2c.1 Data/sample *(description of data/sample and size)*: Face/content validity: review of relevant evidence and guidelines and expert panel consensus process

2c.2 Analytic Method *(type of validity & rationale, method for testing)*:
Face/content validity was established to ensure this measure represented an important aspect of cardiovascular care for which improvement is needed.

2c.3 Testing Results *(statistical results, assessment of adequacy in the context of norms for the test conducted)*:
A review of the relevant evidence and guidelines and expert panel consensus process resulted in the conclusion that this is a valid measure of quality of cardiovascular care for patients following carotid revascularization.

2c C☐ P☐ M☐ N☐

2d. Exclusions Justified

2d.1 Summary of Evidence supporting exclusion(s):

2d.2 Citations for Evidence:

2d.3 Data/sample *(description of data/sample and size)*:

2d.4 Analytic Method *(type analysis & rationale)*:

2d C☐ P☐ M☐ N☐ NA☐

2d.5 **Testing Results** *(e.g., frequency, variability, sensitivity analyses)*:	
2e. Risk Adjustment for Outcomes/ Resource Use Measures 2e.1 **Data/sample** *(description of data/sample and size)*: N/A 2e.2 **Analytic Method** *(type of risk adjustment, analysis, & rationale)*: N/A 2e.3 **Testing Results** *(risk model performance metrics)*: N/A 2e.4 **If outcome or resource use measure is not risk adjusted, provide rationale:** N/A	**2e** C☐ P☐ M☐ N☐ NA ☐
2f. Identification of Meaningful Differences in Performance 2f.1 **Data/sample from Testing or Current Use** *(description of data/sample and size)*: 15,483 patient records from 156 hospitals in the CARE registry from 2005 to 2010. 2f.2 **Methods to identify statistically significant and practically/meaningfully differences in performance** *(type of analysis & rationale)*: Distribution of performance by percentile to demonstrate variability across hospitals. 2f.3 **Provide Measure Scores from Testing or Current Use** *(description of scores, e.g., distribution by quartile, mean, median, SD, etc.; identification of statistically significant and meaningfully differences in performance)*: Mean: 20.6 10th percentile: 0 Lower quartile: 0 Median: 11.0% Upper quartile: 34.1% 90th percentile: 61.4%	**2f** C☐ P☐ M☐ N☐
2g. Comparability of Multiple Data Sources/Methods 2g.1 **Data/sample** *(description of data/sample and size)*: N/A 2g.2 **Analytic Method** *(type of analysis & rationale)*: N/A 2g.3 **Testing Results** *(e.g., correlation statistics, comparison of rankings)*: N/A	**2g** C☐ P☐ M☐ N☐ NA ☐
2h. Disparities in Care 2h.1 **If measure is stratified, provide stratified results** *(scores by stratified categories/cohorts)*: No disparities have been reported for this measure. 2h.2 **If disparities have been reported/identified, but measure is not specified to detect disparities, provide follow-up plans:**	**2h** C☐ P☐ M☐ N☐ NA ☐
TAP/Workgroup: What are the strengths and weaknesses in relation to the subcriteria for *Scientific Acceptability of Measure Properties?*	**2**
Steering Committee: Overall, to what extent was the criterion, *Scientific Acceptability of Measure Properties*, met? **Rationale:**	***2*** C☐ P☐ M☐

	N☐
3. USABILITY	
Extent to which intended audiences (e.g., consumers, purchasers, providers, policy makers) can understand the results of the measure and are likely to find them useful for decision making. (evaluation criteria)	**Eval Rating**
3a. Meaningful, Understandable, and Useful Information 3a.1 **Current Use:** In use 3a.2 **Use in a public reporting initiative (disclosure of performance results to the public at large)** (*If used in a public reporting initiative, provide name of initiative(s), locations, Web page URL(s). If not publicly reported, state the plans to achieve public reporting within 3 years*)**:** ACCF plans to begin voluntary public reporting of NCDR measures, including this measure, by 2012. ACCF is currently evaluating public reporting options and finalizing decisions related to location and display of information to be reported as well as communication plans. 3a.3 **If used in other programs/initiatives (***If used in quality improvement or other programs/initiatives, name of initiative(s), locations, Web page URL(s). If not used for QI, state the plans to achieve use for QI within 3 years***):** This measure is used for QI by NCDR CARE Registry participating institutions. As of October 2010, 174 institutions are enrolled in the CARE registry. Participating institutions receive an institutional outcomes report each quarter with their hospital´s data. This metric is included in the CARE registry outcomes report (to be updated with current specifications in the next outcomes report version). These metrics are selected by an NCDR panel of experts as presenting the greatest opportunity for care improvement. Hospitals receive their measure score on all metrics, as well as the overall rate for all hospitals in the CARE registry, and the median rate. **Testing of Interpretability** (*Testing that demonstrates the results are understood by the potential users for public reporting and quality improvement*) 3a.4 **Data/sample** *(description of data/sample and size)***:** None 3a.5 **Methods** *(e.g., focus group, survey, QI project)***:** None 3a.6 **Results** *(qualitative and/or quantitative results and conclusions)***:** None	**3a** C☐ P☐ M☐ N☐
3b/3c. Relation to other NQF-endorsed measures 3b.1 **NQF # and Title of similar or related measures:**	
(for NQF staff use) **Notes on similar/related endorsed or submitted measures:**	
3b. Harmonization If this measure is related to measure(s) already endorsed by NQF (e.g., same topic, but different target population/setting/data source or different topic but same target population): 3b.2 **Are the measure specifications harmonized? If not, why?**	**3b** C☐ P☐ M☐ N☐ NA ☐
3c. Distinctive or Additive Value 3c.1 **Describe the distinctive, improved, or additive value this measure provides to existing NQF-endorsed measures:** 5.1 **If this measure is similar to measure(s) already endorsed by NQF (i.e., on the same topic and the**	**3c** C☐ P☐ M☐ N☐ NA

same target population), Describe why it is a more valid or efficient way to measure quality:	☐
TAP/Workgroup: What are the strengths and weaknesses in relation to the subcriteria for *Usability?*	**3**
Steering Committee: Overall, to what extent was the criterion, *Usability*, met? **Rationale:**	**3** **C☐** **P☐** **M☐** **N☐**
4. FEASIBILITY	
Extent to which the required data are readily available, retrievable without undue burden, and can be implemented for performance measurement. (evaluation criteria)	Eval Rating
4a. Data Generated as a Byproduct of Care Processes **4a.1-2 How are the data elements that are needed to compute measure scores generated?** Data generated as byproduct of care processes during care delivery (Data are generated and used by healthcare personnel during the provision of care, e.g., blood pressure, lab value, medical condition), Coding/abstraction performed by someone other than person obtaining original information (E.g., DRG, ICD-9 codes on claims, chart abstraction for quality measure or registry)	**4a** **C☐** **P☐** **M☐** **N☐**
4b. Electronic Sources **4b.1 Are all the data elements available electronically?** (*elements that are needed to compute measure scores are in defined, computer-readable fields, e.g., electronic health record, electronic claims*) Yes **4b.2 If not, specify the near-term path to achieve electronic capture by most providers.**	**4b** **C☐** **P☐** **M☐** **N☐**
4c. Exclusions **4c.1 Do the specified exclusions require additional data sources beyond what is required for the numerator and denominator specifications?** No **4c.2 If yes, provide justification.**	**4c** **C☐** **P☐** **M☐** **N☐** **NA** ☐
4d. Susceptibility to Inaccuracies, Errors, or Unintended Consequences **4d.1 Identify susceptibility to inaccuracies, errors, or unintended consequences of the measure and describe how these potential problems could be audited. If audited, provide results.** The NCDR program takes a number of steps to minimize any potential for inaccuracies or errors in data used to report on performance back to hospitals. The process begins with support to data abstractors, including webinars, meetings, resource guides on the website, and clinical quality consultants available via e-mail or toll free phone number, to ensure consistent data collection. The NCDR establishes a unified electronic platform for data capture and submission that includes a certification process of the technical data collection tool selected by the hospital (either a commercially available software vendor product, the NCDR´s own web-based data collection tool, or a hospital´s customized electronic medical record system) that must occur prior to any data submissions. The certification process provides edit checks of data elements within the data collection tool to ensure a high quality data submission. The NCDR data submission process includes a Data Quality Report (DQR) process that checks for validity in submissions based upon predetermined thresholds for element and composite completeness. The NCDR is putting in place a new strategy to systematically review the DQR results. The NCDR on-site audit program has been developed to assess the reliability of data abstraction. This annual process reviews key elements at a select number of patient reports at a select number of sites and provides	**4d** **C☐** **P☐** **M☐** **N☐**

feedback scores to the hospitals. The NCDR audit currently includes the ICD and CathPCI registries. However, the CARE registry will be included in the NCDR audit program in 2011. Any elements deemed critical to capture for this measure will be added upon NQF endorsement.

4e. Data Collection Strategy/Implementation

4e.1 **Describe what you have learned/modified as a result of testing and/or operational use of the measure regarding data collection, availability of data/missing data, timing/frequency of data collection, patient confidentiality, time/cost of data collection, other feasibility/ implementation issues:**
Beta testing with a sample of registry participants takes place with each new registry version to identify errors in the data collection tool. In addition, modifications are made to metrics based on feedback during a public comment period.

The Data Quality Report (DQR) program has been developed to ensure data are valid and complete. The DQR is a process for submitting data files to the NCDR. Participants use their data collection tool software to create a submission file which is uploaded to the NCDR website. After uploading, the data in the file are automatically checked for errors and completeness. Passing the DQR ensures well-formed data and a statistically significant submission. Types of errors detected by the DQR include:

Schema: Structure doesn´t match NCDR requirements
Dates: Inconsistent dates
Selection: Missing or mismatched data; can be parent/child errors where a field requests more data
Outlier: Anomalies or exceptions; data exceeds the possible limits.

4e.2 **Costs to implement the measure** (*costs of data collection, fees associated with proprietary measures*)**:**
CARE registry participants pay a fee of $3,685/year (as of 2010) to enroll in the registry. Staff resources are needed for data collection and submission at the participating institution. Registry site managers/data collectors undergo (non-mandatory) training offered by the NCDR.

4e.3 **Evidence for costs:**
http://www.ncdr.com/WebNCDR/ncdrdocuments/B08352N%20CARE%20Registry%20Enrollment%20Packet%20Complete.pdf

4e.4 **Business case documentation:**

4e
C☐ P☐ M☐ N☐

TAP/Workgroup: What are the strengths and weaknesses in relation to the subcriteria for *Feasibility?*

4

Steering Committee: Overall, to what extent was the criterion, *Feasibility*, met?
Rationale:

4
C☐ P☐ M☐ N☐

RECOMMENDATION

(for NQF staff use) **Check if measure is untested and only eligible for time-limited endorsement.**

Time-limited ☐

Steering Committee: Do you recommend for endorsement?
Comments:

Y☐ N☐ A☐

CONTACT INFORMATION

Co.1 **Measure Steward (Intellectual Property Owner)**
Co.1 **Organization**
American College of Cardiology Foundation (ACCF), 2400 N Street NW, Washington, District Of Columbia, 20037

Co.2 **Point of Contact**
Kristyne, McGuinn, MHS, kmcguinn@acc.org, 202-375-6529-

Measure Developer If different from Measure Steward
Co.3 **Organization**
American College of Cardiology Foundation (ACCF), 2400 N Street NW, Washington, District Of Columbia, 20037

Co.4 **Point of Contact**
Kristyne, McGuinn, MHS, kmcguinn@acc.org, 202-375-6529-

Co.5 **Submitter If different from Measure Steward POC**
Kristyne, McGuinn, MHS, kmcguinn@acc.org, 202-375-6529-, American College of Cardiology Foundation (ACCF)

Co.6 **Additional organizations that sponsored/participated in measure development**
Society for Cardiac Angiography and Interventions (SCAI)

ADDITIONAL INFORMATION

Workgroup/Expert Panel involved in measure development
Ad.1 **Provide a list of sponsoring organizations and workgroup/panel members' names and organizations. Describe the members' role in measure development.**
CARE Registry Steering Committee:
Christopher J. White, MD, FSCAI, FACC, FAHA, FESC
H. Vernon (Skip) Anderson, MD, FACC, FSCAI, FAHA
Kenneth Rosenfield, MD, FSCAI, FACC, FAHA
David J. Cohen, MD, MSc
Michael R. Jaff, DO, FACP, FACC, FAHA (SVMB)
Kalon Ho, MD, MSc, FACC, FACP, FSCAI, FAHA
Alex Abou-Chebl, MD
Robert M. Bersin, MD
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William Gray,MD

Public Reporting Workgroup:
Fred Masoudi, MD, MSPH, FACC, FAHA, FACP
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Jeptha Curtis, MD, FACC
Paul Heidenreich, MD, MS, FACC
Brahmajee Nallamothu, MD, MPH, FACC
Mark Kremers, MD, FACC
Christopher White MD, FACC
Carl Tommaso, MD, FACC, FAHA, FSCAI
Sunil Rao, MD, FACC, FSCAI
Andrea Russo, MD, FACC, FHRS
Debabrata Mukherjee MD, FACC

Ad.2 **If adapted, provide name of original measure:**
Ad.3-5 **If adapted, provide original specifications URL or attachment**

Measure Developer/Steward Updates and Ongoing Maintenance
Ad.6 **Year the measure was first released:** 2007
Ad.7 **Month and Year of most recent revision:** 12, 2010
Ad.8 **What is your frequency for review/update of this measure?** Every 3-4 years or if guideline updates warrant more frequent update, or with new dataset version.
Ad.9 **When is the next scheduled review/update for this measure?** 12, 2011

Ad.10 **Copyright statement/disclaimers:**

Ad.11 -13 **Additional Information web page URL or attachment:** Attachment CAREmeasureTesting.docx

Date of Submission (*MM*/*DD*/*YY*)**:** 06/10/2011

NATIONAL QUALITY FORUM

Measure Evaluation 4.1
December 2009

This form contains the measure information submitted by stewards. Blank fields indicate no information was provided. Attachments also may have been submitted and are provided to reviewers. The subcriteria and most of the footnotes from the evaluation criteria are provided in Word comments within the form and will appear if your cursor is over the highlighted area. Hyperlinks to the evaluation criteria and ratings are provided in each section.

TAP/Workgroup (if utilized)**:** Complete all yellow highlighted areas of the form. Evaluate the extent to which each subcriterion is met. Based on your evaluation, summarize the strengths and weaknesses in each section.

Note: *If there is no TAP or workgroup, the SC also evaluates the subcriteria (yellow highlighted areas).*

Steering Committee: Complete all pink highlighted areas of the form. Review the workgroup/TAP assessment of the subcriteria, noting any areas of disagreement; then evaluate the extent to which each major criterion is met; and finally, indicate your recommendation for the endorsement. Provide the rationale for your ratings.

Evaluation ratings of the extent to which the criteria are met
C = Completely (unquestionably demonstrated to meet the criterion)
P = Partially (demonstrated to partially meet the criterion)
M = Minimally (addressed BUT demonstrated to only minimally meet the criterion)
N = Not at all (NOT addressed; OR incorrectly addressed; OR demonstrated to NOT meet the criterion)
NA = Not applicable (only an option for a few subcriteria as indicated)

(for NQF staff use) **NQF Review #:** 0339 **NQF Project:** Surgery Endorsement Maintenance 2010
MEASURE DESCRIPTIVE INFORMATION
De.1 **Measure Title:** Pediatric Heart Surgery Mortality (PDI 6)
De.2 **Brief description of measure:** Percentage of cases undergoing surgery for congenital heart disease with an in-hospital death.
1.1-2 **Type of Measure:** Outcome De.3 **If included in a composite or paired with another measure, please identify composite or paired measure** Pediatric Heart Surgery Volume (PDI 7) (NQF #0340)
De.4 **National Priority Partners Priority Area:** Population health, Safety De.5 **IOM Quality Domain**: Effectiveness De.6 **Consumer Care Need:** Getting better

CONDITIONS FOR CONSIDERATION BY NQF	
Four conditions must be met before proposed measures may be considered and evaluated for suitability as voluntary consensus standards:	**NQF Staff**
A. The measure is in the public domain or an intellectual property (measure steward agreement) is signed. *Public domain only applies to governmental organizations. All non-government organizations must sign a measure steward agreement even if measures are made publicly and freely available.* A.1 **Do you attest that the measure steward holds intellectual property rights to the measure and the right to use aspects of the measure owned by another entity (e.g., risk model, code set)?** Yes A.2 **Indicate if Proprietary Measure** (*as defined in measure steward agreement*)**:** A.3 **Measure Steward Agreement:** Government entity and in the public domain - no agreement necessary A.4 **Measure Steward Agreement attached:**	**A** Y☐ N☐
B. The measure owner/steward verifies there is an identified responsible entity and process to maintain and update the measure on a schedule that is commensurate with the rate of clinical innovation, but at least	**B** Y☐

every 3 years. Yes, information provided in contact section	N☐
C. The intended use of the measure includes both public reporting and quality improvement. ►**Purpose:** Public Reporting, Quality Improvement (Internal to the specific organization)	C Y☐ N☐
D. The requested measure submission information is complete. Generally, measures should be fully developed and tested so that all the evaluation criteria have been addressed and information needed to evaluate the measure is provided. Measures that have not been tested are only potentially eligible for a time-limited endorsement and in that case, measure owners must verify that testing will be completed within 12 months of endorsement. D.1**Testing:** Yes, fully developed and tested D.2 **Have NQF-endorsed measures been reviewed to identify if there are similar or related measures?** Yes	D Y☐ N☐
(for NQF staff use) **Have all conditions for consideration been met?** **Staff Notes to Steward** (*if submission returned*)**:**	Met Y☐ N☐
Staff Notes to Reviewers (*issues or questions regarding any criteria*)**:**	
Staff Reviewer Name(s):	

TAP/Workgroup Reviewer Name:	
Steering Committee Reviewer Name:	
1. IMPORTANCE TO MEASURE AND REPORT	
Extent to which the specific measure focus is important to making significant gains in health care quality (safety, timeliness, effectiveness, efficiency, equity, patient-centeredness) and improving health outcomes for a specific high impact aspect of healthcare where there is variation in or overall poor performance. ***Measures must be judged to be important to measure and report*** *in order to be evaluated against the remaining criteria.* (evaluation criteria) **1a. High Impact**	Eval Rating
(for NQF staff use) **Specific NPP goal**:	
1a.1 **Demonstrated High Impact Aspect of Healthcare:** Patient/societal consequences of poor quality 1a.2 1a.3 **Summary of Evidence of High Impact:** According to Odegard et al [1] despite advances in perioperative care, including monitoring and drugs, unexpected cardiac arrest remains a significant hazard during anesthesia [2- 5]. Anesthesia-related morbidity and mortality is more frequent in children than in adults, and is more frequent in infants and younger children than in older children [2,4,5,7 – 11]. Using a multivariate model that included age, complexity category, and four comorbidities, Hannan et al. found 8.26% risk-adjusted mortality at hospitals with fewer than 100 cases per year, versus 5.95% at higher volume hospitals (an effect limited to surgeons who performed at least 75 cases per year). [12] For additional material on this topic, see: URL:http://www.qualityindicators.ahrq.gov/downloads/pdi/pdi_measures_v31.pdf 1a.4 **Citations for Evidence of High Impact:** Updated citations will be presented in the May Steering Committee meeting [1] Odegard KC, DiNardo JA, Kussman BD, Shukla A, Harrington J, Casta A, McGowan FX Jr, Hickey PR, Bacha EA, Thiagarajan RR, Laussen PC. The frequency of anesthesia-related cardiac arrests in patients with congenital heart disease undergoing cardiac surgery. Anesth Analg. 2007 Aug;105(2):335-43. PMID: 17646487 [2] Cohen MM, Cameron CB, Duncan PG. Pediatric anesthesia morbidity and mortality in the perioperative period. Anesth Analg 1990;70:160-7Abstract/FREE Full Text2.?	1a C☐ P☐ M☐ N☐

[3] Keenan RL, Boyan CP. Cardiac arrest due to anesthesia. A study of incidence and causes. JAMA 1985;253:2373-7Abstract/FREE Full Text3.
[4] Morray JP, Geiduschek JM, Ramamoorthy C, Haberkern CM, Hackel A, Caplan RA, Domino KB, Posner K, Cheney FW. Anesthesia-related cardiac arrest in children: initial findings of the Pediatric Perioperative Cardiac Arrest (POCA) Registry. Anesthesiology 2000;93:6-14Medline4.
[5] Olsson GL, Hallen B. Cardiac arrest during anaesthesia. A computer-aided study in 250,543 anaesthetics. Acta Anaesthesiol Scand 1988;32:653-64Medline5.
[6] Posner KL, Geiduschek J, Haberkern CM, Ramamoorthy C, Hackel A, Morray JP. Unexpected cardiac arrest among children during surgery: a North American registry to elucidate the incidence and causes of anesthesia related cardiac arrest. Qual Saf Health Care 2002;11:252-7Medline6.
[7] Morray JP. Anesthesia-related cardiac arrest in children. An update. Anesthesiol Clin North America 2002;20:1-287.
[8] Rackow H, Salanitre E, Green LT. Frequency of cardiac arrest associated with anesthesia in infants and children. Pediatrics 1961;28:697-704Medline8.?
[9] Murat I, Constant I, Maud´huy H. Perioperative anaesthetic morbidity in children: a database of 24,165 anaesthetics over a 30-month period. Paediatr Anaesth 2004;14:158-66CrossRefMedline9.
[10] Tay CL, Tan GM, Ng SB. Critical incidents in paediatric anaesthesia: an audit of 10 000 anaesthetics in Singapore. Paediatr Anaesth 2001;11:711-18Medline10.
[11] Braz LG, Modolo NS, do Nascimento P Jr, Bruschi BA, Castiglia YM, Ganem EM, de Carvalho LR, Braz JR. Perioperative cardiac arrest: a study of 53,718 anaesthetics over 9 yr from a Brazilian teaching hospital. Br J Anaesth 2006;96:569-75Abstract/FREE Full Text
[12] Hannan EL, Racz M, Kavey RE, Quaegebeur JM, Williams R. Pediatric cardiac surgery: the effect of hospital and surgeon volume on in-hospital mortality. Pediatrics 1998;101(6):963-9

1b. Opportunity for Improvement

1b.1 Benefits (improvements in quality) envisioned by use of this measure: Higher volume is associeted with reduced mortality and morbidity.

1b.2 Summary of data demonstrating performance gap (variation or overall poor performance) across providers:
Adjusted per 1,000 rates by patient and hospital characteristics, 2007

Mean	Standard error	Location	P-value: Relative to Northeast
63.931	7.946	Northeast	1.000
30.730	2.637	Midwest	0.000
44.326	1.760	South	0.016
33.496	3.316	West	0.000

1b.3 Citations for data on performance gap:
See the following report for a complete treatment of the methodology: “Methods: Applying AHRQ Quality Indicators to Healthcare Cost and Utilization Project (HCUP) Data for the National Healthcare Quality Report” [URL: http://hcupnet.ahrq.gov/QI%20Methods.pdf?JS=Y]

1b.4 Summary of Data on disparities by population group:
1) Estimate 2) Standard error 3) P-value: Relative to marked group-c 4) P-value: 2007 relative to 2006

Median income of patient´s ZIP code:
First quartile (lowest income) 44.830 2.315 0.394 0.112
Second quartile 39.643 2.577 0.671 0.053
Third quartile 32.492 2.639 0.034 0.679
Fourth quartile (highest income)c 41.414 3.276 0.043

Expected payment source:
Private insurancec 29.862 2.198 0.297
Medicare * * * DNC
Medicaid 45.617 1.707 0.000 0.129
Other insurance 52.447 8.437 0.010 0.494

1b
C ☐
P ☐
M ☐
N ☐

Uninsured / self-pay / no charge 44.691 10.293 0.159 0.182

1b.5 Citations for data on Disparities:
AHRQ 2007 Nationwide Inpatient Sample (NIS)

1c. Outcome or Evidence to Support Measure Focus

1c.1 Relationship to Outcomes (*For non-outcome measures, briefly describe the relationship to desired outcome. For outcomes, describe why it is relevant to the target population*)**:** The measure focus is an outcome (mortality) that is relevant to a neonatal population with a diagnosis of congenital heart defect or procedure for congenital heart repair.

1c.2-3. Type of Evidence: Expert opinion, Systematic synthesis of research

1c.4 Summary of Evidence (*as described in the criteria; for outcomes, summarize any evidence that healthcare services/care processes influence the outcome*)**:**
Using a multivariate model that included age, complexity category, and four comorbidities, Hannan et al. found 8.26% risk-adjusted mortality at hospitals with fewer than 100 cases per year, versus 5.95% at higher volume hospitals (an effect limited to surgeons who performed at least 75 cases per year). [1] Two other studies using hospital discharge data from California and Massachusetts found similar effects of hospital volume. [2] [3]
Another source of evidence is that cardiopulmonary bypass or aortic crossclamp time has been repeatedly associated with postoperative mortality, adjusting for a variety of patient characteristics.[4-7] This relationship has been demonstrated not just for the Fontan procedure, but also for the Norwood procedure for hypoplastic left heart syndrome. [8] Experienced surgeons and surgical teams should be able to reduce cardiopulmonary bypass or aortic cross-clamp time, thereby improving postoperative mortality.

1c.5 Rating of strength/quality of evidence (*also provide narrative description of the rating and by whom***):**
B there is moderate certainty that the net benefit is moderate to substantial (review by project team)

1c.6 Method for rating evidence: U.S. Preventive Services Task Force (USPSTF) assigns one of five letter grades to each of its recommendations (A, B, C, D, or I).

1c.7 Summary of Controversy/Contradictory Evidence: Quality-of-care evaluation must take into account variations in "case mix." One study reviewed the application of two case-mix complexity-adjustment tools in the Society of Thoracic Surgeons (STS) Congenital Heart Surgery Database: the Aristotle Basic Complexity (ABC) score and the Risk Adjustment in Congenital Heart Surgery (RACHS-1) method. With both RACHS-1 and ABC, as complexity increases, discharge mortality also ncreases. The ABC approach allows classification of more operations, whereas the RACHS-1 discriminates better at the higher end of complexity. Complexity stratification is a useful method for analyzing the impact of case mix on pediatric cardiac surgical outcomes. Both the RACHS-1 and ABC methods facilitate complexity stratification in the STS database.

1c.8 Citations for Evidence (*other than guidelines***):** Updated citations will be presented in the May Steering Committee meeting

[1] Hannan EL, Racz M, Kavey RE, Quaegebeur JM, Williams R. Pediatric cardiac surgery: the effect of hospital and surgeon volume on in-hospital mortality. Pediatrics 1998;101(6):963-9.
[2] Jenkins KJ, Newburger JW, Lock JE, Davis RB, Coffman GA, Iezzoni LI. In-hospital mortality for surgical repair of congenital heart defects: preliminary observations of variation by hospital caseload. Pediatrics 1995;95(3):323-30.
[3] Sollano JA, Gelijns AC, Moskowitz AJ, Heitjan DF, Cullinane S, Saha T, et al. Volume-outcome relationships in cardiovascular operations: New York State, 1990-1995. J Thorac Cardiovasc Surg 1999;117(3):419-28.
[4] Cetta F, Feldt RH, O´Leary PW, Mair DD, Warnes CA, Driscoll DJ, et al. Improved early morbidity and mortality after Fontan operation: the Mayo Clinic experience, 1987 to 1992. J Am Coll Cardiol 1996;28(2):480-6.
[5] Gentles TL, Gauvreau K, Mayer JE, Jr., Fishberger SB, Burnett J, Colan SD, et al. Functional outcome after the Fontan operation: factors influencing late morbidity. J Thorac Cardiovasc Surg 1997;114(3):392-403; discussion 404-5.
[6] Kaulitz R, Ziemer G, Luhmer I, Kallfelz HC. Modified Fontan operation in functionally univentricular

1c
C☐
P☐
M☐
N☐

hearts: preoperative risk factors and intermediate results. J Thorac Cardiovasc Surg 1996;112(3):658-64. [7] Fontan F, Kirklin JW, Fernandez G, Costa F, Naftel DC, Tritto F, et al. Outcome after a "perfect" Fontan operation. Circulation 1990;81(5):1520-36. [8] Kern JH, Hayes CJ, Michler RE, Gersony WM, Quaegebeur JM. Survival and risk factor analysis for the Norwood procedure for hypoplastic left heart syndrome. Am J Cardiol 1997;80(2):170-4. 1c.9 **Quote the Specific guideline recommendation (***including guideline number and/or page number***):** Surgery for congenital heart disease, especially in infants, requires a setting that readily meets the complex and special needs of this group of patients. These requirements include a cardiac surgeon experienced in the operative and perioperative management of such patients. There should be a pediatric cardiologist, an anesthesia team, perfusionists, intensive care nurses, and appropriate intensive care facilities for the treatment of infants and children. At a hospital where congenital heart operations are performed, a total of 100 congenital heart operations (both open and closed, not including neonatal ductus ligations) should be done. The occasional management of an infant or child with congenital heart disease by an otherwise busy and well-functioning adult cardiac surgical team is strongly discouraged. 1c.10 **Clinical Practice Guideline Citation:** http://www.facs.org/fellows_info/guidelines/cardiac.html 1c.11 **National Guideline Clearinghouse or other URL:** Not Applicable. 1c.12 **Rating of strength of recommendation (***also provide narrative description of the rating and by whom***):** Not Applicable. 1c.13 **Method for rating strength of recommendation** (*If different from USPSTF system, also describe rating and how it relates to USPSTF)***:** Not Applicable. 1c.14 **Rationale for using this guideline over others:** No competing measures found.	
TAP/Workgroup: What are the strengths and weaknesses in relation to the subcriteria for *Importance to Measure and Report?*	**1**
Steering Committee: Was the threshold criterion, *Importance to Measure and Report*, met? **Rationale:**	**1** **Y☐** **N☐**
2. SCIENTIFIC ACCEPTABILITY OF MEASURE PROPERTIES	
Extent to which the measure, as specified, produces consistent (reliable) and credible (valid) results about the quality of care when implemented. (evaluation criteria)	**Eval Rating**
2a. MEASURE SPECIFICATIONS	
S.1 **Do you have a web page where current detailed measure specifications can be obtained?** S.2 **If yes, provide web page URL:** **2a. Precisely Specified**	
2a.1 **Numerator Statement (***Brief, text description of the numerator - what is being measured about the target population, e.g. target condition, event, or outcome***):** Number of deaths (DISP=20) among cases meeting the inclusion and exclusion rules for the denominator with a code of pediatric heart surgery with ICD-9-CM diagnosis of congenital heart disease in any field. 2a.2 **Numerator Time Window (***The time period in which cases are eligible for inclusion in the numerator***):** Time window can be determined by user, but is generally a calendar year. 2a.3 **Numerator Details (***All information required to collect/calculate the numerator, including all codes, logic, and definitions***):** Number of deaths (DISP=20) among cases meeting the inclusion and exclusion rules for the denominator with a	**2a-specs** **C☐** **P☐** **M☐** **N☐**

code of pediatric heart surgery with ICD-9-CM diagnosis of congenital heart disease in any field.

2a.4 Denominator Statement (*Brief, text description of the denominator - target population being measured***):**
Discharges under age 18 with ICD-9-CM procedure codes for congenital heart disease (1P) in any field or non-specific heart surgery (2P) in any field with ICD-9-CM diagnosis of congenital heart disease (2D) in any field.

2a.5 Target population gender: Female, Male
2a.6 Target population age range: Age less than 18 years

2a.7 Denominator Time Window (*The time period in which cases are eligible for inclusion in the denominator***):**
Time window can be determined by user, but is generally a calendar year.

2a.8 Denominator Details (*All information required to collect/calculate the denominator - the target population being measured - including all codes, logic, and definitions***):**
Discharges under age 18 with ICD-9-CM procedure codes for congenital heart disease (1P) or non-specific heart surgery (2P) with ICD-9-CM diagnosis of congenital heart disease (2D) in any field.

Congenital heart disease procedures (1P):
3500
CLOSED VALVOTOMY NOS
3501
CLOSED AORTIC VALVOTOMY
3502
CLOSED MITRAL VALVOTOMY
3503
CLOSED PULMON VALVOTOMY
3504
CLOSED TRICUSP VALVOTOMY
3510
OPEN VALVULOPLASTY NOS
3511
OPN AORTIC VALVULOPLASTY
3512
OPN MITRAL VALVULOPLASTY
3513
OPN PULMON VALVULOPLASTY
3514
OPN TRICUS VALVULOPLASTY
3520
REPLACE HEART VALVE NOS
3521
REPLACE AORT VALV-TISSUE
3522
REPLACE AORTIC VALVE NEC
3523
REPLACE MITR VALV-TISSUE
3524
REPLACE MITRAL VALVE NEC
3525
REPLACE PULM VALV-TISSUE
3526
REPLACE PULMON VALVE NEC
3527
REPLACE TRIC VALV-TISSUE
3528
REPLACE TRICUSP VALV NEC
3531

PAPILLARY MUSCLE OPS
3532
CHORDAE TENDINEAE OPS
3533
ANNULOPLASTY
3534
INFUNDIBULECTOMY
3535
TRABECUL CARNEAE CORD OP
3539
TISS ADJ TO VALV OPS NEC
3541
ENLARGE EXISTING SEP DEF
3542
CREATE SEPTAL DEFECT
3550
PROSTH REP HRT SEPTA NOS
3551
PROS REP ATRIAL DEF-OPN
3552
PROS REPAIR ATRIA DEF-CL
3553
PROST REPAIR VENTRIC DEF
3554
PROS REP ENDOCAR CUSHION
3560
GRFT REPAIR HRT SEPT NOS
3561
GRAFT REPAIR ATRIAL DEF
3562
GRAFT REPAIR VENTRIC DEF
3563
GRFT REP ENDOCAR CUSHION
3570
HEART SEPTA REPAIR NOS
3571
ATRIA SEPTA DEF REP NEC
3572
VENTR SEPTA DEF REP NEC
3573
ENDOCAR CUSHION REP NEC
3581
TOT REPAIR TETRAL FALLOT
3582
TOTAL REPAIR OF TAPVC
3583
TOT REP TRUNCUS ARTERIOS
3584
TOT COR TRANSPOS GRT VES
3591
INTERAT VEN RETRN TRANSP
3592
CONDUIT RT VENT-PUL ART
3593
CONDUIT LEFT VENTR-AORTA
3594
CONDUIT ARTIUM-PULM ART
3595

HEART REPAIR REVISION
3598
OTHER HEART SEPTA OPS
3599
OTHER OP ON HRT VALVES
3699
OTHER OPERATIONS ON VESSEL OF HEART
3733
EXCISION OR DESTRUCTION OF OTHER LESION OR TISSUE OF HEART
3736
EXCISION OR DESTRUCTION OF LEFT ATRIAL APPENDAGE (LAA) OCT08-
375
HEART TRANSPLANTATION (invalid as of OCT03)
3751
HEART TRANSPLANTATION OCT03-
3752
IMPLANT TOT REP HRT SYS OCT03-
390
SYSTEMIC-PULM ART SHUNT
3921
CAVAL-PULMON ART ANASTOM

Non-specific cardiac procedures (2P):
3834
RESECTION OF ABDOMINAL AORTA WITH ANASTOMOSIS
3835
THOR VESSEL RESECT/ANAST
3844
RESECTION OF ABDOMINAL AORTA WITH REPLACEMENT
3845
RESECT THORAC VES W REPL
3864
OTHER EXCISION OF ABDOMINAL AORTA
3865
OTHER EXCISION OF THORACIC VESSEL
3884
OTHER SURGICAL OCCLUSION OF ABDOMINAL AORTA
3885
OCCLUDE THORACIC VES NEC
3949
OTHER REVISION OF VASCULAR PROCEDURE
3956
REPAIR OF BLOOD VESSEL WITH TISSUE PATCH GRAFT
3957
REPAIR OF BLOOD VESSEL WITH SYNTHETIC PATCH GRAFT
3958
REPAIR OF BLOOD VESSEL WITH UNSPECIFIED TYPE OF PATCH GRAFT
3959
REPAIR OF VESSEL NEC

Congenital heart disease diagnoses (2D):
7450
COMMON TRUNCUS
74510
COMPL TRANSPOS GREAT VES
74511
DOUBLE OUTLET RT VENTRIC
74512

CORRECT TRANSPOS GRT VES
74519
TRANSPOS GREAT VESS NEC
7452
TETRALOGY OF FALLOT
7453
COMMON VENTRICLE
7454
VENTRICULAR SEPT DEFECT
7455
SECUNDUM ATRIAL SEPT DEF
74560
ENDOCARD CUSHION DEF NOS
74561
OSTIUM PRIMUM DEFECT
74569
ENDOCARD CUSHION DEF NEC
7457
COR BILOCULARE
7458
SEPTAL CLOSURE ANOM NEC
7459
SEPTAL CLOSURE ANOM NOS
74600
PULMONARY VALVE ANOM NOS
74601
CONG PULMON VALV ATRESIA
74602
CONG PULMON VALVE STENOS
74609
PULMONARY VALVE ANOM NEC
7461
CONG TRICUSP ATRES/STEN
7462
EBSTEIN'S ANOMALY
7463
CONG AORTA VALV STENOSIS
7464
CONG AORTA VALV INSUFFIC
7465
CONGEN MITRAL STENOSIS
7466
CONG MITRAL INSUFFICIENC
7467
HYPOPLAS LEFT HEART SYND
74681
CONG SUBAORTIC STENOSIS
74682
COR TRIATRIATUM
74683
INFUNDIB PULMON STENOSIS
74684
OBSTRUCT HEART ANOM NEC
74685
CORONARY ARTERY ANOMALY
74687
MALPOSITION OF HEART
74689

CONG HEART ANOMALY NEC
7469
CONG HEART ANOMALY NOS
7470
PATENT DUCTUS ARTERIOSUS
74710
COARCTATION OF AORTA
74711
INTERRUPT OF AORTIC ARCH
74720
CONG ANOM OF AORTA NOS
74721
ANOMALIES OF AORTIC ARCH
74722
AORTIC ATRESIA/STENOSIS
74729
CONG ANOM OF AORTA NEC
7473
PULMONARY ARTERY ANOM
74740
GREAT VEIN ANOMALY NOS
74741
TOT ANOM PULM VEN CONNEC
74742
PART ANOM PULM VEN CONN
74749
GREAT VEIN ANOMALY NEC

2a.9 Denominator Exclusions (*Brief text description of exclusions from the target population***):** Exclude cases:
• MDC 14 (pregnancy, childbirth and pueperium)
• with transcatheter interventions (either 3AP, 3BP, 3CP, 3DP, 3EP with 3D, or 3FP) as single cardiac procedures, performed without bypass (5P) but with catheterization (6P)
• with septal defects (4P) as single cardiac procedures without bypass (5P)
• with diagnosis of ASD or VSD (5D) with PDA as the only cardiac procedure
• heart transplant (7P)
• premature infants (4D) with PDA closure (3D and 3EP) as only cardiac procedure;
• age less than or equal to 30 days with PDA closure as only cardiac procedure
• missing discharge disposition (DISP=missing), gender (SEX=missing), age (AGE=missing), quarter (DQTR=missing), year (YEAR=missing) or principal diagnosis (DX1 =missing)
• transferring to another short-term hospital (DISP=2)
• neonates with birth weight less than 500 grams (Birth Weight Category 1)

2a.10 Denominator Exclusion Details (*All information required to collect exclusions to the denominator, including all codes, logic, and definitions***):**
Exclude cases:
• MDC 14 (pregnancy, childbirth and pueperium)
• with transcatheter interventions (either 3AP, 3BP, 3CP, 3DP, 3EP with 3D, or 3FP) as single cardiac procedures, performed without bypass (5P) but with catheterization (6P)
• with septal defects (4P) as single cardiac procedures without bypass (5P)
• with diagnosis of ASD or VSD (5D) with PDA as the only cardiac procedure
• heart transplant (7P)
• premature infants (4D) with PDA closure (3D and 3EP) as only cardiac procedure;
• age less than or equal to 30 days with PDA closure as only cardiac procedure
• missing discharge disposition (DISP=missing), gender (SEX=missing), age (AGE=missing), quarter (DQTR=missing), year (YEAR=missing) or principal diagnosis (DX1 =missing)
• transferring to another short-term hospital (DISP=2)
• neonates with birth weight less than 500 grams (Birth Weight Category 1)

A neonate is defined as any discharge with age in days at admission between zero and 28 days (inclusive). If age in days is missing, then a neonate is defined as an admission type of newborn (SID ATYPE=4) OR an ICD-9-CM code for either in-hospital live birth or neonate observation and evaluation.

Newborn in Hospital Live Birth Codes
V3000
SINGLE LB IN-HOSP W/O CS OCT05-
V3001
SINGLE LB IN-HOSP W CS OCT05-
V3100
TWIN-MATE LB-HOSP W/O CS OCT05-
V3101
TWIN-MATE LB-IN HOS W CS OCT05-
V3200
TWIN-MATE SB-HOSP W/O CS OCT05-
V3201
TWIN-MATE SB-HOSP W CS OCT05-
V3300
TWIN-NOS-IN HOSP W/O CS OCT05-
V3301
TWIN-NOS-IN HOSP W CS OCT05-
V3400
OTH MULT LB-HOSP W/O CS OCT05-
V3401
OTH MULT LB-IN HOSP W CS OCT05-
V3500
OTH MULT SB-HOSP W/O CS OCT05-
V3501
OTH MULT SB-IN HOSP W CS OCT05-
V3600
MULT LB/SB-IN HOS W/O CS OCT05-
V3601
MULT LB/SB-IN HOSP W CS OCT05-
V3700
MULT BRTH NOS-HOS W/O CS OCT05-
V3701
MULT BIRTH NOS-HOSP W CS OCT05-
V3900
LIVEBORN NOS-HOSP W/O CS OCT05-
V3901
LIVEBORN NOS-HOSP W CS OCT05-

Neonate Observation and Evaluation codes:
V290
NB OBSRV SUSPCT INFECT
V291
NB OBSRV SUSPCT NEURLGCL
V292
OBSRV NB SUSPC RESP COND
V293
NB OBS GENETC/METABL CND
V298
NB OBSRV OTH SUSPCT COND
V299
NB OBSRV UNSP SUSPCT CND

Less than 500 grams - Birth Weight Category 1
76401

LIGHT-FOR-DATES <500G
76411
LT-FOR-DATE W/MAL <500G
76421
FETAL MALNUTRITION <500G
76491
FET GROWTH RETARD <500G
76501
EXTREME IMMATUR <500G
76511
PRETERM NEC <500G
V2131
LOW BIRTHWT STATUS <500G

Closed heart valvotomy (3AP):
3500
CLOSED HEART VALVOTOMY, UNSPECIFIED VALUE
3501
CLOSED HEART VALVOTOMY, AORTIC VALUE
3502
CLOSED HEART VALVOTOMY, MITRAL VALUE
3503
CLOSED HEART VALVOTOMY, PULMONARY VALUE
3504
CLOSED HEART VALVOTOMY, TRICUSPID VALUE
Atrial septal enlargement (3BP)
3541
ENLARGEMENT OF EXISTING ATRIAL SEPTAL DEFECT
3542
CREATION OF SEPTAL DEFECT IN HEART
Atrial septal defect repair (3CP)
3551
REPAIR OF ATIAL SEPTAL DEFECT WITH PROSTHESIS, OPEN TECHNIQUE
3571
OTHER AND UNSPECIFIED REPAIR OF ATRIAL SEPTAL DEFECT

Ventricular septal defect repair (3DP):
3553
REPAIR OF VENTRICULAR SEPTAL DEFECT WITH PROSTHESIS
3572
OTHER AND UNSPECIFIED REPAIR OF VENTRICULAR SEPTAL DEFECT

Occlusion of thoracic vessel (3EP):
3885
OCCLUDE THORACIC VES NEC

PDA closure diagnosis code (3D):
7470
PATENT DUCTUS ARTERIOSUS

Other surgical occlusion (3FP):
3884
OTHER SURGICAL OCCLUSION OF AORTA, ABDOMINAL
3885
OTHER SURGICAL OCCLUSION OF THORACIC VESSEL
3959
OTHER REPAIR OF VESSEL

Atrial septal defect repair and enlargement (4P):
3541
ENLARGE EXISTING SEP DEF
3552
PROS REPAIR ATRIA DEF-CL

Extracorporeal circulation (5P):
3961
EXTRACORPOREAL CIRCULAT

Atrial Septal Defect or Ventricular Septal Defect diagnosis (5D):
7454
VENTRICULAR SEPT DEFECT
7455
SECUNDUM ATRIAL SEPT DEF

Catheterization (6P):
3721
RT HEART CARDIAC CATH
3722
LEFT HEART CARDIAC CATH
3723
RT/LEFT HEART CARD CATH
8842
CONTRAST AORTOGRAM
8843
CONTR PULMON ARTERIOGRAM
8844
ARTERIOGRAPHY OF OTHER INTRATHORACIC VESSELS
8850
ANGIOCARDIOGRAPHY, NOT OTHERWISE SPECIFIED
8851
ANGIOCARDIOGRAPHY OF VENAE CAVAE
8852
ANGIOCARDIOGRAPHY OF RIGHT HEART STRUCTURES
8853
ANGIOCARDIOGRAPHY OF LEFT HEART STRUCTURES
8854
COMBINED RIGHT AND LEFT HEART ANGIOCARDIOGRAPHY
8855
CORONARY ARTERIOGRAPHY USING A SINGLE CATHETER
8856
CORONARY ARTERIOGRAPHY USING TWO CATHETERS
8857
OTHER AND UNSPECIFIED CORONARY ARTERIOGRAPHY
8858
NEGATIVE-CONTRAST CARDIAC ROENTGENOGRAPHY

Heart Transplant (7P):
375
HEART TRANSPLANTATION (invalid as of OCT03)
3751
HEART TRANSPLANTATION OCT03-
3752
IMPLANT TOT REP HRT SYS OCT03-

Premature infants (4D):
76500

EXTREME IMMATUR WTNOS
76501
EXTREME IMMATUR <500G
76502
EXTREME IMMATUR 500-749G
76503
EXTREME IMMATUR 750-999G
76504
EXTREME IMMAT 1000-1249G
76505
EXTREME IMMAT 1250-1499G
76506
EXTREME IMMAT 1500-1749G
76507
EXTREME IMMAT 1750-1999G
76508
EXTREME IMMAT 2000-2499G
76509
EXTREME IMMAT 2500+G
76510
PRETERM INFANT NEC WTNOS
76511
PRETERM NEC <500G
76512
PRETERM NEC 500-749G
76513
PRETERM NEC 750-999G
76514
PRETERM NEC 1000-1249G
76515
PRETERM NEC 1250-1499G
76516
PRETERM NEC 1500-1749G
76517
PRETERM NEC 1750-1999G
76518
PRETERM NEC 2000-2499G
76519
PRETERM NEC 2500+G

2a.11 Stratification Details/Variables (*All information required to stratify the measure including the stratification variables, all codes, logic, and definitions***):**
The user has the option to stratify by Gender, birthweight, age in days, age in years, race / ethnicity, primary payer, and custom stratifiers.

2a.12-13 Risk Adjustment Type: Risk adjustment method widely or commercially available

2a.14 Risk Adjustment Methodology/Variables (*List risk adjustment variables and describe conceptual models, statistical models, or other aspects of model or method***):**
PQI: The predicted value for each case is computed using a logistic regression model and covariates for gender and age in years (in 5-year age groups). The reference population used in the model is the universe of discharges for states that participate in the HCUP State Inpatient Databases (SID) for the year 2007 (updated annually), a database consisting of 43 states and approximately 30 million adult discharges. The expected rate is computed as the sum of the predicted value for each case divided by the number of cases for the unit of analysis of interest (i.e., county, state, and region). The risk adjusted rate is computed using indirect standardization as the observed rate divided by the expected rate, multiplied by the reference population rate
The model includes additional covariates for RACHS-1 risk categories.

Required data elements: CMS Diagnosis Related Group (DRG); CMS Major Diagnostic Category (MDC); age in days up to 364, then age years at admission; International Classification of Diseases, Ninth Revision, Clinical Modification (ICD-9-CM) principal and secondary diagnosis codes.

2a.15-17 **Detailed risk model available Web page URL or attachment:** URL None
http://qualityindicators.ahrq.gov/downloads/pd/PDI_Risk_Adjustment_Tables_(Version_4_2).pdf

2a.18-19 **Type of Score:** Rate/proportion
2a.20 **Interpretation of Score:** Better quality = Lower score
2a.21 **Calculation Algorithm (***Describe the calculation of the measure as a flowchart or series of steps***):**
Each indicator is expressed as a rate, is defined as outcome of interest / population at risk or numerator / denominator. The AHRQ Quality Indicators (AHRQ QI) software performs five steps to produce the rates. 1) Discharge-level data is used to mark inpatient records containing the outcome of interest and 2) the population at risk. For provider indicators, the population at risk is also derived from hospital discharge records; for area indicators, the population at risk is derived from U.S. Census data. 3) Calculate observed rates. Using output from steps 1 and 2, rates are calculated for user-specified combinations of stratifiers. 4) Calculate expected rates. Regression coefficients from a reference population database are applied to the discharge records and aggregated to the provider or area level. 5) Calculate risk-adjusted rate. Use the indirect standardization to account for case-mix. 6) Calculate smoothed rate. A Univariate shrinkage factor is applied to the risk-adjusted rates. The shrinkage estimate reflects a reliability adjustment unique to each indicator. Full information on calculation algorithms and specifications can be found at http://qualityindicators.ahrq.gov/PDI_download.htm

2a.22 **Describe the method for discriminating performance** *(e.g., significance testing)***:**
Significance testing is not prescribed by the software. Users may calculate a confidence interval for the risk-adjusted rates and a posterior probability interval for the smoothed rates at a 95% or 99% level. Users may define the relevant benchmark and the methods of discriminating performance according to their application.

2a.23 **Sampling (Survey) Methodology** *If measure is based on a sample (or survey), provide instructions for obtaining the sample, conducting the survey and guidance on minimum sample size (response rate)*:
Not applicable

2a.24 **Data Source (***Check the source(s) for which the measure is specified and tested)*
Administrative claims

2a.25 **Data source/data collection instrument (***Identify the specific data source/data collection instrument, e.g. name of database, clinical registry, collection instrument, etc.***):**
The data source is hospital discharge data such as the HCUP State Inpatient Databases (SID) or equivalent using UB-04 coding standards. The data collection instrument is public-use AHRQ QI software available in SAS or Windows versions

2a.26-28 **Data source/data collection instrument reference web page URL or attachment:** URL None
http://www.qualityindicators.ahrq.gov/software.htm

2a.29-31 **Data dictionary/code table web page URL or attachment:** URL None
http://www.qualityindicators.ahrq.gov/downloads/winqi/AHRQ_QI_Windows_Software_Documentation_V41a.pdf

2a.32-35 **Level of Measurement/Analysis** (*Check the level(s) for which the measure is specified and tested)*
Facility

2a.36-37 **Care Settings (***Check the setting(s) for which the measure is specified and tested)*
Hospital/Acute Care Facility

2a.38-41 **Clinical Services** (*Healthcare services being measured, check all that apply*)
Clinicians: Physicians (MD/DO)

TESTING/ANALYSIS

2b. Reliability testing — **2b** C☐

2b.1 Data/sample *(description of data/sample and size)*: The Pediatric Health Information System (PHIS) dataset was used for these analyses. This dataset represents detailed hospital-based inpatient information from all discharges (n = 385,157) from 34 independent, academic, free-standing, pediatric hospitals in the United States (PHIS). They are heterogeneous with respect to geographic location, bedsize, and average daily census. Data are submitted to PHIS and tested for reliability and validity before inclusion. [1]

References
[1] Slonim AD, Marcin JP, Turenne W, Hall M, Joseph JG. Pediatric patient safety events during hospitalization: approaches to accounting for institution-level effects. Health Serv Res. 2007 Dec;42(6 Pt 1):2275-93; discussion 2294-323. PMID: 17995566.

2b.2 Analytic Method *(type of reliability & rationale, method for testing)*:
The rates of PSIs were computed for all discharges. The patient and institutional characteristics associated with these PSIs were calculated. The analyses sequentially applied three increasingly conservative methods to control for the institution-level effects robust standard error estimation, a fixed effects model, and a random effects model. The degree of difference from a "base state," which excluded institution-level variables, and between the models was calculated. The effects of these analyses on the interpretation of the PSIs are presented. [1]
References
[1] Slonim AD, Marcin JP, Turenne W, Hall M, Joseph JG. Pediatric patient safety events during hospitalization: approaches to accounting for institution-level effects. Health Serv Res. 2007 Dec;42(6 Pt 1):2275-93; discussion 2294-323. PMID: 17995566.

2b.3 Testing Results *(reliability statistics, assessment of adequacy in the context of norms for the test conducted)*:
PRINCIPAL FINDINGS: PSIs are relatively infrequent events in hospitalized children ranging from 0 per 10,000 (postoperative hip fracture) to 87 per 10,000 (postoperative respiratory failure). Significant variables associated PSIs included age (neonates), race (Caucasians), payor status (public insurance), severity of illness (extreme), and hospital size (>300 beds), which all had higher rates of PSIs than their reference groups in the bivariable logistic regression results. The three different approaches of adjusting for institution-level effects demonstrated that there were similarities in both the clinical and statistical significance across each of the models. [1]

References
[1] Slonim AD, Marcin JP, Turenne W, Hall M, Joseph JG. Pediatric patient safety events during hospitalization: approaches to accounting for institution-level effects. Health Serv Res. 2007 Dec;42(6 Pt 1):2275-93; discussion 2294-323. PMID: 17995566.

P☐ M☐ N☐

2c. Validity testing

2c.1 Data/sample *(description of data/sample and size)*: We performed a cross-sectional analysis of California hospital discharges from 2005–2007 for patients aged <18 years. [1]

Agency for Healthcare Research and Quality pediatric-specific quality indicators were used to identify adverse events in 431524 discharges from 38 freestanding, academic, not-for-profit, tertiary care pediatric hospitals in the United States participating in the Pediatric Health Information System database in 2006. [2]

References
[1] Bardach NS, Chien AT, Dudley RA. Small numbers limit the use of the inpatient pediatric quality indicators for hospital comparison. Acad Pediatr. 2010 Jul-Aug;10(4):266-73. PMID: 20599180; doi:10.1016/j.acap.2010.04.025.
[2] Kronman MP, Hall M, Slonim AD, Shah SS. Charges and lengths of stay attributable to adverse patient-care events using pediatric-specific quality indicators: a multicenter study of freestanding children´s hospitals. Pediatrics. 2008 Jun;121(6):e1653-9. PMID: 18519468; DOI: http://dx.doi.org/10.1542/peds.2007-2831.

2c.2 Analytic Method *(type of validity & rationale, method for testing)*:
After excluding discharges with PDIs indicated as present on admission, we determined for each PDI the volume of eligible pediatric patients for each measure at each hospital, the statewide mean rate, and the percentage of hospitals with adequate volume to identify an adverse event rate twice the statewide mean.

2c C☐ P☐ M☐ N☐

[2]

In this study, we matched each case subject with 3 control subjects within the same all-patient refined diagnosis-related group (APR-DRG [3M Corporation, St Paul, MN]) severity level, age group (as defined by the American Academy of Pediatrics as <30 days, 30–364 days, 1–4 years, 5–12 years, 13–17 years, and 18 years), and hospital. If >3 control subjects were available on the basis of these restrictions, we used propensity scores to minimize the bias in selecting matched control subjects. Statistical significance for the difference in use between the case and control subjects was determined by using Wilcoxon´s signed rank test, a nonparametric alternative to the 1-sample t test. [2]

References
[1] Bardach NS, Chien AT, Dudley RA. Small numbers limit the use of the inpatient pediatric quality indicators for hospital comparison. Acad Pediatr. 2010 Jul-Aug;10(4):266-73. PMID: 20599180; doi:10.1016/j.acap.2010.04.025.
[2] Kronman MP, Hall M, Slonim AD, Shah SS. Charges and lengths of stay attributable to adverse patient-care events using pediatric-specific quality indicators: a multicenter study of freestanding children´s hospitals. Pediatrics. 2008 Jun;121(6):e1653-9. PMID: 18519468; DOI: http://dx.doi.org/10.1542/peds.2007-2831.

2c.3 Testing Results *(statistical results, assessment of adequacy in the context of norms for the test conducted)*:
Event rates for pediatric heart surgery mortality were 38 per 1000, requiring patient volumes of 201 to detect an event rate twice the statewide average; 25% of California hospitals had this pediatric volume. Using these AHRQ-developed, nationally endorsed measures of the quality of inpatient pediatric care, one would not be able to identify many hospitals with performance 2 times worse than the statewide average due to extremely low event rates and inadequate pediatric hospital volume. [1]

Age was the only demographic factor with any statistically significant differences between matched and unmatched case subjects for accidental puncture and laceration. The demographic variables race, gender, payer, disposition, and census region had no differences in any of the PDIs. The occurrence of In-hospital mortality after pediatric heart surgery was not associated with a statistically significant increase in LOS but was associated with an increase in overall charges (P < .006 after the Bonferroni correction). [2]

References
[1] Bardach NS, Chien AT, Dudley RA. Small numbers limit the use of the inpatient pediatric quality indicators for hospital comparison. Acad Pediatr. 2010 Jul-Aug;10(4):266-73. PMID: 20599180; doi:10.1016/j.acap.2010.04.025.
[2] Kronman MP, Hall M, Slonim AD, Shah SS. Charges and lengths of stay attributable to adverse patient-care events using pediatric-specific quality indicators: a multicenter study of freestanding children´s hospitals. Pediatrics. 2008 Jun;121(6):e1653-9. PMID: 18519468; DOI: http://dx.doi.org/10.1542/peds.2007-2831.

2d. Exclusions Justified

2d.1 Summary of Evidence supporting exclusion(s):
Exclusions remove cases where the outcome of interest is less likely to be preventable or more likely to be preventable or with no or very low risk

2d.2 Citations for Evidence:
Updated citations will be presented in the May Steering Committee meeting

Measures of Pediatric Health Care Quality Based on Hospital Administrative Data, The Pediatric Quality Indicators. Ver 3.1 March 2007
http://qualityindicators.ahrq.gov/downloads/pdi/pdi_measures_v31.pdf

2d.3 Data/sample *(description of data/sample and size)*: AHRQ 2007 State Inpatient Databases (SID) with 3,500 hospitals and 6 million pediatric discharges

2d.4 Analytic Method *(type analysis & rationale)*:
Expert panel

2d
C☐
P☐
M☐
N☐
NA☐

2d.5 Testing Results *(e.g., frequency, variability, sensitivity analyses)*:
Measures of Pediatric Health Care Quality Based on Hospital Administrative Data, The Pediatric Quality Indicators. Ver 3.1 March 2007
http://qualityindicators.ahrq.gov/downloads/pdi/pdi_measures_v31.pdf

2e. Risk Adjustment for Outcomes/ Resource Use Measures

2e.1 Data/sample *(description of data/sample and size)*: AHRQ 2007 State Inpatient Databases (SID) with 3,500 hospitals and 6 million pediatric discharges

2e.2 Analytic Method *(type of risk adjustment, analysis, & rationale)*:
Risk-adjustment models use a standard set of categories based on readily available classification systems for demographics, severity of illness and comorbidities. Within each category, covariates are initially selected based on a minimum of 30 cases in the outcome of interest. Then a stepwise regression process on a development sample is used to select a parsimonious set of covariates where p<.05. Model is then tested on a validation sample

2e.3 Testing Results *(risk model performance metrics)*:
C-statistic 0.8750

2e.4 If outcome or resource use measure is not risk adjusted, provide rationale: Not applicable

2e C☐ P☐ M☐ N☐ NA☐

2f. Identification of Meaningful Differences in Performance

2f.1 Data/sample from Testing or Current Use *(description of data/sample and size)*: AHRQ 2007 State Inpatient Databases (SID) with 3,500 hospitals and 6 million pediatric discharges

2f.2 Methods to identify statistically significant and practically/meaningfully differences in performance *(type of analysis & rationale)*:
Posterior probability distribution parameterized using the Gamma distribution

2f.3 Provide Measure Scores from Testing or Current Use *(description of scores, e.g., distribution by quartile, mean, median, SD, etc.; identification of statistically significant and meaningfully differences in performance)*:

5th	25th	Median	75th	95th
0.025200	0.037077	0.047287	0.059225	0.079624

2f C☐ P☐ M☐ N☐

2g. Comparability of Multiple Data Sources/Methods

2g.1 Data/sample *(description of data/sample and size)*: Not applicable

2g.2 Analytic Method *(type of analysis & rationale)*:
Not applicable

2g.3 Testing Results *(e.g., correlation statistics, comparison of rankings)*:
Not applicable

2g C☐ P☐ M☐ N☐ NA☐

2h. Disparities in Care

2h.1 If measure is stratified, provide stratified results *(scores by stratified categories/cohorts)*: Median income of patient´s ZIP code:
1) Estimate 2) Standard error 3) P-value: Relative to marked group-c 4) P-value:
2007 relative to 2006
First quartile (lowest income) 44.830 2.315 0.394 0.112
Second quartile 39.643 2.577 0.671 0.053
Third quartile 32.492 2.639 0.034 0.679
Fourth quartile (highest income)c 41.414 3.276 0.043

2h.2 If disparities have been reported/identified, but measure is not specified to detect disparities, provide follow-up plans:

2h C☐ P☐ M☐ N☐ NA☐

Users may stratify based on gender and race/ethnicity	
TAP/Workgroup: What are the strengths and weaknesses in relation to the subcriteria for *Scientific Acceptability of Measure Properties?*	**2**
Steering Committee: Overall, to what extent was the criterion, *Scientific Acceptability of Measure Properties*, met? **Rationale:**	**2** **C** ☐ **P** ☐ **M** ☐ **N** ☐
3. USABILITY	
Extent to which intended audiences (e.g., consumers, purchasers, providers, policy makers) can understand the results of the measure and are likely to find them useful for decision making. (evaluation criteria)	**Eval Rating**
3a. Meaningful, Understandable, and Useful Information **3a.1 Current Use:** In use **3a.2 Use in a public reporting initiative (disclosure of performance results to the public at large)** (*If used in a public reporting initiative, provide name of initiative(s), locations, Web page URL(s). If not publicly reported, state the plans to achieve public reporting within 3 years*)**:** Florida (state) Florida Health Finder http://www.floridahealthfinder.gov/ Kentucky (Norton Healthcare, a hospital system) Norton Healthcare Quality Report http://www.nortonhealthcare.com/body.cfm?id=157 Texas (state) Reports on Hospital Performance http://www.dshs.state.tx.us/thcic/ Vermont (state) Dept of Banking, Insurance, Securities & Health Care Administration Comparison Report http://www.bishca.state.vt.us/health-care/hospitals-health-care-practitioners/2009-vermont-hospital-report-card The measure is also reported on HCUPnet: http://hcupnet.ahrq.gov/HCUPnet.jsp?Id=EB57801381F71C41&Form=MAINSEL&JS=Y&Action=%3E%3ENext%3E%3E&_MAINSEL=AHRQ%20Quality%20Indicators This measure will be used in the MONAHRQ system that is provided for public reporting and quality improvement throughout the United States: http://monahrq.ahrq.gov/ **3a.3 If used in other programs/initiatives (***If used in quality improvement or other programs/initiatives, name of initiative(s), locations, Web page URL(s). If not used for QI, state the plans to achieve use for QI within 3 years***):** University Healthcare Consortium (UHC) - An alliance of 103 academic medical centers and 219 of their affiliated hosptials. UCH reports the AHRQ QIs to their member hospitals. (See www.uhc.edu. Note that meaure results are reported to hospitals; not reported on the UHC site). National Association of Children´s Hospitals and Related Institutions (NACHRI) reports all provider level PDIs to its approximately 85 member children´s hospitals. (See http://www.childrenshospitals.net. Note that meaure results are reported to hospitals; not reported on the NACHRI site).	**3a** **C** ☐ **P** ☐ **M** ☐ **N** ☐

Norton Healthcare - a multi-hospital system in Kentucky (see http://www.nortonhealthcare.com/about/Our_Performance/index.aspx)

Ministry Health Care - a multi-hospital system in Wisconsin (see http://ministryhealth.org/display/router.aspx. Note: measure results reported to hospitals; not reported on site).

Child Health Corporation of America (CHCA) reports all PDIs to its 42 member hospitals, which are large freestanding pediatric hospitals. (See http://www.chca.com/. Note that meaure results are reported to hospitals; not reported on the CHCA site).

This measure will be used in the MONAHRQ system that is provide for public reporting and quality improvement throughout the United States: http://monahrq.ahrq.gov/

Testing of Interpretability (*Testing that demonstrates the results are understood by the potential users for public reporting and quality improvement*)
3a.4 **Data/sample** *(description of data/sample and size)*: AHRQ 2007 State Inpatient Databases (SID) with 3,500 hospitals and 6 million pediatric discharges

3a.5 **Methods** *(e.g., focus group, survey, QI project)*:
A research team from the School of Public Affairs, Baruch College, under contracts with the Department of Public Health, Weill Medical College and Battelle, Inc., has developed a pair of Hospital Quality Model Reports at the request of the Agency for Healthcare Research & Quality (AHRQ). These reports are designed specifically to report comparative information on hospital performance based on the AHRQ Quality Indicators (QIs). The work was done in close collaboration with AHRQ staff and the AHRQ Quality Indicators team.
The Model Reports (discussed immediately above) are based on:
• Extensive search and analysis of the literature on hospital quality measurement and reporting, as well as public reporting on health care quality more broadly;
• Interviews with quality measurement and reporting experts, purchasers, staff of purchasing coalitions, and executives of integrated health care delivery systems who are responsible for quality in their facilities;
• Two focus groups with chief medical officers of hospitals and/or systems and two focus groups with quality managers from a broad mix of hospitals;
• Four focus groups with members of the public who had recently experienced a hospital admission; and
• Four rounds of cognitive interviews (a total of 62 interviews) to test draft versions of the two Model Reports with members of the public with recent hospital experience, basic computer literacy but widely varying levels of education.

3a.6 **Results** *(qualitative and/or quantitative results and conclusions)*:
Given the above review of the literature and original research that was conducted, a Model report was the result that could help sponsors use the best evidence on public reports so they are most likely to have the desired effects on quality.

3b/3c. Relation to other NQF-endorsed measures

3b.1 **NQF # and Title of similar or related measures:**

(for NQF staff use) **Notes on similar/related endorsed or submitted measures:**

3b. Harmonization
If this measure is related to measure(s) already endorsed by NQF (e.g., same topic, but different target population/setting/data source or different topic but same target population):
3b.2 **Are the measure specifications harmonized? If not, why?**

3b
C ☐
P ☐
M ☐
N ☐
NA ☐

3c. Distinctive or Additive Value

3c

3c.1 Describe the distinctive, improved, or additive value this measure provides to existing NQF-endorsed measures: **5.1 If this measure is similar to measure(s) already endorsed by NQF (i.e., on the same topic and the same target population), Describe why it is a more valid or efficient way to measure quality:** No competing measures found.	C☐ P☐ M☐ N☐ NA☐
TAP/Workgroup: What are the strengths and weaknesses in relation to the subcriteria for *Usability?*	**3**
Steering Committee: Overall, to what extent was the criterion, *Usability*, met? **Rationale:**	**3** C☐ P☐ M☐ N☐
4. FEASIBILITY	
Extent to which the required data are readily available, retrievable without undue burden, and can be implemented for performance measurement. (evaluation criteria)	**Eval Rating**
4a. Data Generated as a Byproduct of Care Processes **4a.1-2 How are the data elements that are needed to compute measure scores generated?** Coding/abstraction performed by someone other than person obtaining original information (E.g., DRG, ICD-9 codes on claims, chart abstraction for quality measure or registry)	**4a** C☐ P☐ M☐ N☐
4b. Electronic Sources **4b.1 Are all the data elements available electronically?** (*elements that are needed to compute measure scores are in defined, computer-readable fields, e.g., electronic health record, electronic claims*) Yes **4b.2 If not, specify the near-term path to achieve electronic capture by most providers.**	**4b** C☐ P☐ M☐ N☐
4c. Exclusions **4c.1 Do the specified exclusions require additional data sources beyond what is required for the numerator and denominator specifications?** No **4c.2 If yes, provide justification.**	**4c** C☐ P☐ M☐ N☐ NA☐
4d. Susceptibility to Inaccuracies, Errors, or Unintended Consequences **4d.1 Identify susceptibility to inaccuracies, errors, or unintended consequences of the measure and describe how these potential problems could be audited. If audited, provide results.** Coding professionals follow detail guidelines, are subject to training and credentialing requirements, peer review and audit.	**4d** C☐ P☐ M☐ N☐
4e. Data Collection Strategy/Implementation **4e.1 Describe what you have learned/modified as a result of testing and/or operational use of the measure regarding data collection, availability of data/missing data, timing/frequency of data collection, patient confidentiality, time/cost of data collection, other feasibility/ implementation issues:** None **4e.2 Costs to implement the measure** (*costs of data collection, fees associated with proprietary measures*)**:** Administrative data are collected as part of the routine operations. Some staff time is required to download and execute the software from the AHRQ webs site, which is available at no cost. The software for calculating	**4e** C☐ P☐ M☐ N☐

the measure is available for free at: http://www.qualityindicators.ahrq.gov/software.htm 4e.3 **Evidence for costs:** All data necessary to calculate this measure are routinely collected for hospital administrative purposes. The software for calculating the measure is available for free at: http://www.qualityindicators.ahrq.gov/software.htm 4e.4 **Business case documentation:** All data necessary to calculate this measure are routinely collected for hospital administrative purposes. The software for calculating the measure is available for free at: http://www.qualityindicators.ahrq.gov/software.htm	
TAP/Workgroup: What are the strengths and weaknesses in relation to the subcriteria for *Feasibility?*	**4**
Steering Committee: Overall, to what extent was the criterion, *Feasibility*, met? **Rationale:**	**4** **C☐** **P☐** **M☐** **N☐**
RECOMMENDATION	
(for NQF staff use) **Check if measure is untested and only eligible for time-limited endorsement.**	**Time-limited ☐**
Steering Committee: Do you recommend for endorsement? **Comments:**	**Y☐** **N☐** **A☐**
CONTACT INFORMATION	
Co.1 **Measure Steward (Intellectual Property Owner)** Co.1 **Organization** Agency for Healthcare Research and Quality, 540 Gaither Road, Rockville, Maryland, 20850 Co.2 **Point of Contact** John, Bott, MSSW, MBA, John.Bott@AHRQ.hhs.gov, 301-427-1317-	
Measure Developer If different from Measure Steward Co.3 **Organization** Agency for Healthcare Research and Quality, 540 Gaither Road, Rockville, Maryland, 20850 Co.4 **Point of Contact** John, Bott, MSSW, MBA, John.Bott@AHRQ.hhs.gov, 301-427-1317-	
Co.5 **Submitter If different from Measure Steward POC** John, Bott, MSSW, MBA, John.Bott@AHRQ.hhs.gov, 301-427-1317-, Agency for Healthcare Research and Quality	
Co.6 **Additional organizations that sponsored/participated in measure development** UC Davis, Stanford University, Battelle Memorial Institute	
ADDITIONAL INFORMATION	
Workgroup/Expert Panel involved in measure development Ad.1 **Provide a list of sponsoring organizations and workgroup/panel members' names and organizations. Describe the members' role in measure development.** None	
Ad.2 **If adapted, provide name of original measure:** None Ad.3-5 **If adapted, provide original specifications URL or attachment**	

Measure Developer/Steward Updates and Ongoing Maintenance **Ad.6 Year the measure was first released:** 2006 **Ad.7 Month and Year of most recent revision:** 10, 2009 **Ad.8 What is your frequency for review/update of this measure?** Annual **Ad.9 When is the next scheduled review/update for this measure?** 05, 2011
Ad.10 Copyright statement/disclaimers: The AHRQ QI software is publicly available; no copyright disclaimers
Ad.11 -13 Additional Information web page URL or attachment:
Date of Submission (*MM/DD/YY*)**:** 06/14/2011

NATIONAL QUALITY FORUM

Measure Evaluation 4.1
December 2009

This form contains the measure information submitted by stewards. Blank fields indicate no information was provided. Attachments also may have been submitted and are provided to reviewers. The subcriteria and most of the footnotes from the evaluation criteria are provided in Word comments within the form and will appear if your cursor is over the highlighted area. Hyperlinks to the evaluation criteria and ratings are provided in each section.

TAP/Workgroup (if utilized)**:** Complete all yellow highlighted areas of the form. Evaluate the extent to which each subcriterion is met. Based on your evaluation, summarize the strengths and weaknesses in each section.

Note: *If there is no TAP or workgroup, the SC also evaluates the subcriteria (yellow highlighted areas).*

Steering Committee: Complete all pink highlighted areas of the form. Review the workgroup/TAP assessment of the subcriteria, noting any areas of disagreement; then evaluate the extent to which each major criterion is met; and finally, indicate your recommendation for the endorsement. Provide the rationale for your ratings.

Evaluation ratings of the extent to which the criteria are met
C = Completely (unquestionably demonstrated to meet the criterion)
P = Partially (demonstrated to partially meet the criterion)
M = Minimally (addressed BUT demonstrated to only minimally meet the criterion)
N = Not at all (NOT addressed; OR incorrectly addressed; OR demonstrated to NOT meet the criterion)
NA = Not applicable (only an option for a few subcriteria as indicated)

(for NQF staff use) **NQF Review #:** 0340 **NQF Project:** Surgery Endorsement Maintenance 2010
MEASURE DESCRIPTIVE INFORMATION
De.1 **Measure Title:** Pediatric Heart Surgery Volume (PDI 7)
De.2 **Brief description of measure:** Number of discharges with procedure for pediatric heart surgery
1.1-2 **Type of Measure:** Structure De.3 **If included in a composite or paired with another measure, please identify composite or paired measure** Pediatric Heart Surgery Mortality (PDI 6) (NQF #0339))
De.4 **National Priority Partners Priority Area:** Population health, Safety De.5 **IOM Quality Domain**: Effectiveness, Safety De.6 **Consumer Care Need:** Getting better

CONDITIONS FOR CONSIDERATION BY NQF	
Four conditions must be met before proposed measures may be considered and evaluated for suitability as voluntary consensus standards:	NQF Staff
A. The measure is in the public domain or an intellectual property (measure steward agreement) is signed. *Public domain only applies to governmental organizations. All non-government organizations must sign a measure steward agreement even if measures are made publicly and freely available.* A.1 **Do you attest that the measure steward holds intellectual property rights to the measure and the right to use aspects of the measure owned by another entity (e.g., risk model, code set)?** Yes A.2 **Indicate if Proprietary Measure** (*as defined in measure steward agreement*)**:** A.3 **Measure Steward Agreement:** Government entity and in the public domain - no agreement necessary A.4 **Measure Steward Agreement attached:**	**A** Y☐ N☐
B. The measure owner/steward verifies there is an identified responsible entity and process to maintain and update the measure on a schedule that is commensurate with the rate of clinical innovation, but at least every 3 years. Yes, information provided in contact section	**B** Y☐ N☐

C. The intended use of the measure includes both public reporting and quality improvement. ►**Purpose:** Public Reporting, Quality Improvement (Internal to the specific organization)	**C** Y☐ N☐
D. The requested measure submission information is complete. Generally, measures should be fully developed and tested so that all the evaluation criteria have been addressed and information needed to evaluate the measure is provided. Measures that have not been tested are only potentially eligible for a time-limited endorsement and in that case, measure owners must verify that testing will be completed within 12 months of endorsement. D.1**Testing:** Yes, fully developed and tested D.2 **Have NQF-endorsed measures been reviewed to identify if there are similar or related measures?** Yes	**D** Y☐ N☐
(for NQF staff use) **Have all conditions for consideration been met?** **Staff Notes to Steward** (*if submission returned*)**:**	**Met** Y☐ N☐
Staff Notes to Reviewers (*issues or questions regarding any criteria*)**:**	
Staff Reviewer Name(s):	

TAP/Workgroup Reviewer Name:	
Steering Committee Reviewer Name:	
1. IMPORTANCE TO MEASURE AND REPORT	
Extent to which the specific measure focus is important to making significant gains in health care quality (safety, timeliness, effectiveness, efficiency, equity, patient-centeredness) and improving health outcomes for a specific high impact aspect of healthcare where there is variation in or overall poor performance. ***Measures must be judged to be important to measure and report*** *in order to be evaluated against the remaining criteria.* (evaluation criteria) **1a. High Impact**	**Eval Rating**
(for NQF staff use) **Specific NPP goal**:	
1a.1 **Demonstrated High Impact Aspect of Healthcare:** Patient/societal consequences of poor quality 1a.2 1a.3 **Summary of Evidence of High Impact:** Pending update. Using a multivariate model that included age, complexity category, and four comorbidities, Hannan et al. found 8.26% risk-adjusted mortality at hospitals with fewer than 100 cases per year, versus 5.95% at higher volume hospitals (an effect limited to surgeons who performed at least 75 cases per year). [1] For a more complete review of this topic, see: URL:http://www.qualityindicators.ahrq.gov/downloads/pdi/pdi_measures_v31 1a.4 **Citations for Evidence of High Impact:** Updated citations will be presented in the May Steering Committee meeting [1] Hannan EL, Racz M, Kavey RE, Quaegebeur JM, Williams R. Pediatric cardiac surgery: the effect of hospital and surgeon volume on in-hospital mortality. Pediatrics 1998;101(6):963-9	**1a** C☐ P☐ M☐ N☐
1b. Opportunity for Improvement 1b.1 **Benefits (improvements in quality) envisioned by use of this measure:** Higher volume is associated with reduced mortality and morbidity. 1b.2 **Summary of data demonstrating performance gap (variation or overall poor performance) across providers:** The number of pediatric cardiac procedures is measured accurately with discharge data; in fact, discharge data are probably the best available source for hospital volume information. Previous studies suggest that pediatric cardiac surgery is already highly concentrated at a relatively small number of facilities (e.g., 16	**1b** C☐ P☐ M☐ N☐

hospitals in New York, 37 in California and Massachusetts together). Although some of these facilities have very high volumes, a significant number (e.g., 16 hospitals in California and Massachusetts) perform fewer than 10 cases per year. The highly skewed volume distribution may have an adverse effect on the precision of this measure.

1b.3 Citations for data on performance gap:
AHRQ 2007 State Inpatient Databases (SID) with 4,000 hospitals and 30 million adult discharges

1b.4 Summary of Data on disparities by population group:
Across a broad set of 23 quality indicators, findings indicate that racial/ethnic disparities vary by income levels and types of insurance. Key highlights include the finding that racial/ethnic differences within income or insurance/payer groups are more pronounced for some racial/ethnic groups than others. Hispanic children followed by Asian children had worse quality than whites as measured by the majority of quality indicators. Exceptions included rates of admissions for diabetes, admissions for gastroenteritis, accidental puncture during procedures, and decubitus ulcers . Many indicators showed less than ideal quality for all subgroups of children, even whites with private insurance. [1]

References
[1] Berdahl T, Owens PL, Dougherty D, McCormick MC, Pylypchuk Y, Simpson LA. Annual report on health care for children and youth in the United States: racial/ethnic and socioeconomic disparities in children´s health care quality. Acad Pediatr. 2010 Mar-Apr;10(2):95-118. PMID: 20206909.

1b.5 Citations for data on Disparities:
The analyses are based on data from a nationally representative random sample of children in the United States in 2004 and 2005 from the Medical Expenditure Panel Survey (MEPS) and pediatric hospitalizations from a nationwide sample of hospitals in 2005 from the State Inpatient Databases disparities analysis file from the Healthcare Cost and Utilization Project (HCUP). [1]

1c. Outcome or Evidence to Support Measure Focus

1c.1 Relationship to Outcomes (*For non-outcome measures, briefly describe the relationship to desired outcome. For outcomes, describe why it is relevant to the target population*)**:** The measure focus is an structure (volume) that is associated with an outcome (mortality) relevant to a neonatal population with a diagnosis of congenital heart defect or procedure for congenital heart repair.

1c.2-3. Type of Evidence: Expert opinion, Systematic synthesis of research

1c.4 Summary of Evidence (*as described in the criteria; for outcomes, summarize any evidence that healthcare services/care processes influence the outcome*)**:**
Using a multivariate model that included age, complexity category, and four comorbidities, Hannan et al. found 8.26% risk-adjusted mortality at hospitals with fewer than 100 cases per year, versus 5.95% at higher volume hospitals (an effect limited to surgeons who performed at least 75 cases per year). [1] Two other studies using hospital discharge data from California and Massachusetts found similar effects of hospital volume. [2] [3]
Another source of evidence is that cardiopulmonary bypass or aortic crossclamp time has been repeatedly associated with postoperative mortality, adjusting for a variety of patient characteristics.[4-7] This relationship has been demonstrated not just for the Fontan procedure, but also for the Norwood procedure for hypoplastic left heart syndrome. [8] Experienced surgeons and surgical teams should be able to reduce cardiopulmonary bypass or aortic cross-clamp time, thereby improving postoperative mortality.

1c.5 Rating of strength/quality of evidence (*also provide narrative description of the rating and by whom***):**
B there is moderate certainty that the net benefit is moderate to substantial (review by project team)

1c.6 Method for rating evidence: U.S. Preventive Services Task Force (USPSTF) assigns one of five letter grades to each of its recommendations (A, B, C, D, or I).

1c.7 Summary of Controversy/Contradictory Evidence: A study reviewed the application of two case-mix complexity-adjustment tools in the Society of Thoracic Surgeons (STS) Congenital Heart Surgery Database: the Aristotle Basic Complexity (ABC) score and the Risk Adjustment in Congenital Heart Surgery (RACHS-1)

1c
C ☐
P ☐
M ☐
N ☐

method. With both RACHS-1 and ABC, as complexity increases, discharge mortality also ncreases. The ABC approach allows classification of more operations, whereas the RACHS-1 discriminates better at the higher end of complexity. Complexity stratification is a useful method for analyzing the impact of case mix on pediatric cardiac surgical outcomes. Both the RACHS-1 and ABC methods facilitate complexity stratification in the STS database.

1c.8 Citations for Evidence (*other than guidelines*): Updated citations will be presented in the May Steering Committee meeting

[1] Hannan EL, Racz M, Kavey RE, Quaegebeur JM, Williams R. Pediatric cardiac surgery: the effect of hospital and surgeon volume on in-hospital mortality. Pediatrics 1998;101(6):963-9.
[2] Jenkins KJ, Newburger JW, Lock JE, Davis RB, Coffman GA, Iezzoni LI. In-hospital mortality for surgical repair of congenital heart defects: preliminary observations of variation by hospital caseload. Pediatrics 1995;95(3):323-30.
[3] Sollano JA, Gelijns AC, Moskowitz AJ, Heitjan DF, Cullinane S, Saha T, et al. Volume-outcome relationships in cardiovascular operations: New York State, 1990-1995. J Thorac Cardiovasc Surg 1999;117(3):419-28.
[4] Cetta F, Feldt RH, O´Leary PW, Mair DD, Warnes CA, Driscoll DJ, et al. Improved early morbidity and mortality after Fontan operation: the Mayo Clinic experience, 1987 to 1992. J Am Coll Cardiol 1996;28(2):480-6.
[5] Gentles TL, Gauvreau K, Mayer JE, Jr., Fishberger SB, Burnett J, Colan SD, et al. Functional outcome after the Fontan operation: factors influencing late morbidity. J Thorac Cardiovasc Surg 1997;114(3):392-403; discussion 404-5.
[6] Kaulitz R, Ziemer G, Luhmer I, Kallfelz HC. Modified Fontan operation in functionally univentricular hearts: preoperative risk factors and intermediate results. J Thorac Cardiovasc Surg 1996;112(3):658-64.
[7] Fontan F, Kirklin JW, Fernandez G, Costa F, Naftel DC, Tritto F, et al. Outcome after a "perfect" Fontan operation. Circulation 1990;81(5):1520-36.
[8] Kern JH, Hayes CJ, Michler RE, Gersony WM, Quaegebeur JM. Survival and risk factor analysis for the Norwood procedure for hypoplastic left heart syndrome. Am J Cardiol 1997;80(2):170-4.

1c.9 Quote the Specific guideline recommendation (*including guideline number and/or page number*):
Surgery for congenital heart disease, especially in infants, requires a setting that readily meets the complex and special needs of this group of patients. These requirements include a cardiac surgeon experienced in the operative and perioperative management of such patients. There should be a pediatric cardiologist, an anesthesia team, perfusionists, intensive care nurses, and appropriate intensive care facilities for the treatment of infants and children. At a hospital where congenital heart operations are performed, a total of 100 congenital heart operations (both open and closed, not including neonatal ductus ligations) should be done. The occasional management of an infant or child with congenital heart disease by an otherwise busy and well-functioning adult cardiac surgical team is strongly discouraged.

1c.10 Clinical Practice Guideline Citation: http://www.facs.org/fellows_info/guidelines/cardiac.html
1c.11 National Guideline Clearinghouse or other URL: Not Applicable.

1c.12 Rating of strength of recommendation (*also provide narrative description of the rating and by whom*):
Not Applicable.

1c.13 Method for rating strength of recommendation (*If different from USPSTF system, also describe rating and how it relates to USPSTF)*:
Not Applicable.

1c.14 Rationale for using this guideline over others:
No competing measures found.

TAP/Workgroup: What are the strengths and weaknesses in relation to the subcriteria for *Importance to Measure and Report?*	**1**
Steering Committee: Was the threshold criterion, *Importance to Measure and Report*, met? **Rationale:**	**1** **Y☐** **N☐**

2. SCIENTIFIC ACCEPTABILITY OF MEASURE PROPERTIES	
Extent to which the measure, as specified, produces consistent (reliable) and credible (valid) results about the quality of care when implemented. (evaluation criteria)	Eval Rating
2a. MEASURE SPECIFICATIONS	
S.1 Do you have a web page where current detailed measure specifications can be obtained? **S.2 If yes, provide web page URL:** **2a. Precisely Specified**	
2a.1 Numerator Statement (*Brief, text description of the numerator - what is being measured about the target population, e.g. target condition, event, or outcome***):** Discharges under age 18 with ICD-9-CM procedure codes for either congenital heart disease (1P) in any field or non-specific heart surgery (2P) with ICD-9-CM diagnosis of congenital heart disease (2D) in any field. **2a.2 Numerator Time Window (***The time period in which cases are eligible for inclusion in the numerator***):** Time window can be determined by user, but is generally a calendar year. **2a.3 Numerator Details (***All information required to collect/calculate the numerator, including all codes, logic, and definitions***):** Discharges under age 18 with ICD-9-CM procedure codes for either congenital heart disease (1P) or non-specific heart surgery (2P) with ICD-9-CM diagnosis of congenital heart disease (2D) in any field. Congenital heart disease procedures (1P): 3500 CLOSED VALVOTOMY NOS 3501 CLOSED AORTIC VALVOTOMY 3502 CLOSED MITRAL VALVOTOMY 3503 CLOSED PULMON VALVOTOMY 3504 CLOSED TRICUSP VALVOTOMY 3510 OPEN VALVULOPLASTY NOS 3511 OPN AORTIC VALVULOPLASTY 3512 OPN MITRAL VALVULOPLASTY 3513 OPN PULMON VALVULOPLASTY 3514 OPN TRICUS VALVULOPLASTY 3520 REPLACE HEART VALVE NOS 3521 REPLACE AORT VALV-TISSUE 3522 REPLACE AORTIC VALVE NEC 3523 REPLACE MITR VALV-TISSUE 3524 REPLACE MITRAL VALVE NEC 3525 REPLACE PULM VALV-TISSUE	**2a-specs** C☐ P☐ M☐ N☐

3526
REPLACE PULMON VALVE NEC
3527
REPLACE TRIC VALV-TISSUE
3528
REPLACE TRICUSP VALV NEC
3531
PAPILLARY MUSCLE OPS
3532
CHORDAE TENDINEAE OPS
3533
ANNULOPLASTY
3534
INFUNDIBULECTOMY
3535
TRABECUL CARNEAE CORD OP
3539
TISS ADJ TO VALV OPS NEC
3541
ENLARGE EXISTING SEP DEF
3542
CREATE SEPTAL DEFECT
3550
PROSTH REP HRT SEPTA NOS
3551
PROS REP ATRIAL DEF-OPN
3552
PROS REPAIR ATRIA DEF-CL
3553
PROST REPAIR VENTRIC DEF
3554
PROS REP ENDOCAR CUSHION
3560
GRFT REPAIR HRT SEPT NOS
3561
GRAFT REPAIR ATRIAL DEF
3562
GRAFT REPAIR VENTRIC DEF
3563
GRFT REP ENDOCAR CUSHION
3570
HEART SEPTA REPAIR NOS
3571
ATRIA SEPTA DEF REP NEC
3572
VENTR SEPTA DEF REP NEC
3573
ENDOCAR CUSHION REP NEC
3581
TOT REPAIR TETRAL FALLOT
3582
TOTAL REPAIR OF TAPVC
3583
TOT REP TRUNCUS ARTERIOS
3584
TOT COR TRANSPOS GRT VES
3591
INTERAT VEN RETRN TRANSP

3592
CONDUIT RT VENT-PUL ART
3593
CONDUIT LEFT VENTR-AORTA
3594
CONDUIT ARTIUM-PULM ART
3595
HEART REPAIR REVISION
3598
OTHER HEART SEPTA OPS
3599
OTHER OP ON HRT VALVES
3699
OTHER OPERATIONS ON VESSEL OF HEART
3733
EXCISION OR DESTRUCTION OF OTHER LESION OR TISSUE OF HEART
3736
EXCISION OR DESTRUCTION OF LEFT ATRIAL APPENDAGE (LAA) OCT08-
375
HEART TRANSPLANTATION (invalid as of OCT03)
3751
HEART TRANSPLANTATION OCT03-
3752
IMPLANT TOT REP HRT SYS OCT03-
390
SYSTEMIC-PULM ART SHUNT
3921
CAVAL-PULMON ART ANASTOM

Non-specific cardiac procedures (2P):
3834
RESECTION OF ABDOMINAL AORTA WITH ANASTOMOSIS
3835
THOR VESSEL RESECT/ANAST
3844
RESECTION OF ABDOMINAL AORTA WITH REPLACEMENT
3845
RESECT THORAC VES W REPL
3864
OTHER EXCISION OF ABDOMINAL AORTA
3865
OTHER EXCISION OF THORACIC VESSEL
3884
OTHER SURGICAL OCCLUSION OF ABDOMINAL AORTA
3885
OCCLUDE THORACIC VES NEC
3949
OTHER REVISION OF VASCULAR PROCEDURE
3956
REPAIR OF BLOOD VESSEL WITH TISSUE PATCH GRAFT
3957
REPAIR OF BLOOD VESSEL WITH SYNTHETIC PATCH GRAFT
3958
REPAIR OF BLOOD VESSEL WITH UNSPECIFIED TYPE OF PATCH GRAFT
3959
REPAIR OF VESSEL NEC

Congenital heart disease diagnoses (2D):

7450
COMMON TRUNCUS
74510
COMPL TRANSPOS GREAT VES
74511
DOUBLE OUTLET RT VENTRIC
74512
CORRECT TRANSPOS GRT VES
74519
TRANSPOS GREAT VESS NEC
7452
TETRALOGY OF FALLOT
7453
COMMON VENTRICLE
7454
VENTRICULAR SEPT DEFECT
7455
SECUNDUM ATRIAL SEPT DEF
74560
ENDOCARD CUSHION DEF NOS
74561
OSTIUM PRIMUM DEFECT
74569
ENDOCARD CUSHION DEF NEC
7457
COR BILOCULARE
7458
SEPTAL CLOSURE ANOM NEC
7459
SEPTAL CLOSURE ANOM NOS
74600
PULMONARY VALVE ANOM NOS
74601
CONG PULMON VALV ATRESIA
74602
CONG PULMON VALVE STENOS
74609
PULMONARY VALVE ANOM NEC
7461
CONG TRICUSP ATRES/STEN
7462
EBSTEIN'S ANOMALY
7463
CONG AORTA VALV STENOSIS
7464
CONG AORTA VALV INSUFFIC
7465
CONGEN MITRAL STENOSIS
7466
CONG MITRAL INSUFFICIENC
7467
HYPOPLAS LEFT HEART SYND
74681
CONG SUBAORTIC STENOSIS
74682
COR TRIATRIATUM
74683
INFUNDIB PULMON STENOSIS

74684
OBSTRUCT HEART ANOM NEC
74685
CORONARY ARTERY ANOMALY
74687
MALPOSITION OF HEART
74689
CONG HEART ANOMALY NEC
7469
CONG HEART ANOMALY NOS
7470
PATENT DUCTUS ARTERIOSUS
74710
COARCTATION OF AORTA
74711
INTERRUPT OF AORTIC ARCH
74720
CONG ANOM OF AORTA NOS
74721
ANOMALIES OF AORTIC ARCH
74722
AORTIC ATRESIA/STENOSIS
74729
CONG ANOM OF AORTA NEC
7473
PULMONARY ARTERY ANOM
74740
GREAT VEIN ANOMALY NOS
74741
TOT ANOM PULM VEN CONNEC
74742
PART ANOM PULM VEN CONN
74749
GREAT VEIN ANOMALY NEC

Exclude cases:
• MDC 14 (pregnancy, childbirth and pueperium)
• with transcatheter interventions (either 3AP, 3BP, 3CP, 3DP, 3EP with 3D, or 3FP) as single cardiac procedures, performed without bypass (5P) but with catheterization (6P);
• with septal defects (4P) as single cardiac procedures without bypass (5P)

Transcatheter interventions procedure codes:

Closed heart valvotomy (3AP):
3500
CLOSED HEART VALVOTOMY, UNSPECIFIED VALUE
3501
CLOSED HEART VALVOTOMY, AORTIC VALUE
3502
CLOSED HEART VALVOTOMY, MITRAL VALUE
3503
CLOSED HEART VALVOTOMY, PULMONARY VALUE
3504
CLOSED HEART VALVOTOMY, TRICUSPID VALUE

Atrial septal enlargement (3BP):
3541
ENLARGEMENT OF EXISTING ATRIAL SEPTAL DEFECT

3542
CREATION OF SEPTAL DEFECT IN HEART

Atrial septal defect repair (3CP):
3551
REPAIR OF ATIAL SEPTAL DEFECT WITH PROSTHESIS, OPEN TECHNIQUE
3571
OTHER AND UNSPECIFIED REPAIR OF ATRIAL SEPTAL DEFECT

Ventricular septal defect repair (3DP):
3553
REPAIR OF VENTRICULAR SEPTAL DEFECT WITH PROSTHESIS
3572
OTHER AND UNSPECIFIED REPAIR OF VENTRICULAR SEPTAL DEFECT

Occlusion of thoracic vessel (3EP):
3885
OCCLUDE THORACIC VES NEC

PDA closure diagnosis code (3D):
7470
PATENT DUCTUS ARTERIOSUS

Other surgical occlusion (3FP):
3884
OTHER SURGICAL OCCLUSION OF AORTA, ABDOMINAL
3885
OTHER SURGICAL OCCLUSION OF THORACIC VESSEL
3959
OTHER REPAIR OF VESSEL

Extracorporeal circulation (5P):
3961
EXTRACORPOREAL CIRCULAT

Catheterization (6P):
3721
RT HEART CARDIAC CATH
3722
LEFT HEART CARDIAC CATH
3723
RT/LEFT HEART CARD CATH
8842
CONTRAST AORTOGRAM
8843
CONTR PULMON ARTERIOGRAM
8844
ARTERIOGRAPHY OF OTHER INTRATHORACIC VESSELS
8850
ANGIOCARDIOGRAPHY, NOT OTHERWISE SPECIFIED
8851
ANGIOCARDIOGRAPHY OF VENAE CAVAE
8852
ANGIOCARDIOGRAPHY OF RIGHT HEART STRUCTURES
8853
ANGIOCARDIOGRAPHY OF LEFT HEART STRUCTURES
8854
COMBINED RIGHT AND LEFT HEART ANGIOCARDIOGRAPHY

8855
CORONARY ARTERIOGRAPHY USING A SINGLE CATHETER
8856
CORONARY ARTERIOGRAPHY USING TWO CATHETERS
8857
OTHER AND UNSPECIFIED CORONARY ARTERIOGRAPHY
8858
NEGATIVE-CONTRAST CARDIAC ROENTGENOGRAPHY

Atrial septal defect repair and enlargement (4P):
3541
ENLARGE EXISTING SEP DEF
3552
PROS REPAIR ATRIA DEF-CL

2a.4 **Denominator Statement (***Brief, text description of the denominator - target population being measured***):**
This measure does not have a denominator due to the fact it is a volume measure.

2a.5 **Target population gender:** Female, Male
2a.6 **Target population age range:** Age less than 18 years

2a.7 **Denominator Time Window (***The time period in which cases are eligible for inclusion in the denominator***):**
Not applicable

2a.8 **Denominator Details (***All information required to collect/calculate the denominator - the target population being measured - including all codes, logic, and definitions***):**
Not applicable

2a.9 **Denominator Exclusions (***Brief text description of exclusions from the target population***):** Not applicable. This measure does not have a denominator due to the fact it is a volume measure.

2a.10 **Denominator Exclusion Details (***All information required to collect exclusions to the denominator, including all codes, logic, and definitions***):**
Not applicable. This measure does not have a denominator due to the fact it is a volume measure.

2a.11 **Stratification Details/Variables (***All information required to stratify the measure including the stratification variables, all codes, logic, and definitions***):**
Not applicable

2a.12-13 **Risk Adjustment Type:** No risk adjustment necessary

2a.14 **Risk Adjustment Methodology/Variables (***List risk adjustment variables and describe conceptual models, statistical models, or other aspects of model or method***):**
Not applicable

2a.15-17 **Detailed risk model available Web page URL or attachment:**

2a.18-19 **Type of Score:** Count
2a.20 **Interpretation of Score:** Better quality = Higher score
2a.21 **Calculation Algorithm (***Describe the calculation of the measure as a flowchart or series of steps***):**
The volume is the number of discharges with a procedure for pediatric heart surgery.

2a.22 **Describe the method for discriminating performance** *(e.g., significance testing)***:**
Not applicable

2a.23 **Sampling (Survey) Methodology** *If measure is based on a sample (or survey), provide instructions for obtaining the sample, conducting the survey and guidance on minimum sample size (response rate)*:
Not applicable

2a.24 **Data Source (***Check the source(s) for which the measure is specified and tested)*

Administrative claims

2a.25 **Data source/data collection instrument (***Identify the specific data source/data collection instrument, e.g. name of database, clinical registry, collection instrument, etc.***):**
The data source is hospital discharge data such as the HCUP State Inpatient Databases (SID) or equivalent using UB-04 coding standards. The data collection instrument is public-use AHRQ QI software available in SAS or Windows versions.

2a.26-28 **Data source/data collection instrument reference web page URL or attachment:** URL None
http://www.qualityindicators.ahrq.gov/software.htm

2a.29-31 **Data dictionary/code table web page URL or attachment:** URL None
http://www.qualityindicators.ahrq.gov/downloads/winqi/AHRQ_QI_Windows_Software_Documentation_V41a.pdf

2a.32-35 **Level of Measurement/Analysis** (*Check the level(s) for which the measure is specified and tested)*
Facility

2a.36-37 **Care Settings (***Check the setting(s) for which the measure is specified and tested)*
Hospital/Acute Care Facility

2a.38-41 **Clinical Services** (*Healthcare services being measured, check all that apply*)
Clinicians: Physicians (MD/DO)

TESTING/ANALYSIS

2b. Reliability testing

2b.1 **Data/sample** *(description of data/sample and size)*: AHRQ 2007 State Inpatient Databases (SID) with 4,000 hospitals and 30 million adult discharges

2b.2 **Analytic Method** *(type of reliability & rationale, method for testing)*:
Literature review, clinical panels and empirical analysis

2b.3 **Testing Results** *(reliability statistics, assessment of adequacy in the context of norms for the test conducted)*:
Pediatric heart surgery procedure codes are based on physician documentation; no evidence has been suggested that these codes are not reliably reported.

2b
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N☐

2c. Validity testing

2c.1 **Data/sample** *(description of data/sample and size)*: AHRQ 2007 State Inpatient Databases (SID) with 4,000 hospitals and 30 million adult discharges

2c.2 **Analytic Method** *(type of validity & rationale, method for testing)*:
Literature review, clinical panels and empirical analysis

2c.3 **Testing Results** *(statistical results, assessment of adequacy in the context of norms for the test conducted)*:
Volume is not a direct measure of the quality or outcomes of care. Although higher volumes have been repeatedly associated with better outcomes after pediatric cardiac surgery, these findings may be limited by inadequate risk adjustment.
Only one study used prospectively collected clinical data to estimate the association between hospital volume and mortality following pediatric cardiac surgery.(55) Hannan et al. ordered all cardiac surgical procedures by their actual mortality rates in the 1992-95 Cardiac Surgery Reporting System database. Expert clinicians then grouped the procedures into four clinically sensible subgroups, designed to achieve maximal separation of crude mortality rates (from 1.4% for Category I to 20.1% for Category IV). A multivariate model that included age, complexity category, and four comorbidities (preoperative cyanosis or hypoxia, barotrauma, pulmonary hypertension, major extracardiac anomalies) achieved excellent calibration and discrimination (c=0.818).

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Using this model to estimate risk-adjusted mortality, Hannan et al. found a statistically significant hospital effect (8.26% risk-adjusted mortality at hospitals with fewer than 100 cases per year, versus 5.95% at higher volume hospitals), which was limited to surgeons who performed at least 75 cases per year. Lower volume surgeons experienced relatively high mortality, regardless of total hospital volume. Risk-adjusted mortality differed between low and high-volume hospitals for all 4 complexity categories, although the smallest difference occurred for the highest risk procedures.
Two other studies using hospital discharge data found similar effects of hospital volume. Using aggregated data from California (1988) and Massachusetts (1989), Jenkins et al.(54) estimated risk-adjusted mortality rates of 8.35% and 5.95% at low-volume (100 or fewer cases) and high-volume (more than 100 cases), respectively. However, they also demonstrated especially high risk-adjusted mortality (18.5%) at very low-volume hospitals with fewer than 10 annual cases, and especially low mortality (3.0%) at very high-volume hospitals with more than 300 annual cases. Jenkins et al. could not evaluate the impact of surgeon volume, but they did report stronger volume effects for higher-risk procedures (e.g., OR=12.1 and 3.2 for Category III-IV procedures at hospitals with <10 and 10-100 annual cases, versus OR=2.4 for Category I-II procedures at hospitals with 10-100 annual cases). Finally, Sollano et al. (Sollano, Gelijns et al. 1999) applied the same 4-category risk adjustment procedure developed by Jenkins to hospital discharge data from New York State in 1990-95. They reported a modest but statistically significant effect (OR=0.944 for each additional 100 annual cases), which was limited to neonates (OR=0.636) and post-neonatal infants (OR=0.720) in stratified analyses. Although volume-outcome associations have been demonstrated for pediatric cardiac surgery, volume seems likely to both insensitive and nonspecific as a measure of quality. In addition, pediatric cardiac care is already regionalized, so most procedures are performed in medium-to-high volume hospitals. It has been estimated that shifting patients in California from low-volume to high-volume hospitals would avert only 7 deaths per year.(65)

2d. Exclusions Justified

2d.1 Summary of Evidence supporting exclusion(s):
Exclusions remove cases where the outcome of interest is less likely to be preventable or more likely to be preventable or with no or very low risk.

2d.2 Citations for Evidence:
Updated citations will be presented in the May Steering Committee meeting

Jenkins KJ, Newburger JW, Lock JE, Davis RB, Coffman GA, Iezzoni LI. In-hospital mortality for surgical repair of congenital heart defects: preliminary observations of variation by hospital caseload. Pediatrics 1995;95(3):323-30.

2d.3 Data/sample *(description of data/sample and size)*: Not applicable

2d.4 Analytic Method *(type analysis & rationale)*:
Not applicable

2d.5 Testing Results *(e.g., frequency, variability, sensitivity analyses)*:
Not applicable

2d
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NA☐

2e. Risk Adjustment for Outcomes/ Resource Use Measures

2e.1 Data/sample *(description of data/sample and size)*: Not applicable

2e.2 Analytic Method *(type of risk adjustment, analysis, & rationale)*:
Not applicable

2e.3 Testing Results *(risk model performance metrics)*:
Not applicable

2e.4 If outcome or resource use measure is not risk adjusted, provide rationale: Not applicable

2e
C☐
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NA☐

2f. Identification of Meaningful Differences in Performance

2f.1 Data/sample from Testing or Current Use *(description of data/sample and size)*: AHRQ 2007 State

2f
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Inpatient Databases (SID) with 4,000 hospitals and 30 million adult discharges **2f.2 Methods to identify statistically significant and practically/meaningfully differences in performance** *(type of analysis & rationale)*: Descriptive analysis **2f.3 Provide Measure Scores from Testing or Current Use** *(description of scores, e.g., distribution by quartile, mean, median, SD, etc.; identification of statistically significant and meaningfully differences in performance)*: The number of pediatric cardiac procedures is measured accurately with discharge data. In fact, discharge data are probably the best available source for hospital volume information. Previous studies suggest that pediatric cardiac surgery is already highly concentrated at a relatively small number of facilities (e.g., 16 hospitals in New York, 37 in California and Massachusetts together). Although some of these facilities have very high volumes, a significant number (e.g., 16 hospitals in California and Massachusetts) perform fewer than 10 cases per year. The highly skewed volume distribution may have an adverse effect on the precision of this measure.	M☐ N☐
2g. Comparability of Multiple Data Sources/Methods **2g.1 Data/sample** *(description of data/sample and size)*: Not applicable **2g.2 Analytic Method** *(type of analysis & rationale)*: Not applicable **2g.3 Testing Results** *(e.g., correlation statistics, comparison of rankings)*: Not applicable	**2g** C☐ P☐ M☐ N☐ NA ☐
2h. Disparities in Care **2h.1 If measure is stratified, provide stratified results** *(scores by stratified categories/cohorts)*: Not applicable **2h.2 If disparities have been reported/identified, but measure is not specified to detect disparities, provide follow-up plans:** Not applicable	**2h** C☐ P☐ M☐ N☐ NA ☐
TAP/Workgroup: What are the strengths and weaknesses in relation to the subcriteria for *Scientific Acceptability of Measure Properties?*	**2**
Steering Committee: Overall, to what extent was the criterion, *Scientific Acceptability of Measure Properties*, met? **Rationale:**	**2** C ☐ P ☐ M ☐ N ☐
3. USABILITY	
Extent to which intended audiences (e.g., consumers, purchasers, providers, policy makers) can understand the results of the measure and are likely to find them useful for decision making. (evaluation criteria)	Eval Rating
3a. Meaningful, Understandable, and Useful Information **3a.1 Current Use:** In use **3a.2 Use in a public reporting initiative (disclosure of performance results to the public at large)** (*If used in a public reporting initiative, provide name of initiative(s), locations, Web page URL(s). If not publicly reported, state the plans to achieve public reporting within 3 years*): Florida (state)	**3a** C☐ P☐ M☐ N☐

Florida Health Finder
http://www.floridahealthfinder.gov/

Illinois (state hospital association)
Illinois Hospitals Caring for You
www.illinoishospitals.org

Kentucky (Norton Healthcare, a hospital system)
Norton Healthcare Quality Report
http://www.nortonhealthcare.com/body.cfm?id=157

Texas (state)
Reports on Hospital Performance
http://www.dshs.state.tx.us/thcic/

Vermont (state)
Dept of Banking, Insurance, Securities & Health Care Administration Comparison Report
http://www.bishca.state.vt.us/health-care/hospitals-health-care-practitioners/2009-vermont-hospital-report-card

The measure is also reported on HCUPnet:
http://hcupnet.ahrq.gov/HCUPnet.jsp?Id=EB57801381F71C41&Form=MAINSEL&JS=Y&Action=%3E%3ENext%3E%3E&_MAINSEL=AHRQ%20Quality%20Indicators

This measure will appear in the MONAHRQ system that is provided for public reporting and quality improvement throughout the United States: http://monahrq.ahrq.gov/

3a.3 **If used in other programs/initiatives (***If used in quality improvement or other programs/initiatives, name of initiative(s), locations, Web page URL(s). If not used for QI, state the plans to achieve use for QI within 3 years***):**
University Healthcare Consortium (UHC) - An alliance of 103 academic medical centers and 219 of their affiliated hosptials. UCH reports the AHRQ QIs to their member hospitals. (See www.uhc.edu. Note that meaure results are reported to hospitals; not reported on the UHC site).

National Association of Children´s Hospitals and Related Institutions (NACHRI) reports all provider level PDIs to its approximately 85 member children´s hospitals. (See http://www.childrenshospitals.net. Note that meaure results are reported to hospitals; not reported on the NACHRI site).

Norton Healthcare - a multi-hospital system in Kentucky (see http://www.nortonhealthcare.com/about/Our_Performance/index.aspx)

Ministry Health Care - a multi-hospital system in Wisconsin (see http://ministryhealth.org/display/router.aspx. Note: measure results reported to hospitals; not reported on site).

Child Health Corporation of America (CHCA) reports all PDIs to its 42 member hospitals, which are large freestanding pediatric hospitals. (See http://www.chca.com/. Note that meaure results are reported to hospitals; not reported on the CHCA site).

This measure will be added to the MONAHRQ system that is provided for public reporting and quality improvement throughout the United States: http://monahrq.ahrq.gov/

Testing of Interpretability (*Testing that demonstrates the results are understood by the potential users for public reporting and quality improvement*)
3a.4 **Data/sample** *(description of data/sample and size)***:** AHRQ 2007 State Inpatient Databases (SID) with 4,000 hospitals and 30 million adult discharges

3a.5 Methods *(e.g., focus group, survey, QI project)*: A research team from the School of Public Affairs, Baruch College, under contracts with the Department of Public Health, Weill Medical College and Battelle, Inc., has developed a pair of Hospital Quality Model Reports at the request of the Agency for Healthcare Research & Quality (AHRQ). These reports are designed specifically to report comparative information on hospital performance based on the AHRQ Quality Indicators (QIs). The work was done in close collaboration with AHRQ staff and the AHRQ Quality Indicators team. The Model Reports (discussed immediately above) are based on: • Extensive search and analysis of the literature on hospital quality measurement and reporting, as well as public reporting on health care quality more broadly; • Interviews with quality measurement and reporting experts, purchasers, staff of purchasing coalitions, and executives of integrated health care delivery systems who are responsible for quality in their facilities; • Two focus groups with chief medical officers of hospitals and/or systems and two focus groups with quality managers from a broad mix of hospitals; • Four focus groups with members of the public who had recently experienced a hospital admission; and • Four rounds of cognitive interviews (a total of 62 interviews) to test draft versions of the two Model Reports with members of the public with recent hospital experience, basic computer literacy but widely varying levels of education **3a.6 Results** *(qualitative and/or quantitative results and conclusions)*: Given the above review of the literature and original research that was conducted, a Model report was the result that could help sponsors use the best evidence on public reports so they are most likely to have the desired effects on quality	
3b/3c. Relation to other NQF-endorsed measures **3b.1 NQF # and Title of similar or related measures:**	
(for NQF staff use) **Notes on similar/related endorsed or submitted measures:**	
3b. Harmonization If this measure is related to measure(s) already endorsed by NQF (e.g., same topic, but different target population/setting/data source or different topic but same target population): **3b.2 Are the measure specifications harmonized? If not, why?**	**3b** C☐ P☐ M☐ N☐ NA ☐
3c. Distinctive or Additive Value **3c.1 Describe the distinctive, improved, or additive value this measure provides to existing NQF-endorsed measures:** **5.1 If this measure is similar to measure(s) already endorsed by NQF (i.e., on the same topic and the same target population), Describe why it is a more valid or efficient way to measure quality:** No competing measures found.	**3c** C☐ P☐ M☐ N☐ NA ☐
TAP/Workgroup: What are the strengths and weaknesses in relation to the subcriteria for *Usability?*	**3**
Steering Committee: Overall, to what extent was the criterion, *Usability*, met? **Rationale:**	**3** C☐ P☐ M☐ N☐
4. FEASIBILITY	
Extent to which the required data are readily available, retrievable without undue burden, and can be implemented for performance measurement. (evaluation criteria)	Eval Rating
4a. Data Generated as a Byproduct of Care Processes	**4a** C☐

4a.1-2 **How are the data elements that are needed to compute measure scores generated?** Coding/abstraction performed by someone other than person obtaining original information (E.g., DRG, ICD-9 codes on claims, chart abstraction for quality measure or registry)	P☐ M☐ N☐
4b. Electronic Sources 4b.1 **Are all the data elements available electronically?** (*elements that are needed to compute measure scores are in defined, computer-readable fields, e.g., electronic health record, electronic claims*) Yes 4b.2 **If not, specify the near-term path to achieve electronic capture by most providers.**	4b C☐ P☐ M☐ N☐
4c. Exclusions 4c.1 **Do the specified exclusions require additional data sources beyond what is required for the numerator and denominator specifications?** No 4c.2 **If yes, provide justification.**	4c C☐ P☐ M☐ N☐ NA ☐
4d. Susceptibility to Inaccuracies, Errors, or Unintended Consequences 4d.1 **Identify susceptibility to inaccuracies, errors, or unintended consequences of the measure and describe how these potential problems could be audited. If audited, provide results.** Coding professionals follow detail guidelines, are subject to training and credentialing requirements, peer review and audit	4d C☐ P☐ M☐ N☐
4e. Data Collection Strategy/Implementation 4e.1 **Describe what you have learned/modified as a result of testing and/or operational use of the measure regarding data collection, availability of data/missing data, timing/frequency of data collection, patient confidentiality, time/cost of data collection, other feasibility/ implementation issues:** None 4e.2 **Costs to implement the measure** (*costs of data collection, fees associated with proprietary measures*)**:** Administrative data are collected as part of the routine operations. Some staff time is required to download and execute the software from the AHRQ webs site, which is available at no cost. The software for calculating the measure is available for free at: http://www.qualityindicators.ahrq.gov/software.htm 4e.3 **Evidence for costs:** All data necessary to calculate this measure are routinely collected for hospital administrative purposes. The software for calculating the measure is available for free at: http://www.qualityindicators.ahrq.gov/software.htm 4e.4 **Business case documentation:** All data necessary to calculate this measure are routinely collected for hospital administrative purposes. The software for calculating the measure is available for free at: http://www.qualityindicators.ahrq.gov/software.htm	4e C☐ P☐ M☐ N☐
TAP/Workgroup: What are the strengths and weaknesses in relation to the subcriteria for *Feasibility?*	4
Steering Committee: Overall, to what extent was the criterion, *Feasibility*, met? **Rationale:**	4 C☐ P☐ M☐ N☐
RECOMMENDATION	
(for NQF staff use) **Check if measure is untested and only eligible for time-limited endorsement.**	Time-limit

	ed ☐
Steering Committee: Do you recommend for endorsement? **Comments:**	Y☐ N☐ A☐

CONTACT INFORMATION

Co.1 Measure Steward (Intellectual Property Owner)
Co.1 Organization
Agency for Healthcare Research and Quality, 540 Gaither Road, Rockville, Maryland, 20850

Co.2 Point of Contact
John, Bott, MSSW, MBA, John.Bott@AHRQ.hhs.gov, 301-427-1317-

Measure Developer If different from Measure Steward
Co.3 Organization
Agency for Healthcare Research and Quality, 540 Gaither Road, Rockville, Maryland, 20850

Co.4 Point of Contact
John, Bott, MSSW, MBA, John.Bott@AHRQ.hhs.gov, 301-427-1317-

Co.5 Submitter If different from Measure Steward POC
John, Bott, MSSW, MBA, John.Bott@AHRQ.hhs.gov, 301-427-1317-, Agency for Healthcare Research and Quality

Co.6 Additional organizations that sponsored/participated in measure development
UC Davis,
Stanford University,
Battelle Memorial Institute

ADDITIONAL INFORMATION

Workgroup/Expert Panel involved in measure development
Ad.1 Provide a list of sponsoring organizations and workgroup/panel members' names and organizations. Describe the members' role in measure development.
None

Ad.2 If adapted, provide name of original measure: None
Ad.3-5 If adapted, provide original specifications URL or attachment

Measure Developer/Steward Updates and Ongoing Maintenance
Ad.6 Year the measure was first released: 2001
Ad.7 Month and Year of most recent revision: 10, 2010
Ad.8 What is your frequency for review/update of this measure? Annual
Ad.9 When is the next scheduled review/update for this measure? 05, 2011

Ad.10 Copyright statement/disclaimers: The AHRQ QI software is publicly available; no copyright disclaimers.

Ad.11 -13 Additional Information web page URL or attachment:

Date of Submission (*MM/DD/YY*)**:** 06/14/2011

NATIONAL QUALITY FORUM

Measure Evaluation 4.1
December 2009

This form contains the measure information submitted by stewards. Blank fields indicate no information was provided. Attachments also may have been submitted and are provided to reviewers. The subcriteria and most of the footnotes from the evaluation criteria are provided in Word comments within the form and will appear if your cursor is over the highlighted area. Hyperlinks to the evaluation criteria and ratings are provided in each section.

TAP/Workgroup (if utilized)**:** Complete all yellow highlighted areas of the form. Evaluate the extent to which each subcriterion is met. Based on your evaluation, summarize the strengths and weaknesses in each section.

Note: *If there is no TAP or workgroup, the SC also evaluates the subcriteria (yellow highlighted areas).*

Steering Committee: Complete all pink highlighted areas of the form. Review the workgroup/TAP assessment of the subcriteria, noting any areas of disagreement; then evaluate the extent to which each major criterion is met; and finally, indicate your recommendation for the endorsement. Provide the rationale for your ratings.

Evaluation ratings of the extent to which the criteria are met
C = Completely (unquestionably demonstrated to meet the criterion)
P = Partially (demonstrated to partially meet the criterion)
M = Minimally (addressed BUT demonstrated to only minimally meet the criterion)
N = Not at all (NOT addressed; OR incorrectly addressed; OR demonstrated to NOT meet the criterion)
NA = Not applicable (only an option for a few subcriteria as indicated)

(for NQF staff use) **NQF Review #:** 0352 **NQF Project:** Surgery Endorsement Maintenance 2010
MEASURE DESCRIPTIVE INFORMATION
De.1 **Measure Title:** Failure to Rescue In-Hospital Mortality (risk adjusted)
De.2 **Brief description of measure:** Percentage of patients who died with a complications in the hospital.
1.1-2 **Type of Measure:** Outcome De.3 **If included in a composite or paired with another measure, please identify composite or paired measure** Failure to Rescue 30-day Mortality (risk adjusted)
De.4 **National Priority Partners Priority Area:** Safety De.5 **IOM Quality Domain**: Patient-centered De.6 **Consumer Care Need:** Getting better

CONDITIONS FOR CONSIDERATION BY NQF	
Four conditions must be met before proposed measures may be considered and evaluated for suitability as voluntary consensus standards:	NQF Staff
A. The measure is in the public domain or an intellectual property (measure steward agreement) is signed. *Public domain only applies to governmental organizations. All non-government organizations must sign a measure steward agreement even if measures are made publicly and freely available.* A.1 **Do you attest that the measure steward holds intellectual property rights to the measure and the right to use aspects of the measure owned by another entity (e.g., risk model, code set)?** Yes A.2 **Indicate if Proprietary Measure** (*as defined in measure steward agreement*)**:** Proprietary measure A.3 **Measure Steward Agreement:** Agreement will be signed and submitted prior to or at the time of measure submission A.4 **Measure Steward Agreement attached:**	**A** Y☐ N☐
B. The measure owner/steward verifies there is an identified responsible entity and process to maintain and update the measure on a schedule that is commensurate with the rate of clinical innovation, but at least	**B** Y☐

every 3 years. Yes, information provided in contact section	N☐
C. The intended use of the measure includes both public reporting and quality improvement. ►**Purpose:** Public Reporting, Quality Improvement (Internal to the specific organization)	C Y☐ N☐
D. The requested measure submission information is complete. Generally, measures should be fully developed and tested so that all the evaluation criteria have been addressed and information needed to evaluate the measure is provided. Measures that have not been tested are only potentially eligible for a time-limited endorsement and in that case, measure owners must verify that testing will be completed within 12 months of endorsement. D.1**Testing:** Yes, fully developed and tested D.2 **Have NQF-endorsed measures been reviewed to identify if there are similar or related measures?** Yes	D Y☐ N☐
(for NQF staff use) **Have all conditions for consideration been met?** **Staff Notes to Steward** (*if submission returned*)**:**	Met Y☐ N☐
Staff Notes to Reviewers (*issues or questions regarding any criteria*)**:**	
Staff Reviewer Name(s):	

TAP/Workgroup Reviewer Name:	
Steering Committee Reviewer Name:	
1. IMPORTANCE TO MEASURE AND REPORT	
Extent to which the specific measure focus is important to making significant gains in health care quality (safety, timeliness, effectiveness, efficiency, equity, patient-centeredness) and improving health outcomes for a specific high impact aspect of healthcare where there is variation in or overall poor performance. ***Measures must be judged to be important to measure and report*** *in order to be evaluated against the remaining criteria.* (evaluation criteria) **1a. High Impact**	Eval Rating
(for NQF staff use) **Specific NPP goal**:	
1a.1 **Demonstrated High Impact Aspect of Healthcare:** Affects large numbers, Frequently performed procedure, Severity of illness 1a.2 1a.3 **Summary of Evidence of High Impact:** Failure to Rescue measure has a very high impact because it is applicable to the majority of surgical procedures performed at acute care hospitals. Failure to Rescue affects large number of patients and applies to frequently performed procedures. Failure to Rescue, predicts death after an adverse event which accounts for severity of illness to properly adjust the death rate. The measure is less sensitive to errors in severity adjustment (because all patients in the analysis have complications) and more dependent on hospital characteristics relative to patient characteristics than the mortality rate, while having equivalent reliability. FTR has intuitive appeal as a quality marker, attempting to measure a hospital's ability to manage complications, while being less likely to confuse worse severity of illness with worse quality of care. 1a.4 **Citations for Evidence of High Impact:** 1. Silber JH, Williams SV, Krakauer H, et al. Hospital and patient characteristics associated with death after surgery: A study of adverse occurrence and failure-to-rescue. Med Care. 1992;30:615-629. 2. Silber JH, Romano PS, Rosen AK, et al. Failure-to-rescue: Comparing definitions to measure quality of care. Med Care. 2007;45:918-925. 3. Silber JH, Rosenbaum PR, Schwartz JS, et al. Evaluation of the complication rate as a measure of quality of care in coronary artery bypass graft surgery. JAMA. 1995;274:317-323. 4. Silber JH, Rosenbaum PR, Williams SV, et al. The relationship between choice of outcome measure and hospital rank in general surgical procedures: Implications for quality assessment. Int J Qual Health Care.	1a C☐ P☐ M☐ N☐

1997;9:193-200.
5. Silber JH, Kennedy SK, Even-Shoshan O, et al. Anesthesiologist direction and patient outcomes. Anesthesiology. 2000;93:152-163.
6. Silber JH, Kennedy SK, Even-Shoshan O, et al. Anesthesiologist board certification and patient outcomes. Anesthesiology. 2002;96:1044-1052.
7. Aiken LH, Clarke SP, Sloane DM, et al. Hospital nurse staffing and patient mortality, nurse burnout, and job dissatisfaction. JAMA. 2002;288:1987-1993.
8. Aiken LH, Clarke SP, Cheung RB, et al. Educational levels of hospital nurses and surgical patient mortality. JAMA. 2003;290:1617-1623.
9. Silber JH, Rosenbaum PR, Ross RN. Comparing the contributions of groups of predictors: Which outcomes vary with hospital rather than patient characteristics? J Am Stat Assoc. 1995;90:7-18.
10. Silber JH, Rosenbaum PR, Romano PS, Rosen AK, Wang Y, Teng Y, Halenar MJ, Even-Shoshan O, Volpp KG. Hospital Teaching Intensity, Patient Race,
and Surgical Outcomes. Arch Surg. 2009;144:113-120.
11. Friese CR, Earle CC, Silber JH, Aiken LH. Hospital characteristics, clinical severity, and outcomes for surgical oncology patients. Surgery 2010; 147:602-609.
12. Ghaferi AA, Birkmeyer JD, Dimick JB. Variation in Hospital Mortality Associated with Inpatient Surgery. N Engl J Med 2009; 361:1368-75.

1b. Opportunity for Improvement

1b.1 **Benefits (improvements in quality) envisioned by use of this measure:** The use of Failure to rescue, predicting death after an adverse occurrence, hospitals would be able to improve their quality of care. Hospitals and health care providers benefit from knowing not only their institution´s mortality rate, but also their institution´s ability to rescue patients after an adverse occurrence. Using failure to rescue measure is especially important if hospital resources needed for prevention were different from those needed for rescue. From a research and policy perspective knowing the failure to rescue rate in addition to the mortality rate will improve our understanding of mortality statistics.

1b.2 **Summary of data demonstrating performance gap (variation or overall poor performance) across providers:**
In Aiken et al. shows if the proportion of BSN nurses in all hospitals was 60% rather than 20% 14.2 fewer deaths per 1000 patients with complications (failure to rescue) would be expected. Moreover failure to rescue rates would be decidedly lower if both the workloads of nurses were lighter and the workforce were composed of higher percent-ages of BSN-prepared nurses. (see table 4 in Aiken LH, Clarke SP, Cheung RB, Sloane DM, Silber JH. Educational Levels of Hospital Nurses and Surgical Patient Mortality)

1b.3 **Citations for data on performance gap:**
Cross-sectional analyses of outcomes data for 232,342 general, orthopedic, and vascular surgery patinets discharged from 168 non-federal adult general Pennsylvania hospitals between April 1, 1998, and November 30, 1999, linked to administrative and survey data providing information on educational composition, staffing, and other chracteristics.

1b.4 **Summary of Data on disparities by population group:**
In Silber JH et al Hospital Teaching Intensity, Patient Race,
and Surgical Outcomes. Arch Surg. 2009, shows failure-to rescue rates were consistently lower in hospitals with higher resident-to-bed ratios. Hospitals of high teaching intensity (resident-to-bed ratio=0.6) compared with nonteaching hospitals (resident-to-bed ratio=0) were associated with 14%(95% CI, 12%-15%) lower odds of failure to rescue for combined surgery, with similar finding for subgroup analysis. (see table 3 in paper)

1b.5 **Citations for data on Disparities:**
For information reported in 1b4 the data sample was 2,021,214 patients with medicare claims on general, orthopedic, and vascular surgery admissions in the United States for 2000-2005.

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1c. Outcome or Evidence to Support Measure Focus

1c.1 **Relationship to Outcomes** (*For non-outcome measures, briefly describe the relationship to desired outcome. For outcomes, describe why it is relevant to the target population*)**:** Failure-to-rescue is defined as the probability of death following a complication. The measure will help improve both the management

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of the hospital and our understanding of hospital mortality rates.

1c.2-3. Type of Evidence: Cohort study

1c.4 Summary of Evidence (*as described in the criteria; for outcomes, summarize any evidence that healthcare services/care processes influence the outcome*)**:**
Failure to rescue is influenced by hospital characteristics. Rates differ based on different hospital characteristics such as number of hospital beds, anesthesiologists who are board certified, surgeons who are board certified, presence of house staff, and high technology hospitals, etc. Failure to rescue is an indicator of hospital quality of care. Patients in the age range of 18-90 are analyzed because patients under the age of 18 are considered a pediatric population and have a different set of complications. We use 90 years as a cut-point because of our concern regarding the increased use of do-not-resuscitate at higher ages [Wenger et al. Epidemiology of Do-Not Resuscitate Orders. Disparity by Age, Diagnosis, Gender, Race, and Functional Impairment. Arch Intern Med. 1995; 155(19):2056-62, Hakim et al. Factors Associated with Do-Not-Resuscitate Orders: Patients´, Preferences, Prognoses, and Physicians Judgments. Ann Intern Med.1996; 125:284-293.]. While we do adjust for admission severity when reporting FTR, and this includes age, we still thought it prudent to use an upper bound on age, since DNR status prior to the procedure is not well defined at hospitals [Tabak YP, Johannes RS, Silber JH, Kurtz SG, Gibber EM. Should do-not-resuscitate status be included as a mortality risk adjustor? The impact of DNR variations on performance reporting. Med Care 2005; 43:658-666]

1c.5 Rating of strength/quality of evidence (*also provide narrative description of the rating and by whom***):**
Silber JH, Williams SV, Krakauer H, et al. Hospital and patient characteristics associated with death after surgery: A study of adverse occurrence and failure-to-rescue. Med Care. 1992;30:615-629. Silber JH, Rosenbaum PR, Schwartz JS, et al. Evaluation of the complication rate as a measure of quality of care in coronary artery bypass graft surgery. JAMA. 1995;274:317-323 Silber JH, Romano PS, Rosen AK, et al. Failure-to-rescue: Comparing definitions to measure quality of care. Med Care. 2007;45:918-925

1c.6 Method for rating evidence: In Silber et al JAMA 1995, refers to the "power" of a measure as the ability of that measure to detect differences between hospitals or groups of hospitals, with respect to the outcome measure in question. Should the difference between two hospital failure rates achieve statistical significance, while the difference between those same hospitals´ death rates not achieve statistical significance, then we would consider the failure rate to be more powerful than the death rate. It can be shown that for equivalent adverse occurrence rates, the power to distinguish between two hospitals using the failure rate is always greater than or equal to the power using the death rate. Although somewhat counterintuitive, this result occurs because, although the failure rate and the death rate use the number of deaths as their numerators, the denominator of the failure rate is the number of patients with adverse occurrences, while the denominator of the death rate is the total number of patients. When adverse occurrence rates are not equal across hospitals, the power of the failure rate statistic may be greater than, equal to, or less than that of the death rate. When comparing two hospitals with failure rates F1 and F2 death rates Dl and D2 and adverse occurrence rates A1 and A2 it can be shown that whenever F1>= F2, Dl>= D2 and A1<=A2 then the power in distinguishing such hospitals using the failure rate is greater than or equal to the power when using the death rate. For situations where F1>=F2 and Dl < D2 the sufficient conditions for superior power using the failure rate instead of the death rate is given in the Appendix. Finally, these results are unchanged if one considers either hospital I or 2 in the above arguments to be a group of hospitals or the average of all hospitals (so that hospital 1 or 2 represents a very large sample size).
In summary, failure rate was a function of anesthesia board certification and the presence of surgical housestaff (hospital characteristics) but not a function of admission severity of illness score (patient characteristics). Since the death rate appears to be composed of two distinct rates, quality of care measurement may be improved if all three rates are reported instead of relying on the adjusted mortality rate alone. In so doing, we may better understand the reasons for variation in hospital mortality rates.

1c.7 Summary of Controversy/Contradictory Evidence: N/A

1c.8 Citations for Evidence (*other than guidelines***):** 1. Silber JH, Williams SV, Krakauer H, et al. Hospital and patient characteristics associated with death after surgery: A study of adverse occurrence and failure-to-rescue. Med Care. 1992;30:615-629.

2. Silber JH, Romano PS, Rosen AK, et al. Failure-to-rescue: Comparing definitions to measure quality of care. Med Care. 2007;45:918-925.
3. Silber JH, Rosenbaum PR, Schwartz JS, et al. Evaluation of the complication rate as a measure of quality of care in coronary artery bypass graft surgery. JAMA. 1995;274:317-323.
4. Silber JH, Rosenbaum PR, Williams SV, et al. The relationship between choice of outcome measure and hospital rank in general surgical procedures: Implications for quality assessment. Int J Qual Health Care. 1997;9:193-200.
5. Silber JH, Kennedy SK, Even-Shoshan O, et al. Anesthesiologist direction and patient outcomes. Anesthesiology. 2000;93:152-163.
6. Silber JH, Kennedy SK, Even-Shoshan O, et al. Anesthesiologist board certification and patient outcomes. Anesthesiology. 2002;96:1044-1052.
7. Aiken LH, Clarke SP, Sloane DM, et al. Hospital nurse staffing and patient mortality, nurse burnout, and job dissatisfaction. JAMA. 2002;288:1987-1993.
8. Aiken LH, Clarke SP, Cheung RB, et al. Educational levels of hospital nurses and surgical patient mortality. JAMA. 2003;290:1617-1623.
9. Silber JH, Rosenbaum PR, Ross RN. Comparing the contributions of groups of predictors: Which outcomes vary with hospital rather than patient characteristics? J Am Stat Assoc. 1995;90:7-18.
10. Silber JH, Rosenbaum PR, Romano PS, Rosen AK, Wang Y, Teng Y, Halenar MJ, Even-Shoshan O, Volpp KG. Hospital Teaching Intensity, Patient Race,
and Surgical Outcomes. Arch Surg. 2009;144:113-120.
11. Friese CR, Earle CC, Silber JH, Aiken LH. Hospital characteristics, clinical severity, and outcomes for surgical oncology patients. Surgery 2010; 147:602-609.
12. Ghaferi AA, Birkmeyer JD, Dimick JB. Variation in Hospital Mortality Associated with Inpatient Surgery. N Engl J Med 2009; 361:1368-75.

1c.9 Quote the Specific guideline recommendation (*including guideline number and/or page number***):**
N/A

1c.10 Clinical Practice Guideline Citation: N/A
1c.11 National Guideline Clearinghouse or other URL: N/A

1c.12 Rating of strength of recommendation (*also provide narrative description of the rating and by whom***):**
N/A

1c.13 Method for rating strength of recommendation (*If different from USPSTF system, also describe rating and how it relates to USPSTF)*:
N/A

1c.14 Rationale for using this guideline over others:
The motivation behind the development of FTR was based on 2 questions. The first was an empirical question—suppose hospitals were ranked by adjusted mortality and adjusted complication rates. Would these rankings be highly correlated? The answer is rather surprising—there is generally poor correlation or no correlation in most analyses. Second, suppose 2 hospitals had identical adjusted mortality rates but different adjusted complication rates. Would one prefer care at the hospital with the higher or lower complication rate? If one believes that complications are predominantly driven by patient characteristics, then one may decide to choose the hospital with the higher complication rate, as it achieved an equivalent mortality rate with a sicker population of patients. So there is an empirical question to ask—are adjusted complication rates more related to hospital or patient factors? This has been looked at in a number of ways—and the evidence to date suggests that complication measures are less sensitive to hospital characteristics, after adjusting for severity of illness, than mortality based measures. This is an underlying assumption of FTR theory—complications are undesirable outcome measures because they reflect underlying patient severity and diagnosis coding more than they reflect hospital care. Instead, a hospital's quality is put to the test when a patient develops a complication, and whether a patient is salvaged after a complication will be a function of the care delivered by the hospital and its knowledge base, depth, and facilities. Thus, "good" hospitals will rescue patients by identifying complications quickly and treating them aggressively, resulting in lower FTR. Although many "failures," just like deaths, are often not preventable, we have argued that FTR may be a better measure for comparing hospital quality because of better severity

adjustment properties, and because of its focus on hospital actions. By studying a population of patients who, by definition, have already developed a complication, the specifics of severity of illness adjustment becomes less important in failure rate analyses, because all patients have experienced complications and thus are more uniformly ill.	
TAP/Workgroup: What are the strengths and weaknesses in relation to the subcriteria for *Importance to Measure and Report?*	**1**
Steering Committee: Was the threshold criterion, *Importance to Measure and Report*, met? **Rationale:**	**1** **Y☐** **N☐**
2. SCIENTIFIC ACCEPTABILITY OF MEASURE PROPERTIES	
Extent to which the measure, as specified, produces consistent (reliable) and credible (valid) results about the quality of care when implemented. (evaluation criteria)	**Eval Rating**
2a. MEASURE SPECIFICATIONS	
S.1 **Do you have a web page where current detailed measure specifications can be obtained?** S.2 **If yes, provide web page URL:** **2a. Precisely Specified**	
2a.1 **Numerator Statement (***Brief, text description of the numerator - what is being measured about the target population, e.g. target condition, event, or outcome***):** Patients who died with a complication plus patients who died without documented complications. Death is defined as death in the hospital. All patients in an FTR analysis have developed a complication (by definition). Complicated patient has at least one of the complications defined in Appendix B(see website http://www.research.chop.edu/programs/cor/outcomes.php). Complications are defined using the secondary ICD9 diagnosis and procedure codes and the DRG code of the current admission. Comorbidities are defined in Appendix C (see website http://www.research.chop.edu/programs/cor/outcomes.php) using secondary ICD9 diagnosis codes of the current admission and primary or secondary ICD9 diagnosis codes of previous admission within 90 days of the admission date of the current admission. *When physician part B is available, the definition of complications and comorbidities are augmented to include CPT codes. 2a.2 **Numerator Time Window (***The time period in which cases are eligible for inclusion in the numerator***):** Index Hospitalization (Admission to Discharge) 2a.3 **Numerator Details (***All information required to collect/calculate the numerator, including all codes, logic, and definitions***):** Patients who died with complication and patients who died without documented complications. Death is defined as death in the hospital.	
2a.4 **Denominator Statement (***Brief, text description of the denominator - target population being measured***):** General Surgery, Orthopedic and Vascular patients in specific DRGs with complications plus patients who died in the hospital without complications. Inclusions: adult patients admitted for one of the procedures in the General Surgery, Orthopedic or Vascular DRGs (see appendix A http://www.research.chop.edu/programs/cor/outcomes.php) 2a.5 **Target population gender:** Female, Male	**2a-specs** **C☐** **P☐** **M☐** **N☐**

2a.6 Target population age range: 18-90

2a.7 Denominator Time Window (*The time period in which cases are eligible for inclusion in the denominator***):**
Index Hospitalization (Admission to Discharge)

2a.8 Denominator Details (*All information required to collect/calculate the denominator - the target population being measured - including all codes, logic, and definitions***):**
Adult patients admitted for one of the procedures in the General Surgery, Orthopedic or Vascular DRGs (see Appendix A http://www.research.chop.edu/programs/cor/outcomes.php)who developed an in hospital complication and those who died without a complication.

2a.9 Denominator Exclusions (*Brief text description of exclusions from the target population***):** Patients over age 90, under age 18.

2a.10 Denominator Exclusion Details (*All information required to collect exclusions to the denominator, including all codes, logic, and definitions***):**
N/A

2a.11 Stratification Details/Variables (*All information required to stratify the measure including the stratification variables, all codes, logic, and definitions***):**
Complicated patient has at least one of the complications defined in Appendix B (http://www.research.chop.edu/programs/cor/outcomes.php) Complications are defined using the secondary ICD9 diagnosis and procedure codes and the DRG code of the current admission. When Physician Part B file is available, the definition of complications and comorbidities are augmented to include CPT codes.

2a.12-13 Risk Adjustment Type: Risk-adjustment devised specifically for this measure/condition

2a.14 Risk Adjustment Methodology/Variables (*List risk adjustment variables and describe conceptual models, statistical models, or other aspects of model or method***):**
Risk Adjustment: Model was developed using logistic regression analysis.

Associated data elements: age in years, sex, race, comorbidities, DRGs (combined with and without complications) and procedure codes within DRGs, transfer status.

Failure to rescue is adjusted using a logistic regression model where y is a failure and the total N is composed of patients who develop a complication and patients who died without a complication.

According to developer: The model adjustment variables can vary. We have found that FTR results are fairly stable, even with little adjustment, since all patients in an FTR analysis have developed a complication (by definition), they are a more homogeneous group of patients than the entire population. Hence severity adjustment plays somewhat less of a role than in other outcome measures.

2a.15-17 Detailed risk model available Web page URL or attachment: URL
http://www.research.chop.edu/programs/cor/outcomes.php

2a.18-19 Type of Score: Rate/proportion
2a.20 Interpretation of Score: Better quality = Lower score
2a.21 Calculation Algorithm (*Describe the calculation of the measure as a flowchart or series of steps***):**
Refer to website (http://www.research.chop.edu/programs/cor/outcomes.php)

2a.22 Describe the method for discriminating performance *(e.g., significance testing)***:**
T-test for comparing rates

2a.23 Sampling (Survey) Methodology *If measure is based on a sample (or survey), provide instructions for obtaining the sample, conducting the survey and guidance on minimum sample size (response rate)*:
Measure not based on sample, all surgical patients between the ages of 18 and 90 admitted to an acute care hospital.

2a.24 Data Source (*Check the source(s) for which the measure is specified and tested***)**
Administrative claims

2a.25 Data source/data collection instrument (*Identify the specific data source/data collection instrument, e.g. name of database, clinical registry, collection instrument, etc.***):**
Linked patients hospitalizations claims records, augmented with Outpatient and Part B records; can also use unlinked data if linked files are not available to identify comorbidities and develop definitions of severity and other risk measure.

2a.26-28 Data source/data collection instrument reference web page URL or attachment: URL
http://www.resdac.org/

2a.29-31 Data dictionary/code table web page URL or attachment: URL
http://www.research.chop.edu/programs/cor/outcomes.php

2a.32-35 Level of Measurement/Analysis (*Check the level(s) for which the measure is specified and tested)*
Facility, Health Plan, Integrated Delivery System, Population : County or City, Population : National, Population : Regional, Population : State

2a.36-37 Care Settings (*Check the setting(s) for which the measure is specified and tested)*
Hospital/Acute Care Facility

2a.38-41 Clinical Services (*Healthcare services being measured, check all that apply*)
Clinicians: Physicians (MD/DO)

TESTING/ANALYSIS

2b. Reliability testing

2b.1 Data/sample *(description of data/sample and size)***:** Medicare inpatient claims for general surgical admissions for the period July 1, 1999 to June 30, 2000. There were a total of 1467 hospitals and 403,679 patients. We included patients between 65 and 90 years of age.

2b.2 Analytic Method *(type of reliability & rationale, method for testing)***:**
We defined reliability as described by Lord and Novick using split sample methodology. (Lord FM, Novick MR. Statistical Theories of Mental Test Scores. Reading, MA: Addison-Wesley; 1968)

2b.3 Testing Results *(reliability statistics, assessment of adequacy in the context of norms for the test conducted)***:**
Using Spearman-Brown half split half sample reliability had a correlation of 0.31 and the upper bound on validity was 0.56.

2b C☐ P☐ M☐ N☐

2c. Validity testing

2c.1 Data/sample *(description of data/sample and size)***:** Medicare inpatient claims for general surgical admissions for the period July 1, 1999 to June 30, 2000. There were a total of 1467 hospitals and 403,679 patients. We included patients between 65 and 90 years of age.

2c.2 Analytic Method *(type of validity & rationale, method for testing)***:**
a) Rank correlation between various hospital outcomes (Death, Failure to Rescue, Complications, other measures of Failure to Rescue, Failure to Rescue Complement measures)

b) Marginal and partial coefficients in logit models using detailed patient characteristics and hospital characteristics shown to be associated with better outcomes in previous studies.2, 7 The marginal results use one hospital characteristic at a time along with all patient characteristics. “Partial” regression results, using all hospital and patient variables simultaneously have the disadvantage that correlation between hospital characteristics can cause difficulty in interpreting the effects of individual hospital variables. Hospital characteristics associated with better outcomes (1) teaching hospital status (member of the American Council of Teaching Hospitals); (2) high technology status (does the hospital perform open heart surgery or perform organ transplantation); (3) hospital size greater than 200 beds; (4) bed-to-nurse ratio

2c C☐ P☐ M☐ N☐

(where nurses are the sum of RN plus LPN FTE positions); and (5) nursing skill mix (the ratio of RN/(RN+LPN)).2-8

c) The relative contribution of patient-to-hospital characteristics that predicted each outcome of interest, as provided by the omega statistic.2, 9 The omega statistic computes a ratio of the squared sum of the log odds for model patent variables divided by a similar quantity calculated for the model hospital variables. All else being equal, outcome measures that have lower omega ratios may be more desirable quality indicators, since the lower the omega, the greater the hospital's impact on outcome relative to the patient's impact. This is especially important if modeling patient severity is difficult (as with claims data) so that the lower the omega suggests the higher relative influence of hospital characteristics as compared to patient.

2c.3 Testing Results *(statistical results, assessment of adequacy in the context of norms for the test conducted)*:
FTR itself is highly correlated with death, with a Kendall's tau equal to 0.85, representing a probability of concordance equal to 0.92.

2d. Exclusions Justified

2d.1 Summary of Evidence supporting exclusion(s):
Patients younger than 18 are excluded because they are considered in the pediatric population and have a different set of complications. We use 90 years as a cut-point because of our concern regarding the increased use of do-not-resuscitate at higher ages [Wenger et al. Epidemiology of Do-Not Resuscitate Orders. Disparity by Age, Diagnosis, Gender, Race, and Functional Impairment. Arch Intern Med. 1995; 155(19):2056-62, Hakim et al. Factors Associated with Do-Not-Resuscitate Orders: Patients´, Preferences, Prognoses, and Physicians Judgments. Ann Intern Med.1996; 125:284-293.]. While we do adjust for admission severity when reporting FTR, and this includes age, we still thought it prudent to use an upper bound on age, since DNR status prior to the procedure is not well defined at hospitals [Tabak YP, Johannes RS, Silber JH, Kurtz SG, Gibber EM. Should do-not-resuscitate status be included as a mortality risk adjustor? The impact of DNR variations on performance reporting. Med Care 2005; 43:658-666]

2d.2 Citations for Evidence:
1. Wenger NS, Pearson ML, Desmond KA, Harrison ER, Rubenstein LV, Rogers WH, Kahn KL. Epidemiology of Do-Not Resuscitate Orders. Disparity by Age, Diagnosis, Gender, Race, and Functional Impairment. Arch Intern Med. 1995; 155(19):2056-62
2. Hakim RB, Teno JM, Harrell Jr. FE, Knaus WA, Wenger N, Phillips RS, Layde P, Califf R, Connors Jr. AF, Lynn J. Factors Associated with Do-Not-Resuscitate Orders: Patients´, Preferences, Prognoses, and Physicians Judgments. Ann Intern Med. 1996; 125:284-293.
3. Tabak YP, Johannes RS, Silber JH, Kurtz SG, Gibber EM. Should do-not-resuscitate status be included as a mortality risk adjustor? The impact of DNR variations on performance reporting. Med Care 2005; 43:658-666

2d.3 Data/sample *(description of data/sample and size)*: N/A

2d.4 Analytic Method *(type analysis & rationale)*:
N/A

2d.5 Testing Results *(e.g., frequency, variability, sensitivity analyses)*:
N/A

2d
C ☐
P ☐
M ☐
N ☐
NA ☐

2e. Risk Adjustment for Outcomes/ Resource Use Measures

2e.1 Data/sample *(description of data/sample and size)*: Two different data samples were used to analyze risk adjustment. 1.) 5,972 Medicare patients undergoing elective cholecystectomy or transurethral prostatectomy (Silber et al. Hospital and Patient Characteristics Associated with Death After Surgery A study of Adverse Occrueenece and Failure to Rescue Med Care 1992).
2.) 2,021,214 patients with medicare claims on general, orthopedic, and vascular surgery admissions in the United States for 2000-2005. (Silber et al. Hospital Teaching Intensity, Patient Race, and Surgical Outcomes Arch Surg 2009)

2e.2 Analytic Method *(type of risk adjustment, analysis, & rationale)*:

2e
C ☐
P ☐
M ☐
N ☐
NA ☐

Risk Adjustment: Model was developed using logistic regression analysis, where y is a failure and the total N is composed of patients who develop a complication and patients who died without a complication.

Associated data elements: age in years, sex, race, comorbidities, DRGs (combined with and without complications) and procedure codes within DRGs, transfer status.

The model adjustment variables can vary. We have found that FTR results are fairly stable, even with little adjustment since all patients in an FTR analysis have developed a complication, (by definition), they are a more homogenous group of patients than the entire population. Hence severity adjustment plays somewhat less of a role than in other outcome measures.

2e.3 **Testing Results** *(risk model performance metrics)*:
In earlier work we did report calibration as tested with the Hosmer-Lemeshow statistic, however the research community found that this calibration test fails its asymptotics, it overcalls with large sample size, we do not recommend its use. It is well known that the Hosmer-Lemeshow test is misleading with large data sets, and therefore we have not thought this to be a valid approach. C-statistic ranges 0.70 for the FTR 30 day risk adjustment model (Silber et. al Med Care 1992) to 0.792 (Silber et al. Arch Surg 2009). However c-statistics are also misleading when comparing across populations. Since FTR is a subset of the mortality and complication data set, one cannot compare, in a meaningful way, the c-statistic from FTR to that of mortality or complication.

2e.4 **If outcome or resource use measure is not risk adjusted, provide rationale:** N/A

2f. Identification of Meaningful Differences in Performance

2f.1 **Data/sample from Testing or Current Use** *(description of data/sample and size)*: Medicare inpatient claims for general surgical admissions for the period July 1, 1999 to June 30, 2000. There were a total of 1467 hospitals and 403,679 patients. We included patients between 65 and 90 years of age.

2f.2 **Methods to identify statistically significant and practically/meaningfully differences in performance** *(type of analysis & rationale)*:
T-test for comparing rates.

2f.3 **Provide Measure Scores from Testing or Current Use** *(description of scores, e.g., distribution by quartile, mean, median, SD, etc.; identification of statistically significant and meaningfully differences in performance)*:
75% Q3= 0.12, 50% Median=0.09, 25% Q1=0.06, Mean= 0.09, Std Deviation= 0.05

2f
C☐
P☐
M☐
N☐

2g. Comparability of Multiple Data Sources/Methods

2g.1 **Data/sample** *(description of data/sample and size)*: FTR was developed using standardized hospital discharge records, which are widely collected by states agencies and which hospitals are mandated to report to CMS. One of the big advantages of adopting FTR is that the data on which it is based is uniformely reported, checked for errors and edited. This is administrative data available for the entire population over 65 and for all patients admitted to acute care hospitals.

2g.2 **Analytic Method** *(type of analysis & rationale)*:
N/A

2g.3 **Testing Results** *(e.g., correlation statistics, comparison of rankings)*:
N/A

2g
C☐
P☐
M☐
N☐
NA☐

2h. Disparities in Care

2h.1 **If measure is stratified, provide stratified results** *(scores by stratified categories/cohorts)*:
Disparities in care are shown in Silber et al Arch Surg 2009 where the results show white patients displayed a reduction in failure-to-rescue rates in the teaching intensive hospitals vs non-teaching hospitals (OR, 0.94; 95% CI, 0.92-0.97), black patients displayed an increased failure-to-rescue rate (OR, 1.06; 95% CI, 1.00-1.12)(Results are based on 30 day mortality FTR however in-hospital showed similar results)

2h
C☐
P☐
M☐
N☐
NA☐

2h.2 If disparities have been reported/identified, but measure is not specified to detect disparities, provide follow-up plans: Failure to Rescue can be used to detect disparities in health outcomes across providers, shown in Silber et al. Arch Surg 2009.	
TAP/Workgroup: What are the strengths and weaknesses in relation to the subcriteria for *Scientific Acceptability of Measure Properties?*	**2**
Steering Committee: Overall, to what extent was the criterion, *Scientific Acceptability of Measure Properties*, met? **Rationale:**	**2** **C☐** **P☐** **M☐** **N☐**
3. USABILITY	
Extent to which intended audiences (e.g., consumers, purchasers, providers, policy makers) can understand the results of the measure and are likely to find them useful for decision making. (evaluation criteria)	**Eval Rating**
3a. Meaningful, Understandable, and Useful Information **3a.1 Current Use:** In use **3a.2 Use in a public reporting initiative (disclosure of performance results to the public at large)** (*If used in a public reporting initiative, provide name of initiative(s), locations, Web page URL(s). If not publicly reported, state the plans to achieve public reporting within 3 years*)**:** FTR information is online for the public to access (http://stokes.chop.edu/programs/cor/outcomes.php). Consumers can access FTR results through the multiple research publications on the measure. In the future FTR could be reported on a wider scale, the same way that mortality rates are reported. **3a.3 If used in other programs/initiatives (***If used in quality improvement or other programs/initiatives, name of initiative(s), locations, Web page URL(s). If not used for QI, state the plans to achieve use for QI within 3 years***):** Currently used to assess the impact of the change in the resident work hours regulations on patient outcomes in a recently NHLBI funded study (1R01HL094593-01) entitled "Work Hour Regulation for Physician Trainees: Educational and Clinical Outcomes" **Testing of Interpretability** (*Testing that demonstrates the results are understood by the potential users for public reporting and quality improvement*) **3a.4 Data/sample** *(description of data/sample and size)***:** In Ghaferi et al "Variation in Hospital Mortality Associated with Inpatient Surgery" studied 84,730 patients who had undergone inpatient general and vascular surgery from 2005-2007 using data from the American College of Surgeons National Surgical Quality Improvement Program. **3a.5 Methods** *(e.g., focus group, survey, QI project)***:** Ranked ranked hospitals according to their risk-adjusted overall rate of death and divided them into five groups. For hospitals in each overall mortality quintile, we then assessed the incidence of overall and major complications and the rate of death among patients with major complications **3a.6 Results** *(qualitative and/or quantitative results and conclusions)***:** Rates of death varied widely across hospital quintiles, from 3.5% in very-low-mortality hospitals to 6.9% in very-high-mortality hospitals. Hospitals with either very high mortality or very low mortality had similar rates of overall complications (24.6% and 26.9%, respectively) and of major complications (18.2% and 16.2%, respectively). Rates of individual complications did not vary significantly across hospital mortality quintiles. In contrast, mortality in patients with major complications was almost twice as high in hospitals with very high overall mortality as in those with very low overall mortality (21.4% vs. 12.5%, P<0.001). Differences in rates of death among patients with major complications were also the primary determinant of variation in overall mortality with individual operations. In addition to efforts aimed at avoiding complications in the first place, reducing mortality associated with inpatient surgery will require greater attention to the timely recognition and management of complications once they occur.	**3a** **C☐** **P☐** **M☐** **N☐**
3b/3c. Relation to other NQF-endorsed measures	

3b.1 NQF # and Title of similar or related measures: 0200 Death among surgical inpatients with treatable serious complications (failure to rescue)	
(for NQF staff use) **Notes on similar/related endorsed or submitted measures:**	
3b. Harmonization If this measure is related to measure(s) already endorsed by NQF (e.g., same topic, but different target population/setting/data source or different topic but same target population): **3b.2 Are the measure specifications harmonized? If not, why?**	**3b** C☐ P☐ M☐ N☐ NA☐
3c. Distinctive or Additive Value **3c.1 Describe the distinctive, improved, or additive value this measure provides to existing NQF-endorsed measures:** **5.1 If this measure is similar to measure(s) already endorsed by NQF (i.e., on the same topic and the same target population), Describe why it is a more valid or efficient way to measure quality:** Needleman et al adapted the FTR measure to "nurse sensitive complications" by selecting a limited number of complications for the FTR measure. This change in definition, which we will call FTR-N, was developed to better focus on nursing quality of care. Because only deaths after nursing sensitive complications are studied, a large number of deaths are not used in the analysis. Subsequently, AHRQ again adapted the FTR-N definition to reflect quality from a "patient safety" perspective (ie, the identification of deaths that were especially likely to be preventable). Expert panels guided both of these adaptations through consensus development panels. The National Quality Forum, through its own process of selecting National Voluntary onsensus Standards for Nursing-Sensitive Care, endorsed Needleman et al's adaptation and assigned it to AHRQ for updating and support.FTR-N includes only 6 complications (pneumonia, shock, gastrointestinal bleeding, cardiac arrest, sepsis, and deep venous thrombosis) in its denominator definition, and it excludes deaths in patients without these complications. FTR-A adds renal failure to the FTR-N list of eligible complications, and modestly alters the definition of several others Table 1C and 1D display the impact of restricting the denominator of FTR to more limited sets of complications, as in the FTR-N and FTR-A definitions, respectively. Note first that the number of patients defined as having a complication fell from 189,031 (46.8%) in Table 1A to 43,500 (10.8%) in Table 1C and 39,101 (9.7%) in Table 1D. However, this smaller complication rate comes at an important cost—of all deaths, the proportion coded as having a complication (the precedence rate) fell from 95% in Table 1A to only 51% in Table 1C, and 58.5% in Table 1D. (Refer tp Silber et al. Med Care 2007)	**3c** C☐ P☐ M☐ N☐ NA☐
TAP/Workgroup: What are the strengths and weaknesses in relation to the subcriteria for *Usability?*	**3**
Steering Committee: Overall, to what extent was the criterion, *Usability*, met? **Rationale:**	**3** C☐ P☐ M☐ N☐
4. FEASIBILITY	
Extent to which the required data are readily available, retrievable without undue burden, and can be implemented for performance measurement. (evaluation criteria)	Eval Rating
4a. Data Generated as a Byproduct of Care Processes **4a.1-2 How are the data elements that are needed to compute measure scores generated?** Coding/abstraction performed by someone other than person obtaining original information (E.g., DRG, ICD-9 codes on claims, chart abstraction for quality measure or registry)	**4a** C☐ P☐ M☐ N☐
4b. Electronic Sources	**4b**

4b.1 Are all the data elements available electronically? (*elements that are needed to compute measure scores are in defined, computer-readable fields, e.g., electronic health record, electronic claims*) Yes **4b.2 If not, specify the near-term path to achieve electronic capture by most providers.**	C☐ P☐ M☐ N☐
4c. Exclusions **4c.1 Do the specified exclusions require additional data sources beyond what is required for the numerator and denominator specifications?** No **4c.2 If yes, provide justification.**	**4c** C☐ P☐ M☐ N☐ NA☐
4d. Susceptibility to Inaccuracies, Errors, or Unintended Consequences **4d.1 Identify susceptibility to inaccuracies, errors, or unintended consequences of the measure and describe how these potential problems could be audited. If audited, provide results.** FTR is given to minimal susceptibility to inaccuracies or errors since it uses data collected uniformly across all hospitals and providers. The data is carefully checked by CMS before it is being released to researchers. However there may be unobserved differences among patients due to the lack of more detailed clinical information available only through chart abstraction.	**4d** C☐ P☐ M☐ N☐
4e. Data Collection Strategy/Implementation **4e.1 Describe what you have learned/modified as a result of testing and/or operational use of the measure regarding data collection, availability of data/missing data, timing/frequency of data collection, patient confidentiality, time/cost of data collection, other feasibility/ implementation issues:** We have developed FTR measures based on restricted information, available only from the inpatient files. When possible, such as in the Medicare population, we improve the risk adjustment by using more patient level information available in the outpatient or Carrier file **4e.2 Costs to implement the measure** (*costs of data collection, fees associated with proprietary measures*)**:** CMS data is made available to researchers through ResDac, and its cost depends on the number of records requested, the number of years, and the type of file (inpatient, outpatient, or carrier) **4e.3 Evidence for costs:** N/A **4e.4 Business case documentation:** N/A	**4e** C☐ P☐ M☐ N☐
TAP/Workgroup: What are the strengths and weaknesses in relation to the subcriteria for *Feasibility?*	**4**
Steering Committee: Overall, to what extent was the criterion, *Feasibility*, met? **Rationale:**	**4** C☐ P☐ M☐ N☐
RECOMMENDATION	
(for NQF staff use) **Check if measure is untested and only eligible for time-limited endorsement.**	**Time-limited** ☐
Steering Committee: Do you recommend for endorsement? **Comments:**	Y☐ N☐

	A☐

CONTACT INFORMATION

Co.1 Measure Steward (Intellectual Property Owner)
Co.1 Organization
The Children´s Hospital of Philadelphia, 3535 Market Street, Suite 1029, Philadelphia, Pennsylvania, 19104

Co.2 Point of Contact
Jeffrey H., Silber, MD, PhD, silber@email.chop.edu, 215-590-2540-

Measure Developer If different from Measure Steward
Co.3 Organization
The Children´s Hospital of Philadelphia, 3535 Market Street, Suite 1029, Philadelphia, Pennsylvania, 19104

Co.4 Point of Contact
Orit, Even-Shoshan, MS, shoshan@email.chop.edu, 215-590-2809-

Co.5 Submitter If different from Measure Steward POC
Orit, Even-Shoshan, MS, shoshan@email.chop.edu, 215-590-2809-, The Children´s Hospital of Philadelphia

Co.6 Additional organizations that sponsored/participated in measure development
N/A

ADDITIONAL INFORMATION

Workgroup/Expert Panel involved in measure development
Ad.1 Provide a list of sponsoring organizations and workgroup/panel members' names and organizations. Describe the members' role in measure development.
A group of clinicians and coding experts from the University of Pennsylvania reviewed the updated ICD, CPT, and DRG codes and updated the measure to reflect current coding.

Ad.2 If adapted, provide name of original measure: N/A
Ad.3-5 If adapted, provide original specifications URL or attachment

Measure Developer/Steward Updates and Ongoing Maintenance
Ad.6 Year the measure was first released:
Ad.7 Month and Year of most recent revision:
Ad.8 What is your frequency for review/update of this measure?
Ad.9 When is the next scheduled review/update for this measure?

Ad.10 Copyright statement/disclaimers:

Ad.11 -13 Additional Information web page URL or attachment: URL
http://www.research.chop.edu/programs/cor/outcomes.php

Date of Submission (*MM/DD/YY*)**:** 06/08/2011

NATIONAL QUALITY FORUM

Measure Evaluation 4.1
December 2009

This form contains the measure information submitted by stewards. Blank fields indicate no information was provided. Attachments also may have been submitted and are provided to reviewers. The subcriteria and most of the footnotes from the evaluation criteria are provided in Word comments within the form and will appear if your cursor is over the highlighted area. Hyperlinks to the evaluation criteria and ratings are provided in each section.

TAP/Workgroup (if utilized)**:** Complete all yellow highlighted areas of the form. Evaluate the extent to which each subcriterion is met. Based on your evaluation, summarize the strengths and weaknesses in each section.

Note: *If there is no TAP or workgroup, the SC also evaluates the subcriteria (yellow highlighted areas).*

Steering Committee: Complete all pink highlighted areas of the form. Review the workgroup/TAP assessment of the subcriteria, noting any areas of disagreement; then evaluate the extent to which each major criterion is met; and finally, indicate your recommendation for the endorsement. Provide the rationale for your ratings.

Evaluation ratings of the extent to which the criteria are met
C = Completely (unquestionably demonstrated to meet the criterion)
P = Partially (demonstrated to partially meet the criterion)
M = Minimally (addressed BUT demonstrated to only minimally meet the criterion)
N = Not at all (NOT addressed; OR incorrectly addressed; OR demonstrated to NOT meet the criterion)
NA = Not applicable (only an option for a few subcriteria as indicated)

(for NQF staff use) **NQF Review #:** 0353 **NQF Project:** Surgery Endorsement Maintenance 2010
MEASURE DESCRIPTIVE INFORMATION
De.1 **Measure Title:** Failure to Rescue 30-Day Mortality (risk adjusted)
De.2 **Brief description of measure:** Percentage of patients who died with a complication within 30 days from admission.
1.1-2 **Type of Measure:** Outcome De.3 **If included in a composite or paired with another measure, please identify composite or paired measure** Failure to Rescue In-Hospital Mortality (risk adjusted)
De.4 **National Priority Partners Priority Area:** Safety De.5 **IOM Quality Domain:** De.6 **Consumer Care Need:** Getting better

CONDITIONS FOR CONSIDERATION BY NQF	
Four conditions must be met before proposed measures may be considered and evaluated for suitability as voluntary consensus standards:	**NQF Staff**
A. The measure is in the public domain or an intellectual property (measure steward agreement) is signed. *Public domain only applies to governmental organizations. All non-government organizations must sign a measure steward agreement even if measures are made publicly and freely available.* A.1 **Do you attest that the measure steward holds intellectual property rights to the measure and the right to use aspects of the measure owned by another entity (e.g., risk model, code set)?** Yes A.2 **Indicate if Proprietary Measure** (*as defined in measure steward agreement*)**:** Proprietary measure A.3 **Measure Steward Agreement:** Agreement will be signed and submitted prior to or at the time of measure submission A.4 **Measure Steward Agreement attached:**	**A** Y☐ N☐
B. The measure owner/steward verifies there is an identified responsible entity and process to maintain and	**B**

update the measure on a schedule that is commensurate with the rate of clinical innovation, but at least every 3 years. Yes, information provided in contact section	Y☐ N☐
C. The intended use of the measure includes both public reporting and quality improvement. ►**Purpose:** Public Reporting, Quality Improvement (Internal to the specific organization)	C Y☐ N☐
D. The requested measure submission information is complete. Generally, measures should be fully developed and tested so that all the evaluation criteria have been addressed and information needed to evaluate the measure is provided. Measures that have not been tested are only potentially eligible for a time-limited endorsement and in that case, measure owners must verify that testing will be completed within 12 months of endorsement. D.1**Testing:** Yes, fully developed and tested D.2 **Have NQF-endorsed measures been reviewed to identify if there are similar or related measures?** Yes	D Y☐ N☐
(for NQF staff use) **Have all conditions for consideration been met?** **Staff Notes to Steward** (*if submission returned*)**:**	**Met** Y☐ N☐
Staff Notes to Reviewers (*issues or questions regarding any criteria*)**:**	
Staff Reviewer Name(s):	

TAP/Workgroup Reviewer Name:	
Steering Committee Reviewer Name:	
1. IMPORTANCE TO MEASURE AND REPORT	
Extent to which the specific measure focus is important to making significant gains in health care quality (safety, timeliness, effectiveness, efficiency, equity, patient-centeredness) and improving health outcomes for a specific high impact aspect of healthcare where there is variation in or overall poor performance. ***Measures must be judged to be important to measure and report*** *in order to be evaluated against the remaining criteria.* (evaluation criteria) **1a. High Impact**	**Eval Rating**
(for NQF staff use) **Specific NPP goal**:	
1a.1 **Demonstrated High Impact Aspect of Healthcare:** Affects large numbers, Frequently performed procedure, Severity of illness 1a.2 1a.3 **Summary of Evidence of High Impact:** Failure to Rescue measure has a very high impact because it is applicable to the majority of surgical procedures performed at acute care hospitals. Failure to Rescue affects large number of patients and applies to frequently performed procedures. Failure to Rescue, predicts death after an adverse event which accounts for severity of illness to properly adjust the death rate. The measure is less sensitive to errors in severity adjustment (because all patients in the analysis have complications) and more dependent on hospital characteristics relative to patient characteristics than the mortality rate, while having equivalent reliability. FTR has intuitive appeal as a quality marker, attempting to measure a hospital's ability to manage complications, while being less likely to confuse worse severity of illness with worse quality of care. 1a.4 **Citations for Evidence of High Impact:** 1. Silber JH, Williams SV, Krakauer H, et al. Hospital and patient characteristics associated with death after surgery: A study of adverse occurrence and failure-to-rescue. Med Care. 1992;30:615-629. 2. Silber JH, Romano PS, Rosen AK, et al. Failure-to-rescue: Comparing definitions to measure quality of care. Med Care. 2007;45:918-925. 3. Silber JH, Rosenbaum PR, Schwartz JS, et al. Evaluation of the complication rate as a measure of quality of care in coronary artery bypass graft surgery. JAMA. 1995;274:317-323. 4. Silber JH, Rosenbaum PR, Williams SV, et al. The relationship between choice of outcome measure and	1a C☐ P☐ M☐ N☐

hospital rank in general surgical procedures: Implications for quality assessment. Int J Qual Health Care. 1997;9:193-200.
5. Silber JH, Kennedy SK, Even-Shoshan O, et al. Anesthesiologist direction and patient outcomes. Anesthesiology. 2000;93:152-163.
6. Silber JH, Kennedy SK, Even-Shoshan O, et al. Anesthesiologist board certification and patient outcomes. Anesthesiology. 2002;96:1044-1052.
7. Aiken LH, Clarke SP, Sloane DM, et al. Hospital nurse staffing and patient mortality, nurse burnout, and job dissatisfaction. JAMA. 2002;288:1987-1993.
8. Aiken LH, Clarke SP, Cheung RB, et al. Educational levels of hospital nurses and surgical patient mortality. JAMA. 2003;290:1617-1623.
9. Silber JH, Rosenbaum PR, Ross RN. Comparing the contributions of groups of predictors: Which outcomes vary with hospital rather than patient characteristics? J Am Stat Assoc. 1995;90:7-18.
10. Silber JH, Rosenbaum PR, Romano PS, Rosen AK, Wang Y, Teng Y, Halenar MJ, Even-Shoshan O, Volpp KG. Hospital Teaching Intensity, Patient Race,
and Surgical Outcomes. Arch Surg. 2009;144:113-120.
11. Friese CR, Earle CC, Silber JH, Aiken LH. Hospital characteristics, clinical severity, and outcomes for surgical oncology patients. Surgery 2010; 147:602-609.
12. Ghaferi AA, Birkmeyer JD, Dimick JB. Variation in Hospital Mortality Associated with Inpatient Surgery. N Engl J Med 2009; 361:1368-75.

1b. Opportunity for Improvement

1b.1 **Benefits (improvements in quality) envisioned by use of this measure:** The use of Failure to rescue, predicting death after an adverse occurrence, hospitals would be able to improve their quality of care. Hospitals and health care providers benefit from knowing not only their institution´s mortality rate, but also their institution´s ability to rescue patients after an adverse occurrence. Using failure to rescue measure is especially important if hospital resources needed for prevention were different from those needed for rescue. From a research and policy perspective knowing the failure to rescue rate in addition to the mortality rate will improve our understanding of mortality statistics.

1b.2 **Summary of data demonstrating performance gap (variation or overall poor performance) across providers:**
In Aiken et al. shows if the proportion of BSN nurses in all hospitals was 60% rather than 20% 14.2 fewer deaths per 1000 patients with complications (failure to rescue) would be expected. Moreover failure to rescue rates would be decidedly lower if both the workloads of nurses were lighter and the workforce were composed of higher percent-ages of BSN-prepared nurses. (see table 4 in Aiken LH, Clarke SP, Cheung RB, Sloane DM, Silber JH. Educational Levels of Hospital Nurses and Surgical Patient Mortality)

1b.3 **Citations for data on performance gap:**
In Silber JH et al Hospital Teaching Intensity, Patient Race,
Cross-sectional analyses of outcomes data for 232,342 general, orthopedic, and vascular surgery patients discharged from 168 non-federal adult general Pennsylvania hospitals between April 1, 1998, and November 30, 1999, linked to administrative and survey data providing information on educational composition, staffing, and other characteristics.

1b.4 **Summary of Data on disparities by population group:**
In Silber JH et al Hospital Teaching Intensity, Patient Race,
and Surgical Outcomes. Arch Surg. 2009, shows failure-to rescue rates were consistently lower in hospitals with higher resident-to-bed ratios. Hospitals of high teaching intensity (resident-to-bed ratio=0.6) compared with non-teaching hospitals (resident-to-bed ratio=0) were associated with 14%(95% CI, 12%-15%) lower odds of failure to rescue for combined surgery, with similar finding for subgroup analysis. (see table 3 in paper)

1b.5 **Citations for data on Disparities:**
For information reported in 1b4 the data sample was 2,021,214 patients with medicare claims on general, orthopedic, and vascular surgery admissions in the United States for 2000-2005.

1b
C☐
P☐
M☐
N☐

1c. Outcome or Evidence to Support Measure Focus

1c.1 **Relationship to Outcomes** (*For non-outcome measures, briefly describe the relationship to desired*

1c
C☐
P☐

outcome. For outcomes, describe why it is relevant to the target population): Failure-to-rescue is defined as the probability of death following a complication. The measure will help improve both the management of the hospital and our understanding of hospital mortality rates.

M☐ N☐

1c.2-3. Type of Evidence: Cohort study

1c.4 Summary of Evidence (*as described in the criteria; for outcomes, summarize any evidence that healthcare services/care processes influence the outcome*):
Failure to rescue is influenced by hospital characteristics. Rates differ based on different hospital characteristics such as number of hospital beds, anesthesiologists who are board certified, surgeons who are board certified, presence of house staff, and high technology hospitals, etc. Failure to rescue is an indicator of hospital quality of care. Patients in the age range of 18-90 are analyzed because patients under the age of 18 are considered a pediatric population and have a different set of complications. We use 90 years as a cut-point because of our concern regarding the increased use of do-not-resuscitate at higher ages [Wenger et al. Epidemiology of Do-Not Resuscitate Orders. Disparity by Age, Diagnosis, Gender, Race, and Functional Impairment. Arch Intern Med. 1995; 155(19):2056-62, Hakim et al. Factors Associated with Do-Not-Resuscitate Orders: Patients´, Preferences, Prognoses, and Physicians Judgments. Ann Intern Med.1996; 125:284-293.]. While we do adjust for admission severity when reporting FTR, and this includes age, we still thought it prudent to use an upper bound on age, since DNR status prior to the procedure is not well defined at hospitals [Tabak YP, Johannes RS, Silber JH, Kurtz SG, Gibber EM. Should do-not-resuscitate status be included as a mortality risk adjustor? The impact of DNR variations on performance reporting. Med Care 2005; 43:658-666]

1c.5 Rating of strength/quality of evidence (*also provide narrative description of the rating and by whom*):
Silber JH, Williams SV, Krakauer H, et al. Hospital and patient characteristics associated with death after surgery: A study of adverse occurrence and failure-to-rescue. Med Care. 1992;30:615-629. Silber JH, Rosenbaum PR, Schwartz JS, et al. Evaluation of the complication rate as a measure of quality of care in coronary artery bypass graft surgery. JAMA. 1995;274:317-323 Silber JH, Romano PS, Rosen AK, et al. Failure-to-rescue: Comparing definitions to measure quality of care. Med Care. 2007;45:918-925

1c.6 Method for rating evidence: In Silber et al JAMA 1995, refers to the "power" of a measure as the ability of that measure to detect differences between hospitals or groups of hospitals, with respect to the outcome measure in question. Should the difference between two hospital failure rates achieve statistical significance, while the difference between those same hospitals´ death rates not achieve statistical significance, then we would consider the failure rate to be more powerful than the death rate. It can be shown that for equivalent adverse occurrence rates, the power to distinguish between two hospitals using the failure rate is always greater than or equal to the power using the death rate. Although somewhat counterintuitive, this result occurs because, although the failure rate and the death rate use the number of deaths as their numerators, the denominator of the failure rate is the number of patients with adverse occurrences, while the denominator of the death rate is the total number of patients. When adverse occurrence rates are not equal across hospitals, the power of the failure rate statistic may be greater than, equal to, or less than that of the death rate. When comparing two hospitals with failure rates F1 and F2 death rates Dl and D2 and adverse occurrence rates A1 and A2 it can be shown that whenever F1>= F2, Dl>= D2 and A1<=A2 then the power in distinguishing such hospitals using the failure rate is greater than or equal to the power when using the death rate. For situations where F1>=F2 and Dl < D2 the sufficient conditions for superior power using the failure rate instead of the death rate is given in the Appendix. Finally, these results are unchanged if one considers either hospital I or 2 in the above arguments to be a group of hospitals or the average of all hospitals (so that hospital 1 or 2 represents a very large sample size).
In summary, failure rate was a function of anesthesia board certification and the presence of surgical housestaff (hospital characteristics) but not a function of admission severity of illness score (patient characteristics). Since the death rate appears to be composed of two distinct rates, quality of care measurement may be improved if all three rates are reported instead of relying on the adjusted mortality rate alone. In so doing, we may better understand the reasons for variation in hospital mortality rates.

1c.7 Summary of Controversy/Contradictory Evidence: N/A

1c.8 Citations for Evidence (*other than guidelines*): 1. Silber JH, Williams SV, Krakauer H, et al. Hospital

and patient characteristics associated with death after surgery: A study of adverse occurrence and failure-to-rescue. Med Care. 1992;30:615-629.
2. Silber JH, Romano PS, Rosen AK, et al. Failure-to-rescue: Comparing definitions to measure quality of care. Med Care. 2007;45:918-925.
3. Silber JH, Rosenbaum PR, Schwartz JS, et al. Evaluation of the complication rate as a measure of quality of care in coronary artery bypass graft surgery. JAMA. 1995;274:317-323.
4. Silber JH, Rosenbaum PR, Williams SV, et al. The relationship between choice of outcome measure and hospital rank in general surgical procedures: Implications for quality assessment. Int J Qual Health Care. 1997;9:193-200.
5. Silber JH, Kennedy SK, Even-Shoshan O, et al. Anesthesiologist direction and patient outcomes. Anesthesiology. 2000;93:152-163.
6. Silber JH, Kennedy SK, Even-Shoshan O, et al. Anesthesiologist board certification and patient outcomes. Anesthesiology. 2002;96:1044-1052.
7. Aiken LH, Clarke SP, Sloane DM, et al. Hospital nurse staffing and patient mortality, nurse burnout, and job dissatisfaction. JAMA. 2002;288:1987-1993.
8. Aiken LH, Clarke SP, Cheung RB, et al. Educational levels of hospital nurses and surgical patient mortality. JAMA. 2003;290:1617-1623.
9. Silber JH, Rosenbaum PR, Ross RN. Comparing the contributions of groups of predictors: Which outcomes vary with hospital rather than patient characteristics? J Am Stat Assoc. 1995;90:7-18.
10. Silber JH, Rosenbaum PR, Romano PS, Rosen AK, Wang Y, Teng Y, Halenar MJ, Even-Shoshan O, Volpp KG. Hospital Teaching Intensity, Patient Race,
and Surgical Outcomes. Arch Surg. 2009;144:113-120.
11. Friese CR, Earle CC, Silber JH, Aiken LH. Hospital characteristics, clinical severity, and outcomes for surgical oncology patients. Surgery 2010; 147:602-609.
12. Ghaferi AA, Birkmeyer JD, Dimick JB. Variation in Hospital Mortality Associated with Inpatient Surgery. N Engl J Med 2009; 361:1368-75.

1c.9 Quote the Specific guideline recommendation (*including guideline number and/or page number***):**
N/A

1c.10 Clinical Practice Guideline Citation: N/A
1c.11 National Guideline Clearinghouse or other URL: N/A

1c.12 Rating of strength of recommendation (*also provide narrative description of the rating and by whom***):**
N/A

1c.13 Method for rating strength of recommendation (*If different from USPSTF system, also describe rating and how it relates to USPSTF)*:
N/A

1c.14 Rationale for using this guideline over others:
The motivation behind the development of traditional FTR was based on 2 questions. The first was an empirical question—suppose hospitals were ranked by adjusted mortality and adjusted complication rates. Would these rankings be highly correlated? The answer is rather surprising—there is generally poor correlation or no correlation in most analyses. Second, suppose 2 hospitals had identical adjusted mortality rates but different adjusted complication rates. Would one prefer care at the hospital with the higher or lower complication rate? If one believes that complications are predominantly driven by patient characteristics, then one may decide to choose the hospital with the higher complication rate, as it achieved an equivalent mortality rate with a sicker population of patients. So there is an empirical question to ask—are adjusted complication rates more related to hospital or patient factors? This has been looked at in a number of ways—and the evidence to date suggests that complication measures are less sensitive to hospital characteristics, after adjusting for severity of illness, than mortality based measures. This is an underlying assumption of FTR theory—complications are undesirable outcome measures because they reflect underlying patient severity and diagnosis coding more than they reflect hospital care. Instead, a hospital's quality is put to the test when a patient develops a complication, and whether a patient is salvaged after a complication will be a function of the care delivered by the hospital and its knowledge base, depth, and facilities. Thus, "good" hospitals will rescue patients by identifying complications quickly and treating them

aggressively, resulting in lower FTR. Although many "failures," just like deaths, are often not preventable, we have argued that FTR may be a better measure for comparing hospital quality because of better severity adjustment properties, and because of its focus on hospital actions. By studying a population of patients who, by definition, have already developed a complication, the specifics of severity of illness adjustment becomes less important in failure rate analyses, because all patients have experienced complications and thus are more uniformly ill.	
TAP/Workgroup: What are the strengths and weaknesses in relation to the subcriteria for *Importance to Measure and Report?*	**1**
Steering Committee: Was the threshold criterion, *Importance to Measure and Report*, met? **Rationale:**	**1** **Y☐** **N☐**
2. SCIENTIFIC ACCEPTABILITY OF MEASURE PROPERTIES	
Extent to which the measure, as specified, produces consistent (reliable) and credible (valid) results about the quality of care when implemented. (evaluation criteria)	**Eval Rating**
2a. MEASURE SPECIFICATIONS	
S.1 Do you have a web page where current detailed measure specifications can be obtained? **S.2 If yes, provide web page URL:** **2a. Precisely Specified**	
2a.1 Numerator Statement (*Brief, text description of the numerator - what is being measured about the target population, e.g. target condition, event, or outcome***):** Patients who died with a complication plus patients who died without documented complications. Death is defined as death within 30 days from admission. All patients in an FTR analysis have developed a complication (by definition). Complicated patient has at least one of the complications defined in Appendix B(see website http://www.research.chop.edu/programs/cor/outcomes.php). Complications are defined using the secondary ICD9 diagnosis and procedure codes and the DRG code of the current admission. Comorbidities are defined in Appendix C(see website http://www.research.chop.edu/programs/cor/outcomes.php) using secondary ICD9 diagnosis codes of the current admission and primary or secondary ICD9 diagnosis codes of previous admission within 90 days of the admission date of the current admission. *When physician part B is available, the definition of complications and comorbidities are augmented to include CPT codes. **2a.2 Numerator Time Window (***The time period in which cases are eligible for inclusion in the numerator***):** Within 30 days from admission. **2a.3 Numerator Details (***All information required to collect/calculate the numerator, including all codes, logic, and definitions***):** Patients who died with complication and patients who died without documented complications. Death is defined as death within 30 days from admission.	
2a.4 Denominator Statement (*Brief, text description of the denominator - target population being measured***):** General Surgery, Orthopedic and Vascular patients in specific DRGs with complications plus patients who died in the hospital without complications. Inclusions: adult patients admitted for one of the procedures in the General Surgery, Orthopedic or Vascular DRGs (see appendix A http://www.research.chop.edu/programs/cor/outcomes.php)	**2a-specs** **C☐** **P☐** **M☐** **N☐**

Inclusions: adult patients admitted for one of the procedures in the General Surgery, Orthopedic or Vascular DRGs (see appendix A)

2a.5 **Target population gender:** Female, Male
2a.6 **Target population age range:** 18-90

2a.7 **Denominator Time Window (***The time period in which cases are eligible for inclusion in the denominator***):**
Within 30 days from admission

2a.8 **Denominator Details (***All information required to collect/calculate the denominator - the target population being measured - including all codes, logic, and definitions***):**
Adult patients admitted for one of the procedures in the General Surgery, Orthopedic or Vascular DRGs (see Appendix A http://www.research.chop.edu/programs/cor/outcomes.php)who developed an in hospital complication and those who died without a complication.

2a.9 **Denominator Exclusions (***Brief text description of exclusions from the target population***):** Patients over age 90, under age 18.

2a.10 **Denominator Exclusion Details (***All information required to collect exclusions to the denominator, including all codes, logic, and definitions***):**
N/A

2a.11 **Stratification Details/Variables (***All information required to stratify the measure including the stratification variables, all codes, logic, and definitions***):**
Complicated patient has at least one of the complications defined in Appendix B (http://www.research.chop.edu/programs/cor/outcomes.php) Complications are defined using the secondary ICD9 diagnosis and procedure codes and the DRG code of the current admission. When Physician Part B file is available, the definition of complications and comorbidities are augmented to include CPT codes.

2a.12-13 **Risk Adjustment Type:** Risk-adjustment devised specifically for this measure/condition

2a.14 **Risk Adjustment Methodology/Variables (***List risk adjustment variables and describe conceptual models, statistical models, or other aspects of model or method***):**
Risk Adjustment: Model was developed using logistic regression analysis.

Associated data elements: age in years, sex, race, comorbidities, DRGs (combined with and without complications) and procedure codes within DRGs, transfer status.

Failure to rescue is adjusted using a logistic regression model where y is a failure and the total N is composed of patients who develop a complication and patients who died without a complication.

According to developer: The model adjustment variables can vary. We have found that FTR results are fairly stable, even with little adjustment, since all patients in an FTR analysis have developed a complication (by definition), they are a more homogeneous group of patients than the entire population. Hence severity adjustment plays somewhat less of a role than in other outcome measures.

2a.15-17 **Detailed risk model available Web page URL or attachment:** URL
http://www.research.chop.edu/programs/cor/outcomes.php

2a.18-19 **Type of Score:** Rate/proportion
2a.20 **Interpretation of Score:** Better quality = Lower score
2a.21 **Calculation Algorithm (***Describe the calculation of the measure as a flowchart or series of steps***):**
Refer to website (http://www.research.chop.edu/programs/cor/outcomes.php)

2a.22 **Describe the method for discriminating performance** *(e.g., significance testing)***:**
T-test for comparing rates

2a.23 **Sampling (Survey) Methodology** *If measure is based on a sample (or survey), provide instructions for obtaining the sample, conducting the survey and guidance on minimum sample size (response rate)*:

Measure not based on sample, all surgical patients between the ages of 18 and 90 admitted to an acute care hospital.

2a.24 **Data Source (***Check the source(s) for which the measure is specified and tested)*
Administrative claims

2a.25 **Data source/data collection instrument (***Identify the specific data source/data collection instrument, e.g. name of database, clinical registry, collection instrument, etc.***):**
Linked patients hospitalizations claims records, augmented with Outpatient and Part B records; can also use unlinked data if linked files are not available to identify comorbidities and develop definitions of severity and other risk measure.

2a.26-28 **Data source/data collection instrument reference web page URL or attachment:** URL
http://www.resdac.org/

2a.29-31 **Data dictionary/code table web page URL or attachment:** URL
http://www.research.chop.edu/programs/cor/outcomes.php

2a.32-35 **Level of Measurement/Analysis** (*Check the level(s) for which the measure is specified and tested)*
Facility, Health Plan, Integrated Delivery System, Population : County or City, Population : National, Population : Regional, Population : State

2a.36-37 **Care Settings (***Check the setting(s) for which the measure is specified and tested)*
Hospital/Acute Care Facility

2a.38-41 **Clinical Services** (*Healthcare services being measured, check all that apply*)
Clinicians: Physicians (MD/DO)

TESTING/ANALYSIS

2b. Reliability testing

2b.1 **Data/sample** *(description of data/sample and size)***:** Medicare inpatient claims for general surgical admissions for the period July 1, 1999 to June 30, 2000. There were a total of 1467 hospitals and 403,679 patients. We included patients between 65 and 90 years of age.

2b.2 **Analytic Method** *(type of reliability & rationale, method for testing)***:**
We defined reliability as described by Lord and Novick using split sample methodology. (Lord FM, Novick MR. Statistical Theories of Mental Test Scores. Reading, MA: Addison-Wesley; 1968)

2b.3 **Testing Results** *(reliability statistics, assessment of adequacy in the context of norms for the test conducted)***:**
Using Spearman-Brown half split half sample reliability had a correlation of 0.32 and the upper bound on validity was 0.56.

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2c. Validity testing

2c.1 **Data/sample** *(description of data/sample and size)***:** Medicare inpatient claims for general surgical admissions for the period July 1, 1999 to June 30, 2000. There were a total of 1467 hospitals and 403,679 patients. We included patients between 65 and 90 years of age.

2c.2 **Analytic Method** *(type of validity & rationale, method for testing)***:**
a) Rank correlation between various hospital outcomes (Death, Failure to Rescue, Complications, other measures of Failure to Rescue, Failure to Rescue Complement measures)

b) Marginal and partial coefficients in logit models using detailed patient characteristics and hospital characteristics shown to be associated with better outcomes in previous studies.2, 7 The marginal results use one hospital characteristic at a time along with all patient characteristics. “Partial” regression results, using all hospital and patient variables simultaneously have the disadvantage that correlation between

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hospital characteristics can cause difficulty in interpreting the effects of individual hospital variables. Hospital characteristics associated with better outcomes (1) teaching hospital status (member of the American Council of Teaching Hospitals); (2) high technology status (does the hospital perform open heart surgery or perform organ transplantation); (3) hospital size greater than 200 beds; (4) bed-to-nurse ratio (where nurses are the sum of RN plus LPN FTE positions); and (5) nursing skill mix (the ratio of RN/(RN+LPN)).2-8

c) The relative contribution of patient-to-hospital characteristics that predicted each outcome of interest, as provided by the omega statistic.2, 9 The omega statistic computes a ratio of the squared sum of the log odds for model patent variables divided by a similar quantity calculated for the model hospital variables. All else being equal, outcome measures that have lower omega ratios may be more desirable quality indicators, since the lower the omega, the greater the hospital's impact on outcome relative to the patient's impact. This is especially important if modeling patient severity is difficult (as with claims data) so that the lower the omega suggests the higher relative influence of hospital characteristics as compared to patient.

2c.3 Testing Results *(statistical results, assessment of adequacy in the context of norms for the test conducted)*:
FTR itself is highly correlated with death, with a Kendall's tau equal to 0.83, representing a probability of concordance equal to 0.91.

2d. Exclusions Justified

2d.1 Summary of Evidence supporting exclusion(s):
Patients younger than 18 are excluded because they are considered in the pediatric population and have a different set of complications. We use 90 years as a cut-point because of our concern regarding the increased use of do-not-resuscitate at higher ages [Wenger et al. Epidemiology of Do-Not Resuscitate Orders. Disparity by Age, Diagnosis, Gender, Race, and Functional Impairment. Arch Intern Med. 1995; 155(19):2056-62, Hakim et al. Factors Associated with Do-Not-Resuscitate Orders: Patients´, Preferences, Prognoses, and Physicians Judgments. Ann Intern Med.1996; 125:284-293.]. While we do adjust for admission severity when reporting FTR, and this includes age, we still thought it prudent to use an upper bound on age, since DNR status prior to the procedure is not well defined at hospitals [Tabak YP, Johannes RS, Silber JH, Kurtz SG, Gibber EM. Should do-not-resuscitate status be included as a mortality risk adjustor? The impact of DNR variations on performance reporting. Med Care 2005; 43:658-666]

2d.2 Citations for Evidence:
1. Wenger NS, Pearson ML, Desmond KA, Harrison ER, Rubenstein LV, Rogers WH, Kahn KL. Epidemiology of Do-Not Resuscitate Orders. Disparity by Age, Diagnosis, Gender, Race, and Functional Impairment. Arch Intern Med. 1995; 155(19):2056-62
2. Hakim RB, Teno JM, Harrell Jr. FE, Knaus WA, Wenger N, Phillips RS, Layde P, Califf R, Connors Jr. AF, Lynn J. Factors Associated with Do-Not-Resuscitate Orders: Patients´, Preferences, Prognoses, and Physicians Judgments. Ann Intern Med. 1996; 125:284-293.
3. Tabak YP, Johannes RS, Silber JH, Kurtz SG, Gibber EM. Should do-not-resuscitate status be included as a mortality risk adjustor? The impact of DNR variations on performance reporting. Med Care 2005; 43:658-666

2d.3 Data/sample *(description of data/sample and size)*: N/A

2d.4 Analytic Method *(type analysis & rationale)*:
N/A

2d.5 Testing Results *(e.g., frequency, variability, sensitivity analyses)*:
N/A

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NA ☐

2e. Risk Adjustment for Outcomes/ Resource Use Measures

2e.1 Data/sample *(description of data/sample and size)*: Two different data samples were used to analyze risk adjustment. 1.) 5,972 Medicare patients undergoing elective cholecystectomy or transurethral prostatectomy (Silber et al. Hospital and Patient Characteristics Associated with Death After Surgery A study of Adverse Occrueenece and Failure to Rescue Med Care 1992).
2.) 2,021,214 patients with medicare claims on general, orthopedic, and vascular surgery admissions in the

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NA ☐

United States for 2000-2005. (Silber et al. Hospital Teaching Intensity, Patient Race, and Surgical Outcomes Arch Surg 2009) 2e.2 **Analytic Method** *(type of risk adjustment, analysis, & rationale)*: Risk Adjustment: Model was developed using logistic regression analysis, where y is a failure and the total N is composed of patients who develop a complication and patients who died without a complication. 2e.3 **Testing Results** *(risk model performance metrics)*: In earlier work we did report calibration as tested with the Hosmer-Lemeshow statistic, however the research community found that this calibration test fails its asymptotics, it overcalls with large sample size, we do not recommend its use. It is well known that the Hosmer-Lemeshow test is misleading with large data sets, and therefore we have not thought this to be a valid approach. C-statistic ranges 0.70 for the FTR 30 day risk adjustment model (Silber et. al Med Care 1992) to 0.792 (Silber et al. Arch Surg 2009). However c-statistics are also misleading when comparing across populations. Since FTR is a subset of the mortality and complication data set, one cannot compare, in a meaningful way, the c-statistic from FTR to that of mortality or complication. 2e.4 **If outcome or resource use measure is not risk adjusted, provide rationale:** N/A	
2f. Identification of Meaningful Differences in Performance 2f.1 **Data/sample from Testing or Current Use** *(description of data/sample and size)*: Medicare inpatient claims for general surgical admissions for the period July 1, 1999 to June 30, 2000. There were a total of 1467 hospitals and 403,679 patients. We included patients between 65 and 90 years of age. 2f.2 **Methods to identify statistically significant and practically/meaningfully differences in performance** *(type of analysis & rationale)*: T-test for comparing rates. 2f.3 **Provide Measure Scores from Testing or Current Use** *(description of scores, e.g., distribution by quartile, mean, median, SD, etc.; identification of statistically significant and meaningfully differences in performance)*: 75% Q3 = 0.16, Median= 0.12, 25% Q1 =0.09, Mean= 0.13, Std Deviation =0.05.	**2f** C☐ P☐ M☐ N☐
2g. Comparability of Multiple Data Sources/Methods 2g.1 **Data/sample** *(description of data/sample and size)*: FTR was developed using standardized hospital discharge records, which are widely collected by states agencies and which hospitals are mandated to report to CMS. One of the big advantages of adopting FTR is that the data on which it is based is uniformely reported, checked for errors and edited. This is administrative data available for the entire population over 65 and for all patients admitted to acute care hospitals. 2g.2 **Analytic Method** *(type of analysis & rationale)*: N/A 2g.3 **Testing Results** *(e.g., correlation statistics, comparison of rankings)*: N/A	**2g** C☐ P☐ M☐ N☐ NA☐
2h. Disparities in Care 2h.1 **If measure is stratified, provide stratified results** *(scores by stratified categories/cohorts)*: Disparities in care are shown in Silber et al Arch Surg 2009 where the results show white patients displayed a reduction in failure-to-rescue rates in the teaching intensive hospitals vs non-teaching hospitals (OR, 0.94; 95% CI, 0.92-0.97), black patients displayed an increased failure-to-rescue rate (OR, 1.06; 95% CI, 1.00-1.12) 2h.2 **If disparities have been reported/identified, but measure is not specified to detect disparities, provide follow-up plans:** Failure to Rescue can be used to detect disparities in health outcomes across providers, shown in Silber et al. Arch Surg 2009.	**2h** C☐ P☐ M☐ N☐ NA☐
TAP/Workgroup: What are the strengths and weaknesses in relation to the subcriteria for *Scientific*	**2**

Acceptability of Measure Properties?	
Steering Committee: Overall, to what extent was the criterion, *Scientific Acceptability of Measure Properties*, met? **Rationale:**	***2*** **C☐** **P☐** **M☐** **N☐**
3. USABILITY	
Extent to which intended audiences (e.g., consumers, purchasers, providers, policy makers) can understand the results of the measure and are likely to find them useful for decision making. (evaluation criteria)	**Eval Rating**
3a. Meaningful, Understandable, and Useful Information **3a.1 Current Use:** In use **3a.2 Use in a public reporting initiative (disclosure of performance results to the public at large)** (*If used in a public reporting initiative, provide name of initiative(s), locations, Web page URL(s). If not publicly reported, state the plans to achieve public reporting within 3 years*)**:** FTR information is online for the public to access (http://stokes.chop.edu/programs/cor/outcomes.php). Consumers can access FTR results through the multiple research publications on the measure. In the future FTR could be reported on a wider scale, the same way that mortality rates are reported. **3a.3 If used in other programs/initiatives (***If used in quality improvement or other programs/initiatives, name of initiative(s), locations, Web page URL(s). If not used for QI, state the plans to achieve use for QI within 3 years***):** Currently used to assess the impact of the change in the resident work hours regulations on patient outcomes in a recently NHLBI funded study (1R01HL094593-01) entitled "Work Hour Regulation for Physician Trainees: Educational and Clinical Outcomes" **Testing of Interpretability** (*Testing that demonstrates the results are understood by the potential users for public reporting and quality improvement*) **3a.4 Data/sample** *(description of data/sample and size)***:** In Ghaferi et al "Variation in Hospital Mortality Associated with Inpatient Surgery" studied 84,730 patients who had undergone inpatient general and vascular surgery from 2005-2007 using data from the American College of Surgeons National Surgical Quality Improvement Program. **3a.5 Methods** *(e.g., focus group, survey, QI project)***:** Ranked ranked hospitals according to their risk-adjusted overall rate of death and divided them into five groups. For hospitals in each overall mortality quintile, we then assessed the incidence of overall and major complications and the rate of death among patients with major complications (failure to rescue rate). **3a.6 Results** *(qualitative and/or quantitative results and conclusions)***:** Rates of death varied widely across hospital quintiles, from 3.5% in very-low-mortality hospitals to 6.9% in very-high-mortality hospitals. Hospitals with either very high mortality or very low mortality had similar rates of overall complications (24.6% and 26.9%, respectively) and of major complications (18.2% and 16.2%, respectively). Rates of individual complications did not vary significantly across hospital mortality quintiles. In contrast, mortality in patients with major complications was almost twice as high in hospitals with very high overall mortality as in those with very low overall mortality (21.4% vs. 12.5%, P<0.001). Differences in rates of death among patients with major complications were also the primary determinant of variation in overall mortality with individual operations. In addition to efforts aimed at avoiding complications in the first place, reducing mortality associated with inpatient surgery will require greater attention to the timely recognition and management of complications once they occur.	**3a** **C☐** **P☐** **M☐** **N☐**
3b/3c. Relation to other NQF-endorsed measures **3b.1 NQF # and Title of similar or related measures:** 0200 Death among surgical inpatients with treatable serious complications (failure to rescue)	
(for NQF staff use) **Notes on similar/related endorsed or submitted measures:**	
3b. Harmonization	**3b**

If this measure is related to measure(s) already endorsed by NQF (e.g., same topic, but different target population/setting/data source or different topic but same target population): **3b.2 Are the measure specifications harmonized? If not, why?**	C☐ P☐ M☐ N☐ NA☐
3c. Distinctive or Additive Value **3c.1 Describe the distinctive, improved, or additive value this measure provides to existing NQF-endorsed measures:** **5.1 If this measure is similar to measure(s) already endorsed by NQF (i.e., on the same topic and the same target population), Describe why it is a more valid or efficient way to measure quality:** Needleman et al adapted the FTR measure to "nurse sensitive complications" by selecting a limited number of complications for the FTR measure. This change in definition, which we will call FTR-N, was developed to better focus on nursing quality of care. Because only deaths after nursing sensitive complications are studied, a large number of deaths are not used in the analysis. Subsequently, AHRQ again adapted the FTR-N definition to reflect quality from a "patient safety" perspective (ie, the identification of deaths that were especially likely to be preventable). Expert panels guided both of these adaptations through consensus development panels. The National Quality Forum, through its own process of selecting National Voluntary onsensus Standards for Nursing-Sensitive Care, endorsed Needleman et al's adaptation and assigned it to AHRQ for updating and support.FTR-N includes only 6 complications (pneumonia, shock, gastrointestinal bleeding, cardiac arrest, sepsis, and deep venous thrombosis) in its denominator definition, and it excludes deaths in patients without these complications. FTR-A adds renal failure to the FTR-N list of eligible complications, and modestly alters the definition of several others Table 1C and 1D display the impact of restricting the denominator of FTR to more limited sets of complications, as in the FTR-N and FTR-A definitions, respectively. Note first that the number of patients defined as having a complication fell from 189,031 (46.8%) in Table 1A to 43,500 (10.8%) in Table 1C and 39,101 (9.7%) in Table 1D. However, this smaller complication rate comes at an important cost—of all deaths, the proportion coded as having a complication (the precedence rate) fell from 95% in Table 1A to only 51% in Table 1C, and 58.5% in Table 1D. (Refer tp Silber et al. Med Care 2007)	**3c** C☐ P☐ M☐ N☐ NA☐
TAP/Workgroup: What are the strengths and weaknesses in relation to the subcriteria for *Usability?*	**3**
Steering Committee: Overall, to what extent was the criterion, *Usability*, met? **Rationale:**	**3** C☐ P☐ M☐ N☐
4. FEASIBILITY	
Extent to which the required data are readily available, retrievable without undue burden, and can be implemented for performance measurement. (evaluation criteria)	**Eval Rating**
4a. Data Generated as a Byproduct of Care Processes **4a.1-2 How are the data elements that are needed to compute measure scores generated?** Coding/abstraction performed by someone other than person obtaining original information (E.g., DRG, ICD-9 codes on claims, chart abstraction for quality measure or registry)	**4a** C☐ P☐ M☐ N☐
4b. Electronic Sources **4b.1 Are all the data elements available electronically?** (*elements that are needed to compute measure scores are in defined, computer-readable fields, e.g., electronic health record, electronic claims*) Yes **4b.2 If not, specify the near-term path to achieve electronic capture by most providers.**	**4b** C☐ P☐ M☐ N☐

4c. Exclusions **4c.1 Do the specified exclusions require additional data sources beyond what is required for the numerator and denominator specifications?** No **4c.2 If yes, provide justification.**	**4c** **C** ☐ **P** ☐ **M** ☐ **N** ☐ **NA** ☐
4d. Susceptibility to Inaccuracies, Errors, or Unintended Consequences **4d.1 Identify susceptibility to inaccuracies, errors, or unintended consequences of the measure and describe how these potential problems could be audited. If audited, provide results.** FTR is given to minimal susceptibility to inaccuracies or errors since it uses data collected uniformly across all hospitals and providers. The data is carefully checked by CMS before it is being released to researchers. However there may be unobserved differences among patients due to the lack of more detailed clinical information available only through chart abstraction.	**4d** **C** ☐ **P** ☐ **M** ☐ **N** ☐
4e. Data Collection Strategy/Implementation **4e.1 Describe what you have learned/modified as a result of testing and/or operational use of the measure regarding data collection, availability of data/missing data, timing/frequency of data collection, patient confidentiality, time/cost of data collection, other feasibility/ implementation issues:** We have developed FTR measures based on restricted information, available only from the inpatient files. When possible, such as in the Medicare population, we improve the risk adjustment by using more patient level information available in the outpatient or Carrier file **4e.2 Costs to implement the measure** (*costs of data collection, fees associated with proprietary measures*)**:** CMS data is made available to researchers through ResDac, and its cost depends on the number of records requested, the number of years, and the type of file (inpatient, outpatient, or carrier) **4e.3 Evidence for costs:** N/A **4e.4 Business case documentation:** N/A	**4e** **C** ☐ **P** ☐ **M** ☐ **N** ☐
TAP/Workgroup: What are the strengths and weaknesses in relation to the subcriteria for *Feasibility?*	**4**
Steering Committee: Overall, to what extent was the criterion, *Feasibility*, met? **Rationale:**	**4** **C** ☐ **P** ☐ **M** ☐ **N** ☐
RECOMMENDATION	
(for NQF staff use) **Check if measure is untested and only eligible for time-limited endorsement.**	**Time-limited** ☐
Steering Committee: Do you recommend for endorsement? **Comments:**	**Y** ☐ **N** ☐ **A** ☐
CONTACT INFORMATION	
Co.1 Measure Steward (Intellectual Property Owner) **Co.1 Organization**	

The Children´s Hospital of Philadelphia, 34th St. and Civic Center Blvd., Philadelphia, Pennsylvania, 19104

Co.2 **Point of Contact**
Jeffrey, Silber, PhD, MD, silber@email.chop.edu, 215-590-2540-

Measure Developer If different from Measure Steward
Co.3 **Organization**
The Children´s Hospital of Philadelphia, 34th St. and Civic Center Blvd., Philadelphia, Pennsylvania, 19104

Co.4 **Point of Contact**
Orit, Even-Shoshan, MS, shoshan@email.chop.edu, 215-590-2809-

Co.5 **Submitter If different from Measure Steward POC**
Orit, Even-Shoshan, MS, shoshan@email.chop.edu, 215-590-2809-, The Children´s Hospital of Philadelphia

Co.6 **Additional organizations that sponsored/participated in measure development**
N/A

ADDITIONAL INFORMATION

Workgroup/Expert Panel involved in measure development
Ad.1 **Provide a list of sponsoring organizations and workgroup/panel members' names and organizations. Describe the members' role in measure development.**
A group of clinicians and coding experts from the University of Pennsylvania reviewed the updated ICD, CPT, and DRG codes and updated the measure to reflect current coding.

Ad.2 **If adapted, provide name of original measure:** N/A
Ad.3-5 **If adapted, provide original specifications URL or attachment**

Measure Developer/Steward Updates and Ongoing Maintenance
Ad.6 **Year the measure was first released:**
Ad.7 **Month and Year of most recent revision:**
Ad.8 **What is your frequency for review/update of this measure?**
Ad.9 **When is the next scheduled review/update for this measure?**

Ad.10 **Copyright statement/disclaimers:**

Ad.11 -13 **Additional Information web page URL or attachment:** URL
http://www.research.chop.edu/programs/cor/outcomes.php

Date of Submission (*MM/DD/YY*)**:** 06/08/2011

NATIONAL QUALITY FORUM

Measure Evaluation 4.1
December 2009

This form contains the measure information submitted by stewards. Blank fields indicate no information was provided. Attachments also may have been submitted and are provided to reviewers. The subcriteria and most of the footnotes from the evaluation criteria are provided in Word comments within the form and will appear if your cursor is over the highlighted area. Hyperlinks to the evaluation criteria and ratings are provided in each section.

TAP/Workgroup (if utilized)**:** Complete all yellow highlighted areas of the form. Evaluate the extent to which each subcriterion is met. Based on your evaluation, summarize the strengths and weaknesses in each section.

Note: *If there is no TAP or workgroup, the SC also evaluates the subcriteria (yellow highlighted areas).*

Steering Committee: Complete all pink highlighted areas of the form. Review the workgroup/TAP assessment of the subcriteria, noting any areas of disagreement; then evaluate the extent to which each major criterion is met; and finally, indicate your recommendation for the endorsement. Provide the rationale for your ratings.

Evaluation ratings of the extent to which the criteria are met
C = Completely (unquestionably demonstrated to meet the criterion)
P = Partially (demonstrated to partially meet the criterion)
M = Minimally (addressed BUT demonstrated to only minimally meet the criterion)
N = Not at all (NOT addressed; OR incorrectly addressed; OR demonstrated to NOT meet the criterion)
NA = Not applicable (only an option for a few subcriteria as indicated)

(for NQF staff use) **NQF Review #:** 0351 **NQF Project:** Surgery Endorsement Maintenance 2010
MEASURE DESCRIPTIVE INFORMATION
De.1 **Measure Title:** Death among surgical inpatients with serious, treatable complications (PSI 4)
De.2 **Brief description of measure:** Percentage of cases having developed specified complications of care with an in-hospital death.
1.1-2 **Type of Measure:** Outcome De.3 **If included in a composite or paired with another measure, please identify composite or paired measure** Not applicable
De.4 **National Priority Partners Priority Area:** Population health, Safety De.5 **IOM Quality Domain**: Effectiveness De.6 **Consumer Care Need:** Getting better

CONDITIONS FOR CONSIDERATION BY NQF	
Four conditions must be met before proposed measures may be considered and evaluated for suitability as voluntary consensus standards:	**NQF Staff**
A. The measure is in the public domain or an intellectual property (measure steward agreement) is signed. *Public domain only applies to governmental organizations. All non-government organizations must sign a measure steward agreement even if measures are made publicly and freely available.* A.1 **Do you attest that the measure steward holds intellectual property rights to the measure and the right to use aspects of the measure owned by another entity (e.g., risk model, code set)?** Yes A.2 **Indicate if Proprietary Measure** (*as defined in measure steward agreement*)**:** A.3 **Measure Steward Agreement:** Government entity and in the public domain - no agreement necessary A.4 **Measure Steward Agreement attached:**	**A** Y☐ N☐
B. The measure owner/steward verifies there is an identified responsible entity and process to maintain and update the measure on a schedule that is commensurate with the rate of clinical innovation, but at least	**B** Y☐

every 3 years. Yes, information provided in contact section	N☐
C. The intended use of the measure includes both public reporting and quality improvement. ►**Purpose:** Public Reporting, Quality Improvement (Internal to the specific organization)	C Y☐ N☐
D. The requested measure submission information is complete. Generally, measures should be fully developed and tested so that all the evaluation criteria have been addressed and information needed to evaluate the measure is provided. Measures that have not been tested are only potentially eligible for a time-limited endorsement and in that case, measure owners must verify that testing will be completed within 12 months of endorsement. D.1**Testing:** Yes, fully developed and tested D.2 **Have NQF-endorsed measures been reviewed to identify if there are similar or related measures?** Yes	D Y☐ N☐
(for NQF staff use) **Have all conditions for consideration been met?** **Staff Notes to Steward** (*if submission returned*)**:**	Met Y☐ N☐
Staff Notes to Reviewers (*issues or questions regarding any criteria*)**:**	
Staff Reviewer Name(s):	

TAP/Workgroup Reviewer Name:	
Steering Committee Reviewer Name:	
1. IMPORTANCE TO MEASURE AND REPORT	
Extent to which the specific measure focus is important to making significant gains in health care quality (safety, timeliness, effectiveness, efficiency, equity, patient-centeredness) and improving health outcomes for a specific high impact aspect of healthcare where there is variation in or overall poor performance. ***Measures must be judged to be important to measure and report*** *in order to be evaluated against the remaining criteria.* (evaluation criteria) **1a. High Impact**	Eval Rating
(for NQF staff use) **Specific NPP goal**:	
1a.1 **Demonstrated High Impact Aspect of Healthcare:** Patient/societal consequences of poor quality 1a.2 1a.3 **Summary of Evidence of High Impact:** Pending update. This indicator was originally proposed by Silber et al.31 as a more powerful tool than the risk adjusted mortality rate to detect true differences in patient outcomes across hospitals. The underlying premise was that better hospitals are distinguished not by having fewer adverse occurrences but by more successfully averting death among (i.e., rescuing) patients who experience such complications. Silber et al's original definition was based on key clinical findings abstracted from the medical records of 2,831 cholecystectomy patients and 3,141 transurethral prostatectomy patients admitted to 531 hospitals in 1985. The key postoperative diagnoses that defined the denominator at risk of "failure to rescue" included cardiac arrhythmias, congestive heart failure, cardiac arrest, pneumonia, pulmonary embolus, pneumothorax, renal dysfunction, stroke, wound infection, and unplanned return to surgery. More recently, Needleman and Buerhaus137 adapted failure to rescue to administrative data sets, hypothesizing that this outcome might be sensitive to nurse staffing. Their denominator definition included the ICD-9-CM codes for sepsis, pneumonia (including aspiration), acute upper gastrointestinal bleeding, shock, cardiac/respiratory arrest, deep vein thrombosis (DVT), and pulmonary embolus (PE). 1a.4 **Citations for Evidence of High Impact:** Updated citations will be presented in the May Steering Committee meeting	1a C☐ P☐ M☐ N☐

Measures of Patient Safety Based on Hospital Administrative Data -
The Patient Safety Indicators, August 2002
http://qualityindicators.ahrq.gov/downloads/technical/psi_technical_review.zip

1b. Opportunity for Improvement

1b.1 Benefits (improvements in quality) envisioned by use of this measure: Silber and colleagues have published a series of studies establishing the construct validity of failure to rescue rates through their associations with
hospital characteristics and other measures of hospital performance. Among patients admitted for cholecystectomy and transurethral prostatectomy, failure to rescue was independent of severity of illness at admission, but was significantly associated with the presence of surgical housestaff and a lower percentage of board-certified anesthesiologists.31 The adverse occurrence rate was independent of this hospital characteristic. In a larger sample of 74,647 patients who underwent general surgical procedures in 1991-92, lower failure to rescue rates were found at hospitals with high ratios of registered nurses to beds.68 Failure rates were strongly associated with risk adjusted mortality rates, as expected, but not with complication rates.143 Finally, among
16,673 patients admitted for coronary artery bypass surgery, failure rates were lower (whereas complication rates were higher) at hospitals with magnetic resonance imaging facilities, bone marrow transplantation units, or approved residency training programs.32 More recently, Needleman and Buerhaus137 confirmed that higher registered nurse staffing (RN hours/adjusted patient day) and better nursing skill mix (RN hours/licensed nurse hours) were consistently associated with lower failure to rescue rates among major surgery patients from 799 hospitals in 11 states in 1997, even using administrative data to define complications. An increase from the 25th to the 75th percentile on these two
measures of staffing was associated with 5.9% (95% CI, 1.5% to 10.2%) and 3.9% (95% CI, -1.1% to 8.8%) decreases, respectively, in the rate of failure-to-rescue among major surgery patients.138 These associations were inconsistent among medical patients, in that nursing skill mix was associated with the failure-to-rescue rate (rate ratio 0.81, 95% CI 0.66-1.00) but aggregate registered nurse staffing was not (rate ratio 1.00, 95% CI 0.99-1.01). An increase from the 25th to the 75th percentile on nursing skill mix was associated with a 2.5% (95% CI, 0.0% to 5.0%) decrease in the failure-to-rescue rate among medical patients.

1b.2 Summary of data demonstrating performance gap (variation or overall poor performance) across providers:
1) Signal Variance 2) Signal Standard Deviation 3) Better Than Average 4) Worse than Average (95% probability interval)

1) 0.000996672391 2) 0.031570118641 3) 1.89% 4) 3.92%

1b.3 Citations for data on performance gap:
AHRQ 2007 State Inpatient Databases (SID) with 4,000 hospitals and 30 million adult discharges

1b.4 Summary of Data on disparities by population group:
1) Estimate 2) Standard error 3) P-value: Relative to marked group-c 4) P-value:
2007 relative to 2006
Median income of patient´s ZIP code:
First quartile (lowest income) 107.685 0.446 0.000 0.000
Second quartile 106.520 0.514 0.000 0.000
Third quartile 103.842 0.541 0.423 0.000
Fourth quartile (highest income)c 103.204 0.583 0.000

Expected payment source:
Private insurancec 101.823 0.497 0.000
Medicare 103.325 0.362 0.015 0.000
Medicaid 110.349 0.684 0.000 0.000
Other insurance 114.903 1.368 0.000 0.303
Uninsured / self-pay / no charge 126.797 1.093 0.000 0.000

1b.5 Citations for data on Disparities:
AHRQ 2007 Nationwide Inpatient Sample (NIS) with 800 hospitals and 7 million discharges

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1c. Outcome or Evidence to Support Measure Focus

1c.1 Relationship to Outcomes (*For non-outcome measures, briefly describe the relationship to desired outcome. For outcomes, describe why it is relevant to the target population*)**:** Mortality is a frequent outcome among patients with serious treatable complications

1c.2-3. Type of Evidence: Expert opinion, Systematic synthesis of research

1c.4 Summary of Evidence (*as described in the criteria; for outcomes, summarize any evidence that healthcare services/care processes influence the outcome*)**:**
Silber and colleagues have published a series of studies establishing the construct validity of failure to rescue rates through their associations with
hospital characteristics and other measures of hospital performance. Among patients admitted for cholecystectomy and transurethral prostatectomy, failure to rescue was independent of severity of illness at admission, but was significantly associated with the presence of surgical housestaff and a lower percentage of board-certified anesthesiologists.31 The adverse occurrence rate was independent of this hospital characteristic. In a larger sample of 74,647 patients who underwent general surgical procedures in 1991-92, lower failure to rescue rates were found at hospitals with high ratios of registered nurses to beds.68 Failure rates were strongly associated with risk adjusted mortality rates, as expected, but not with complication rates.143 Finally, among 16,673 patients admitted for coronary artery bypass surgery, failure rates were lower
(whereas complication rates were higher) at hospitals with magnetic resonance imaging facilities, bone marrow transplantation units, or approved residency training programs.32

More recently, Needleman and Buerhaus137 confirmed that higher registered nurse
staffing (RN hours/adjusted patient day) and better nursing skill mix (RN hours/licensed nurse hours) were consistently associated with lower failure to rescue rates among major surgery patients from 799 hospitals in 11 states in 1997, even using administrative data to define complications. An increase from the 25th to the 75th percentile on these two measures of staffing was associated with 5.9% (95% CI, 1.5% to 10.2%) and 3.9% (95% CI, -1.1% to 8.8%) decreases, respectively, in the rate of failure-to-rescue among major surgery patients.138 These associations were inconsistent among medical patients, in that nursing skill mix was associated with the failure-to-rescue rate (rate ratio 0.81, 95% CI 0.66-1.00) but aggregate registered nurse staffing was not (rate ratio 1.00, 95% CI 0.99-1.01). An increase from the 25th to the 75th percentile on nursing skill mix was associated with a 2.5% (95% CI, 0.0% to 5.0%) decrease in the failure-to-rescue rate among medical patients.

1c.5 Rating of strength/quality of evidence (*also provide narrative description of the rating and by whom***):**
Testing, rating, and review were conducted by the project team. A full report on the literature review and empirical evaluation can be found in Refinement of the HCUP Quality Indicators by the UCSF-Stanford EPC, Detailed coding information for each QI is provided in the document Prevention Quality Indicators Technical Specifications. Rating of performance on empirical evaluations, ranged from 0 to 26. The scores were intended as a guide for summarizing the performance of each indicator on four empirical tests of precision (signal variance, area-level share, signal ratio, and R-squared) and five tests of minimum bias (rank correlation, top and bottom decile movement, absolute change, and change over two deciles), as described in the previous section.

1c.6 Method for rating evidence: The project team conducted empirical analyses to explore the frequency and variation of the indicators, the potential bias, based on limited risk adjustment, and the relationship between indicators. The data sources used in the empirical analyses were the 1997 Florida State Inpatient Database (SID) for initial testing and development and the 1997 HCUP State Inpatient Database for 19 States (referred to in this guide as the HCUP SID) for the final empirical analyses.

All potential indicators were examined empirically by developing and conducting statistical tests for precision, bias, and relatedness of indicators. Three different estimates of hospital performance were calculated for each indicator:

1. The raw indicator rate was calculated using the number of adverse events in the numerator divided by the number of discharges in the population at risk by hospital.

1c
C☐
P☐
M☐
N☐

2. The raw indicator was adjusted to account for differences among hospitals in age, gender, modified DRG, and comorbidities.

- Adjacent DRG categories that were separated by the presence or absence of comorbidities or complications were collapsed to avoid adjusting for the complication being measured. Most of the super-Major Diagnostic Category (MDC) DRG categories were excluded for the same reason.
- APR-DRG risk adjustment was not implemented because removing applicable complications from each indicator was beyond the scope of this project.
- The ICD-9-CM codes used to define comorbidity categories were modified to exclude conditions likely to represent potentially preventable complications in certain settings.
- "Acute on chronic" comorbidities were captured so that some patients with especially severe comorbidities would not be mislabeled as not having conditions of interest.
- Comorbidities in obstetric patients were added.
- 3. Multivariate signal extraction methods were applied to adjust for reliability by estimating the amount of "noise" (i.e., variation due to random error) relative to the amount of "signal" (i.e., systematic variation in hospital performance or reliability) for each indicator.

Similar reliability adjustment has been used in the literature for similar purposes.40 41 The project team constructed a set of statistical tests to examine precision, bias, and relatedness of indicators for all accepted Provider-level Indicators, and precision and bias for all accepted Area-level Indicators. It should be noted that rates based on fewer than 30 cases in the numerator or the denominator are not reported. This exclusion rule serves two purposes:

- It eliminates unstable estimates based on too few cases.
- It helps protect the identities of hospitals and patients.

1c.7 Summary of Controversy/Contradictory Evidence: Panelists expressed concern regarding patients with "do not resuscitate" (DNR) status. In cases where this DNR status is not a direct result of poor quality of care, it would be contrary to patient desire and poor quality of care to rescue a patient. In addition, very old patients?or patients with advanced cancer or HIV?may not desire or may be particularly difficult to rescue from these complications. As a result, this indicator definition was modified to exclude those patients age 75 years and older. In addition, panelists suggested the exclusion of patients admitted from long-term care facilities.

Panelists noted that several adverse incentives may be introduced by implementing this indicator. In particular, since some type of adjustment may be desirable, this indicator may encourage the upcoding of complications and comorbidities to inflate the denominator or manipulate risk adjustment. Others noted that this indicator could encourage irresponsible resource use and allocation, although this is likely to be a controversial idea. Finally, panelists emphasized that this indicator should be used internally by hospitals, as it is not validated for public reporting.

See the following for a complete treatment of the topic:
http://www.qualityindicators.ahrq.gov/downloads/psi/psi_guide_v31.pdf
Note: The Literature Review Findings column summarizes evidence specific to each potential concern on the link between the PQIs and quality of care, as described in step 3 above. A question mark (?) indicates that the concern is theoretical or suggested, but no specific evidence was found in the literature. A check mark indicates that the concern has been demonstrated in the literature.

1c.8 Citations for Evidence (*other than guidelines*): Updated citations will be presented in the May Steering Committee meeting

Silber JH, Williams SV, Krakauer H, Schwartz JS. Hospital and patient characteristics associated with death after surgery. A study of adverse occurrence and failure to rescue. Med Care 1992;30(7):615-29.
Silber J, Rosenbaum P, Ross R. Comparing the contributions of groups of predictors: Which outcomes vary with hospital rather than patient characteristics? J Am Stat Assoc 1995;90:7-18.
Silber JH, Rosenbaum PR, Williams SV, Ross RN, Schwartz JS. The relationship between choice of outcome measure and hospital rank in general surgical procedures: Implications for quality assessment. Int J Qual Health Care 1997;9(3):193-200.
Needleman J, Buerhaus PI, Mattke S, Stewart M, Zelevinsky K. Nurse Staffing and Patient Outcomes in Hospitals. Boston MA: Health Resources and Services Administration; 2001 February 28. Report No.:230-99-0021.

1c.9 Quote the Specific guideline recommendation (*including guideline number and/or page number*): Not applicable **1c.10 Clinical Practice Guideline Citation:** Not applicable **1c.11 National Guideline Clearinghouse or other URL:** Not applicable **1c.12 Rating of strength of recommendation (*also provide narrative description of the rating and by whom*):** Not applicable **1c.13 Method for rating strength of recommendation** (*If different from USPSTF system, also describe rating and how it relates to USPSTF)*: Not applicable **1c.14 Rationale for using this guideline over others:** Not applicable	
TAP/Workgroup: What are the strengths and weaknesses in relation to the subcriteria for *Importance to Measure and Report?*	**1**
Steering Committee: Was the threshold criterion, *Importance to Measure and Report*, met? **Rationale:**	**1** **Y☐** **N☐**
2. SCIENTIFIC ACCEPTABILITY OF MEASURE PROPERTIES	
Extent to which the measure, as specified, produces consistent (reliable) and credible (valid) results about the quality of care when implemented. (evaluation criteria)	**Eval Rating**
2a. MEASURE SPECIFICATIONS	
S.1 Do you have a web page where current detailed measure specifications can be obtained? **S.2 If yes, provide web page URL:** **2a. Precisely Specified**	
2a.1 Numerator Statement (*Brief, text description of the numerator - what is being measured about the target population, e.g. target condition, event, or outcome*): All discharges with a disposition of "deceased" (DISP=20) among cases meeting the inclusion and exclusion rules for the denominator. **2a.2 Numerator Time Window (*The time period in which cases are eligible for inclusion in the numerator*):** Time window can be determined by user, but is generally a calendar year. **2a.3 Numerator Details (*All information required to collect/calculate the numerator, including all codes, logic, and definitions*):** All discharges with a disposition of "deceased" (DISP=20) among cases meeting the inclusion and exclusion rules for the denominator.	
2a.4 Denominator Statement (*Brief, text description of the denominator - target population being measured*): All surgical discharges age 18 years and older or MDC 14 (pregnancy, childbirth, and puerperium) defined by specific DRGs or MS-DRGs and an ICD-9-CM code for an operating room procedure, principal procedure within 2 days of admission OR admission type of elective (ATYPE=3) with potential complications of care listed in Death among Surgical definition (e.g., pneumonia, DVT/PE, sepsis, shock/cardiac arrest, or GI hemorrhage/acute ulcer). **2a.5 Target population gender:** Female **2a.6 Target population age range:** 18 and older **2a.7 Denominator Time Window (*The time period in which cases are eligible for inclusion in the***	**2a-specs** **C☐** **P☐** **M☐** **N☐**

denominator):
Time window can be determined by user, but is generally a calendar year.

2a.8 **Denominator Details (***All information required to collect/calculate the denominator - the target population being measured - including all codes, logic, and definitions***):**
All surgical discharges age 18 years and older or MDC 14 (pregnancy, childbirth, and puerperium) defined by specific DRGs or MS-DRGs and an ICD-9-CM code for an operating room procedure, principal procedure within 2 days of admission OR admission type of elective (ATYPE=3) with potential complications of care listed in Death among Surgical definition (pneumonia, DVT/PE, sepsis, shock/cardiac arrest, or GI hemorrhage/acute ulcer).

See Patient Safety Indicators Appendices:
• Appendix A – Operating Room Procedure Codes
• Appendix D – Surgical Discharge DRGs
• Appendix E – Surgical Discharge MS-DRGs
PSI appendices at:
http://www.qualityindicators.ahrq.gov/downloads/psi/TechSpecs42/PSI%20Appendices.pdf:

FTR 2 - DVT/PE: Denominator
A diagnosis of pulmonary embolism or deep vein thrombosis in any secondary diagnosis field

ICD-9-CM Pulmonary Embolism and Deep Vein Thrombosis diagnosis codes:
Pulmonary Embolism
4151
PULMONARY EMBOLISM AND INFARCTION
41511
IATROGENIC PULMONARY EMBOLISM AND INFARCTION
41519
PULMONARY EMBOLISM AND INFARCTION, OTHER
Deep Vein Thrombosis
45111
PHLEBITIS AND THROMBOSIS OF FEMORAL VEIN (DEEP) (SUPERFICIAL)
45119
PHLEBITIS AND THROMBOPHLEBITIS OF DEEP VESSEL OF LOWER EXTREMITIES – OTHER
4512
PHLEBITIS AND THROMBOPHLEBITIS OF LOWER EXTREMITIES UNSPECIFIED
45181
PHLEBITIS AND THROMBOPHLEBITIS OF ILIAC VEIN
4519
PHLEBITIS AND THROMBOPHLEBITIS OF OTHER SITES - OF UNSPECIFIED SITE
45340
DVT-EMBLSM LOWER EXT NOS (OCT 04)
45341
DVT-EMB PROX LOWER EXT (OCT 04)
45342
DVT-EMB DISTAL LOWER EXT (OCT 04)
4538
OTHER VENOUS EMBOLISM AND THROMBOSIS OF OTHER SPECIFIED VEINS
4539
OTHER VENOUS EMBOLISM AND THROMBOSIS OF UNSPECIFIED SITE

FTR 3 – Pneumonia: Denominator
A diagnosis of pneumonia in any secondary diagnosis field

ICD-9-CM Pneumonia diagnosis codes:
4820
PNEUMONIA DUE TO KLEBSIELLA PNEUMONIAE
4821

PNEUMONIA DUE TO PSEUDOMONAS
4822
PNEUMONIA DUE TO HEMOPHILUS INFLUENZAE [H. INFLUENZAE]
4823
PNEUMONIA DUE TO STREPTOCOCCUS
48230
PNEUMONIA DUE TO STREPTOCOCCUS – STREPTOCOCCUS, UNSPECIFIED
48231
PNEUMONIA DUE TO STREPTOCOCCUS – GROUP A
48232
PNEUMONIA DUE TO STREPTOCOCCUS – GROUP B
48239
PNEUMONIA DUE TO STREPTOCOCCUS – OTHER STREPTOCOCCUS
4824
PNEUMONIA DUE TO STAPHYLOCOCCUS
48240
PNEUMONIA DUE TO STAPHYLOCOCCUS – PNEUMONIA DUE TO STAPHYLOCOCCUS, UNSPECIFIED
48241
METHICILLIN SUSCEPTIBLE PNEUMONIA DUE TO STAPHYLOCOCCUS AUREUS OCT08-
48242
METHICILLIN RESISTANT PNEUMONIA DUE TO STAPHYLOCOCCUS AUREUS OCT08-
48249
PNEUMONIA DUE TO STAPHYLOCOCCUS – OTHER STAPHYLOCOCCUS PNEUMONIA
4828
PNEUMONIA DUE TO OTHER SPECIFIED BACTERIA
48281
PNEUMONIA DUE TO OTHER SPECIFIED BACTERIA – ANAEROBES
48282
PNEUMONIA DUE TO OTHER SPECIFIED BACTERIA – EXCHERICHIA COLI [E COLI]
48283
PNEUMONIA DUE TO OTHER SPECIFIED BACTERIA – OTHER GRAM-NEGATIVE BACTERIA
48284
PNEUMONIA DUE TO OTHER SPECIFIED BACTERIA – LEGIONNAIRES´ DISEASE
48289
PNEUMONIA DUE TO OTHER SPECIFIED BACTERIA – OTHER SPECIFIED BACTERIA
4829
BACTERIAL PNEUMONIA UNSPECIFIED
485
BRONCHOPNEUMONIA, ORGANISM UNSPECIFIED
486
PNEUMONIA, ORGANISM UNSPECIFIED
5070
DUE TO INHALATION OF FOOD OR VOMITUS
514
PULMONARY CONGESTION AND HYPOSTASIS

FTR 4 – Sepsis: Denominator
A diagnosis of sepsis in any secondary diagnosis field

Include ICD-9-CM Sepsis diagnosis codes:
0380
STREPTOCOCCAL SEPTICEMIA
0381
STAPHYLOCOCCAL SEPTICEMIA
03810
STAPHYLOCOCCAL SEPTICEMIA, UNSPECIFIED
03811
METHICILLIN SUSCEPTIBLE STAPHYLOCOCCUS AUREUS SEPTICEMIA OCT08-

03812
METHICILLIN RESISTANT STAPHYLOCOCCUS AUREUS SEPTICEMIA OCT08-
03819
OTHER STAPHYLOCOCCAL SEPTICEMIA
0382
PNEUMOCOCCAL SEPTICEMIA (STREPTOCOCCUS PNEUMONIAE SEPTICEMIA)
0383
SEPTICEMIA DUE TO ANAEROBES
03840
GRAM-NEGATIVE ORGANISM, UNSPECIFIED
03841
HEMOPHILUS INFLUENZAE
03842
ESCHERICHIA COLI
03843
PSEUDOMONAS
03844
SERRATIA
03849
SEPTICEMIA DUE TO OTHER GRAM-NEGATIVE ORGANISMS
0388
OTHER SPECIFIED SEPTICEMIAS
0389
UNSPECIFIED SEPTICEMIA
78552
SEPTIC SHOCK OCT03-
78559*
SHOCK W/O MENTION OF TRAUMA- OTHER
99591
SYSTEMIC INFLAMMATORY RESPONSE SYNDROME DUE TO INFECTIOUS PROCESS W/O ORGAN DYSFUNCTION
99592
SYSTEMIC INFLAMMATORY RESPONSE SYNDROME DUE TO INFECTIOUS PROCESS W/ ORGAN DYSFUNCTION
9980
POSTOPERATIVE SHOCK
*No longer valid in FY2005

FTR 5 - Shock or Cardiac Arrest: Denomniator
A diagnosis of shock or cardiac arrest in any secondary field or any procedure for shock or cardiac arrest

Include ICD-9-CM Shock or Cardiac Arrest diagnosis codes:
4275
CARDIAC ARREST
6395
COMPLICATIONS FOLLOWING ABORTION AND ECTOPIC AND MOLAR PREGNANCIES, SHOCK
66910
SHOCK DURING OR FOLLOWING LABOR AND DELIVERY – UNSPECIFIED AS TO EPISODE OF CARE OR NOT APPLICABLE
66911
SHOCK DURING OR FOLLOWING LABOR AND DELIVERY – DELIVERED, W/ OR W/O MENTION OF ANTEPARTUM CONDITION
66912
SHOCK DURING OR FOLLOWING LABOR AND DELIVERY – DELIVERED, W/ MENTION OF POSTPARTUM COMPLICATION
66913
SHOCK DURING OR FOLLOWING LABOR AND DELIVERY – ANTEPARTUM CONDITION OR COMPLICATION
66914
SHOCK DURING OR FOLLOWING LABOR AND DELIVERY – POSTPARTUM CONDITION OR COMPLICATION
7855

SHOCK NOS
78550
SHOCK, UNSPECIFIED
78551
CARDIOGENIC SHOCK
78552
SEPTIC SHOCK OCT03-
78559
SHOCK W/O MENTION OF TRAUMA- OTHER
7991
RESPIRATORY ARREST
9950
OTHER ANAPHYLACTIC SHOCK
9954
SHOCK DUE TO ANESTHESIA
9980
POSTOPERATIVE SHOCK
9994
ANAPHYLACTIC SHOCK DUE TO SERUM
ICD-9-CM Shock or Cardiac Arrest procedure codes:
9393
NONMECHANICAL METHODS OF RESUSCITATION
9960
CARDIOPULMONARY RESUSCITATION, NOS
9963
CLOSED CHEST CARDIAC MASSAGE

FTR 6 - GI Hemorrhage/Acute Ulcer: Denominator
A diagnosis of hemorrhage or acute ulcer in any secondary field

ICD-9-CM GI Hemorrhage/Acute Ulcer diagnosis codes:
4560
ESOPHAGEAL VARICES W/ BLEEDING
45620
ESOPHAGEAL VARICES IN DISEASES CLASSIFIED ELSEWHERE W/ BLEEDING
5307
GASTROESOPHAGEAL LACERATION-HEMORRHAGE SYNDROME
53082
ESOPHAGEAL HEMORRHAGE
Gastric ulcer:
53100
ACUTE W/ HEMORRHAGE – W/O MENTION OF OBSTRUCTION
53101
ACUTE W/ HEMORRHAGE – W/ OBSTRUCTION
53110
ACUTE W/ PERFORATION – W/O MENTION OF OBSTRUCTION
53111
ACUTE W/ PERFORATION – W/ OBSTRUCTION
53120
ACUTE W/ HEMORRHAGE AND PERFORATION – W/O MENTION OF OBSTRUCTION
53121
ACUTE W/ HEMORRHAGE AND PERFORATION – W/ OBSTRUCTION
53130
ACUTE W/O MENTION OF HEMORRHAGE OR PERFORATION – W/O MENTION OF OBSTRUCTION
53131
ACUTE W/O MENTION OF HEMORRHAGE OR PERFORATION – W/ OBSTRUCTION
53190
UNSPECIFIED AS ACUTE OR CHRONIC, W/O MENTION OF HEMORRHAGE OR PERFORATION – W/O MENTION OF

OBSTRUCTION
53191
UNSPECIFIED AS ACUTE OR CHRONIC, W/O MENTION OF HEMORRHAGE OR PERFORATION – W/ OBSTRUCTION
Duodenal ulcer:
53200
ACUTE W/ HEMORRHAGE – W/O MENTION OF OBSTRUCTION
53201
ACUTE W/ HEMORRHAGE – W/ OBSTRUCTION
53210
ACUTE W/ PERFORATION – W/O MENTION OF OBSTRUCTION
53211
ACUTE W/ PERFORATION – W/ OBSTRUCTION
53220
ACUTE W/ HEMORRHAGE AND PERFORATION – W/O MENTION OF OBSTRUCTION
53221
ACUTE W/ HEMORRHAGE AND PERFORATION – W/ OBSTRUCTION
53230
ACUTE W/O MENTION OF HEMORRHAGE OR PERFORATION – W/O MENTION OF OBSTRUCTION
53231
ACUTE W/O MENTION OF HEMORRHAGE OR PERFORATION – W/ OBSTRUCTION
53290
UNSPECIFIED AS ACUTE OR CHRONIC, W/O MENTION OF HEMORRHAGE OR PERFORATION – W/O MENTION OF OBSTRUCTION
53291
UNSPECIFIED AS ACUTE OR CHRONIC, W/O MENTION OF HEMORRHAGE OR PERFORATION – W/ OBSTRUCTION
Peptic ulcer:
53300
SITE UNSPECIFIED ACUTE W/ HEMORRHAGE – W/O MENTION OF OBSTRUCTION
53301
SITE UNSPECIFIED ACUTE W/ HEMORRHAGE – W/ OBSTRUCTION
53310
SITE UNSPECIFIED ACUTE W/ PERFORATION – W/O MENTION OF OBSTRUCTION
53311
SITE UNSPECIFIED ACUTE W/ PERFORATION – W/ OBSTRUCTION
53320
SITE UNSPECIFIED ACUTE W/ HEMORRHAGE AND PERFORATION – W/O MENTION OF OBSTRUCTION
53321
SITE UNSPECIFIED ACUTE W/ HEMORRHAGE AND PERFORATION – W/O MENTION OF OBSTRUCTION
53330
SITE UNSPECIFIED ACUTE W/O MENTION OF HEMORRHAGE AND PERFORATION – W/O MENTION OF OBSTRUCTION
53331
SITE UNSPECIFIED ACUTE W/O MENTION OF HEMORRHAGE AND PERFORATION – W/ OBSTRUCTION
53390
SITE UNSPECIFIED AS ACUTE OR CHRONIC, W/O MENTION OF HEMORRHAGE OR PERFORATION – W/O MENTION OF OBSTRUCTION
53391
UNSPECIFIED AS ACUTE OR CHRONIC, W/O MENTION OF HEMORRHAGE OR PERFORATION – W/ OBSTRUCTION
Gastrojejunal ulcer:
53400
ACUTE W/ HEMORRHAGE – W/O MENTION OF OBSTRUCTION
53401
ACUTE W/ HEMORRHAGE – W/ OBSTRUCTION
53410
ACUTE W/ PERFORATION – W/O MENTION OF OBSTRUCTION
53411
ACUTE W/ PERFORATION – W/ OBSTRUCTION
53420

ACUTE W/ HEMORRHAGE AND PERFORATION – W/O MENTION OF OBSTRUCTION
53421
ACUTE W/ HEMORRHAGE AND PERFORATION – W/ OBSTRUCTION
53430
ACUTE W/O MENTION OF HEMORRHAGE OR PERFORATION – W/O MENTION OF OBSTRUCTION
53431
ACUTE W/O MENTION OF HEMORRHAGE OR PERFORATION – W/ OBSTRUCTION
53490
UNSPECIFIED AS ACUTE OR CHRONIC, W/O MENTION OF HEMORRHAGE OR PERFORATION – W/O MENTION OF OBSTRUCTION
53491
UNSPECIFIED AS ACUTE OR CHRONIC, W/O MENTION OF HEMORRHAGE OR PERFORATION – W/ OBSTRUCTION
Gastritis and duodenitis:
53501
ACUTE GASTRITIS – W/ HEMORRHAGE
53511
ATROPHIC GASTRITIS – W/ HEMORRHAGE
53521
GASTRIC MUCOSAL HYPERTROPHY – W/ HEMORRHAGE
53531
ALCOHOLIC GASTRITIS – W/ HEMORRHAGE
53541
OTHER SPECIFIED GASTRITIS – W/ HEMORRHAGE
53551
UNSPECIFIED GASTRITIS AND GASTRODUODENITIS – W/ HEMORRHAGE
53561
DUODENITIS – W/ HEMORRHAGE
53783
ANGIODYSPLASIA OF STOMACH AND DUODENUM – W/ HEMORRHAGE
53784
DIEULAFOY LESION (HEMORRHAGIC) OF STOMACH AND DUODENUM
56202
DIVERTICULOSIS OF SMALL INTESTINE – W/ HEMORRHAGE
56203
DIVERTICULITIS OF SMALL INTESTINE – W/ HEMORRHAGE
56212
DIVERTICULOSIS OF COLON – W/ HEMORRHAGE
56213
DIVERTICULITIS OF COLON – W/ HEMORRHAGE
5693
HEMORRHAGE OF RECTUM AND ANUS
56985
ANGIODYSPLASIA OF INTESTINE – W/ HEMORRHAGE
56986
DIEULAFOY LESION (HEMORRHAGIC) OF INTESTINE
5780
HEMATEMESIS
5781
BLOOD IN STOOL
5789
HEMORRHAGE OF GASTROINTESTINAL TRACT, UNSPECIFIED

2a.9 Denominator Exclusions (*Brief text description of exclusions from the target population***):** Exclude cases:
• age 90 years and older
• transferred to an acute care facility (DISP = 2)
• missing discharge disposition (DISP=missing), gender (SEX=missing), age (AGE=missing), quarter (DQTR=missing), year (YEAR=missing) or principal diagnosis (DX1 =missing)

NOTE: Additional exclusion criteria is specific to each diagnosis (pneumonia, DVT/PE, sepsis, shock/cardiac arrest, or GI hemorrhage/acute ulcer). See 2a.10.

2a.10 Denominator Exclusion Details (*All information required to collect exclusions to the denominator, including all codes, logic, and definitions***):**
Exclude cases:
• age 90 years and older
• transferred to an acute care facility (DISP = 2)
• missing discharge disposition (DISP=missing), gender (SEX=missing), age (AGE=missing), quarter (DQTR=missing), year (YEAR=missing) or principal diagnosis (DX1 =missing)

NOTE: Additional exclusion criteria is specific to each diagnosis (pneumonia, DVT/PE, sepsis, shock/cardiac arrest, or GI hemorrhage/acute ulcer). See below for specifics.

FTR 2 - DVT/PE: Exclusions
• with a diagnosis of pulmonary embolism or deep vein thrombosis in the primary diagnosis field (Defined in 2a.8)
• with a diagnosis of abortion-related or postpartum obstetric pulmonary embolism in the primary diagnosis field

ICD-9-CM Abortion-related and Postpartum Obstetric Pulmonary Embolism diagnosis codes:
63460
SPONTANEOUS ABORTION W/ EMBOLISM - UNSPECIFIED
63461
SPONTANEOUS ABORTION W/ EMBOLISM - INCOMPLETE
63462
SPONTANEOUS ABORTION W/ EMBOLISM - COMPLETE
63560
LEGAL ABORTION W/ EMBOLISM - UNSPECIFIED
63561
LEGAL ABORTION W/ EMBOLISM - INCOMPLETE
63562
LEGAL ABORTION W/ EMBOLISM - COMPLETE
63660
ILLEGAL ABORTION W/ EMBOLISM - UNSPECIFIED
63661
ILLEGAL ABORTION W/ EMBOLISM - INCOMPLETE
63662
ILLEGAL ABORTION W/ EMBOLISM - COMPLETE
63760
ABORTION NOS W/ EMBOLISM - UNSPECIFIED
63761
ABORTION NOS W/ EMBOLISM - INCOMPLETE
63762
ABORTION NOS W/ EMBOLISM - COMPLETE
6386
ATTEMPTED ABORTION W/ EMBOLISM
6396
POSTABORTION EMBOLISM
67320
OBSTETRICAL BLOOD-CLOT EMBOLISM, UNSPECIFIED AS TO EPISODE OF CARE OR NOT APPLICABLE
67321
OBSTETRICAL BLOOD-CLOT EMBOLISM, DELIVERED, W/ OR W/O MENTION OF ANTEPARTUM CONDITION
67322
OBSTETRICAL BLOOD-CLOT EMBOLISM, DELIVERED, W/ MENTION OF POSTPARTUM COMPLICATION
67323
OBSTETRICAL BLOOD-CLOT EMBOLISM, ANTEPARTUM CONDITION OR COMPLICATION
67324

OBSTETRICAL BLOOD-CLOT EMBOLISM, POSTPARTUM CONDITION OR COMPLICATION

FTR 3 – Pneumonia: Exclusions
• with a diagnosis of pneumonia or respiratory complications in the primary diagnosis field (Defined in 2a.8)
• with any diagnosis code for viral pneumonia
• with any diagnosis of or procedure for immunocompromised state.
• MDC 4 (diseases/disorders of respiratory system)

See Patient Safety Indicators Appendices:
• Appendix I – Immunocompromised State Diagnosis and Procedure Codes
PSI appendices at:
http://www.qualityindicators.ahrq.gov/downloads/psi/TechSpecs42/PSI%20Appendices.pdf:

ICD-9-CM Respiratory Complications diagnosis code:
9973
RESPIRATORY COMPLICATIONS
ICD-9-CM Viral Pneumonia diagnosis codes:
4800
ADENOVIRAL PNEUMONIA
4801
RESPIRATORY SYNCYTIAL VIRAL PNEUMONIA
4802
PARAINFLUENZA VIRAL PNEUMONIA
4803
PNEUMONIA DUE TO SARS OCT03-
4808
VIRAL PNEUMONIA NOT ELSEWHERE CLASSIFIED
4809
VIRAL PNEUMONIA UNSPECIFIED
481
PNEUMOCOCCAL PNEUMONIA
4830
PNEUMONIA DUE TO MYCOPLASMA PNEUMONIAE
4831
PNEUMONIA DUE TO CHLAMYDIA
4838
PNEUMONIA DUE TO OTHER SPECIFIED ORGANISM
4841
PNEUMONIA IN CYTOMEGALIC INCLUSION DISEASE
4843
PNEUMONIA IN WHOOPING COUGH
4845
PNEUMONIA IN ANTHRAX
4846
PNEUMONIA IN ASPERGILLOSIS
4847
PNEUMONIA IN OTHER SYSTEMIC MYCOSES
4848
PNEUMONIA IN INFECTIOUS DISEASE NOT ELSEWHERE CLASSIFIED
4870
INFLUENZA W/ PNEUMONIA
4871
FLU W/ RESPIRATORY MANIFEST NOT ELSEWHERE CLASSIFIED
4878
FLU W/ MANIFESTATION NOT ELSEWHERE CLASSIFIED
488
FLU D/T AVIAN FLU VIRUS
4880

INFLUENZA DUE TO IDENTIFIED AVIAN INFLUENZA VIRUS OCT09-
4881
INFLUENZA DUE TO IDENTIFIED NOVEL H1N1 INFLUENZA VIRUS OCT09-

FTR 4 – Sepsis: Exclusions
• with a diagnosis of sepsis in the principal diagnosis field (Defined in 2a.8)
• with any diagnosis of infection
• with any diagnosis of or procedure for immunocompromised state
• with a length of stay of less than 4 days

See Patient Safety Indicators Appendices:
• Appendix F – Infection Diagnosis Codes
• Appendix I – Immunocompromised State Diagnosis and Procedure Codes
PSI appendices at:
http://www.qualityindicators.ahrq.gov/downloads/psi/TechSpecs42/PSI%20Appendices.pdf:

FTR 5 - Shock or Cardiac Arrest: Exclusions
• with a primary diagnosis of shock or cardiac arrest (Defined in 2a.8)
• with a primary diagnosis of trauma
• with a primary diagnosis of hemorrhage or GI hemorrhage
• with a primary diagnosis of abortion-related shock
• MDC 4 (diseases/disorders of respiratory system)
• MDC 5 (diseases/disorders of circulatory system)

See Patient Safety Indicators Appendices:
• Appendix G – Trauma Diagnosis Codes
PSI appendices at:
http://www.qualityindicators.ahrq.gov/downloads/psi/TechSpecs42/PSI%20Appendices.pdf:

ICD-9-CM Hemorrhage diagnosis codes:
2851
ACUTE POSTHEMORRHAGIC ANEMIA
4590
OTHER DISORDERS OF CIRCULATORY SYSTEM, HEMORRHAGE, UNSPECIFIED
56881
HEMOPERITONEUM (NONTRAUMATIC)
9582
CERTAIN EARLY COMPLICATIONS OF TRAUMA, SECONDARY AND RECURRENT HEMORRHAGE
99811
HEMORRHAGE COMPLICATING A PROCEDURE
ICD-9-CM Gastrointestinal (GI) Hemorrhage diagnosis codes:
4560
ESOPHAGEAL VARICES W/ BLEEDING
45620
ESOPHAGEAL VARICES IN DISEASES CLASSIFIED ELSEWHERE W/ BLEEDING
5307
GASTROESOPHAGEAL LACERATION – HEMORRHAGE SYNDROME
53082
ESOPHAGEAL HEMORRHAGE
53100
GASTRIC ULCER ACUTE W/ HEMORRHAGE – W/O MENTION OF OBSTRUCTION
53101
GASTRIC ULCER ACUTE W/ HEMORRHAGE – W/ OBSTRUCTION
53120
GASTRIC ULCER ACUTE W/ HEMORRHAGE AND PERFORATION – W/O MENTION OF OBSTRUCTION
53121
GASTRIC ULCER ACUTE W/ HEMORRHAGE AND PERFORATION – W/ OBSTRUCTION
53140

GASTRIC ULCER CHRONIC OR UNSPECIFIED W/ HEMORRHAGE – W/O MENTION OF OBSTRUCTION
53141
GASTRIC ULCER CHRONIC OR UNSPECIFIED W/ HEMORRHAGE – W/ OBSTRUCTION
53160
GASTRIC ULCER CHRONIC OR UNSPECIFIED W/ HEMORRHAGE AND PERFORATION – W/O MENTION OF OBSTRUCTION
53161
GASTRIC ULCER CHRONIC OR UNSPECIFIED W/ HEMORRHAGE AND PERFORATION – W/ OBSTRUCTION
53200
DUODENAL ULCER ACUTE W/ HEMORRHAGE – W/O MENTION OF OBSTRUCTION
53201
DUODENAL ULCER ACUTE W/ HEMORRHAGE – W/ OBSTRUCTION
53220
DUODENAL ULCER ACUTE W/ HEMORRHAGE AND PERFORATION – W/O MENTION OF OBSTRUCTION
53221
DUODENAL ULCER ACUTE W/ HEMORRHAGE AND PERFORATION – W/ OBSTRUCTION
53240
DUODENAL ULCER CHRONIC OR UNSPECIFIED W/ HEMORRHAGE – W/O MENTION OF OBSTRUCTION
53241
DUODENAL ULCER CHRONIC OR UNSPECIFIED W/ HEMORRHAGE – W/ OBSTRUCTION
53260
DUODENAL ULCER CHRONIC OR UNSPECIFIED W/ HEMORRHAGE AND PERFORATION – W/O MENTION OF OBSTRUCTION
53261
DUODENAL ULCER CHRONIC OR UNSPECIFIED W/ HEMORRHAGE AND PERFORATION – W/ OBSTRUCTION
53300
PEPTIC ULCER, SITE UNSPECIFIED, ACUTE W/ HEMORRHAGE – W/O MENTION OF OBSTRUCTION
53301
PEPTIC ULCER, SITE UNSPECIFIED, ACUTE W/ HEMORRHAGE – W/ OBSTRUCTION
53320
PEPTIC ULCER, SITE UNSPECIFIED, ACUTE W/ HEMORRHAGE AND PERFORATION – W/O MENTION OF OBSTRUCTION
53321
PEPTIC ULCER, SITE UNSPECIFIED, ACUTE W/ HEMORRHAGE AND PERFORATION – W/ OBSTRUCTION
53340
PEPTIC ULCER, SITE UNSPECIFIED, CHRONIC OR UNSPECIFIED W/ HEMORRHAGE – W/O MENTION OF OBSTRUCTION
53341
PEPTIC ULCER, SITE UNSPECIFIED, CHRONIC OR UNSPECIFIED W/ HEMORRHAGE – W/ OBSTRUCTION
53360
PEPTIC ULCER, SITE UNSPECIFIED, CHRONIC OR UNSPECIFIED W/ HEMORRHAGE AND PERFORATION – W/O MENTION OF OBSTRUCTION
53361
PEPTIC ULCER, SITE UNSPECIFIED, CHRONIC OR UNSPECIFIED W/ HEMORRHAGE AND PERFORATION – W/ OBSTRUCTION
53400
GASTROJEJUNAL ULCER, ACUTE W/ HEMORRHAGE – W/O MENTION OF OBSTRUCTION
53401
GASTROJEJUNAL ULCER, ACUTE W/ HEMORRHAGE – W/ OBSTRUCTION
53420
GASTROJEJUNAL ULCER, ACUTE W/ HEMORRHAGE AND PERFORATION – W/O MENTION OF OBSTRUCTION
53421
GASTROJEJUNAL ULCER, ACUTE W/ HEMORRHAGE AND PERFORATION – W/ OBSTRUCTION
53440
GASTROJEJUNAL ULCER, CHRONIC OR UNSPECIFIED W/ HEMORRHAGE – W/O MENTION OF OBSTRUCTION
53441
GASTROJEJUNAL ULCER, CHRONIC OR UNSPECIFIED W/ HEMORRHAGE – W/ OBSTRUCTION
53460

GASTROJEJUNAL ULCER, CHRONIC OR UNSPECIFIED W/ HEMORRHAGE AND PERFORATION – W/O MENTION OF OBSTRUCTION
53461
GASTROJEJUNAL ULCER, CHRONIC OR UNSPECIFIED W/ HEMORRHAGE AND PERFORATION – W/ OBSTRUCTION
53501
GASTRITIS AND DUODENITIS, ACUTE GASTRITIS W/ HEMORRHAGE
53511
GASTRITIS AND DUODENITIS, ATROPHIC GASTRITIS W/ HEMORRHAGE
53521
GASTRITIS AND DUODENITIS, GASTRIC MUCOSAL HYPERTROPHY, W/ HEMORRHAGE
53531
GASTRITIS AND DUODENITIS, ALCOHOLIC GASTRITIS, W/ HEMORRHAGE
53541
GASTRITIS AND DUODENITIS, OTHER SPECIFIED GASTRITIS – W/ HEMORRHAGE
53551
GASTRITIS AND DUODENITIS, UNSPECIFIED GASTRITIS AND GASTRODUODENITIS – W/ HEMORRHAGE
53561
GASTRITIS AND DUODENITIS, DUODENITIS – W/ HEMORRHAGE
53783
OTHER SPECIFIED DISORDERS OF STOMACH AND DUODENUM, ANGIODYSPLASIA OF STOMACH AND DUODENUM – W/ HEMORRHAGE
53784
DIEULAFOY LESION (HEMORRHAGIC) OF STOMACH AND DUODENUM
56202
DIVERTICULOSIS OF SMALL INTESTINE – W/ HEMORRHAGE
56203
DIVERTICULITIS OF SMALL INTESTINE – W/ HEMORRHAGE
56212
DIVERTICULOSIS OF COLON – W/ HEMORRHAGE
56213
DIVERTICULITIS OF COLON – W/ HEMORRHAGE
5693
HEMORRHAGE OF RECTUM AND ANUS
56985
ANGIODYSPLASIA OF INTESTINE - W/ HEMORRHAGE
56986
DIEULAFOY LESION (HEMORRHAGIC) OF INTESTINE
5780
GASTROINTESTINAL HEMORRHAGE, HEMATEMESIS
5781
GASTROINTESTINAL HEMORRHAGE, BLOOD IN STOOL
5789
GASTROINTESTINAL HEMORRHAGE, HEMORRHAGE OF GASTROINTESTINAL TRACT, UNSPECIFIED
ICD-9-CM Abortion-related Shock diagnosis codes:
63450
SPONTANEOUS ABORTION W/ SHOCK - UNSPECIFIED
63451
SPONTANEOUS ABORTION W/ SHOCK - INCOMPLETE
63452
SPONTANEOUS ABORTION W/ SHOCK - COMPLETE
63550
LEGAL ABORTION W/ SHOCK - UNSPECIFIED
63551
LEGAL ABORTION W/ SHOCK - INCOMPLETE
63552
LEGAL ABORTION W/ SHOCK - COMPLETE
63650
ILLEGAL ABORTION W/ SHOCK - UNSPECIFIED

63651
ILLEGAL ABORTION W/ SHOCK - INCOMPLETE
63652
ILLEGAL ABORTION W/ SHOCK - COMPLETE
63750
ABORTION NOS W/ SHOCK - UNSPECIFIED
63751
ABORTION NOS W/ SHOCK - INCOMPLETE
63752
ABORTION NOS W/ SHOCK - COMPLETE
6385
ATTEMPTED ABORTION W/ SHOCK

FTR 6 - GI Hemorrhage/Acute Ulcer: Exclusions
• with a primary diagnosis of hemorrhage or acute ulcer (Defined in 2a.8)
• with a primary diagnosis of trauma
• with a primary diagnosis of alcoholism
• with a primary diagnosis of anemia
• MDC 6 (diseases and disorders of the digestive system)
• MDC 7 (diseases and disorders of the hepatobiliary system and pancreas)

See Patient Safety Indicators Appendices:
• Appendix G – Trauma Diagnosis Codes
PSI appendices at:
http://www.qualityindicators.ahrq.gov/downloads/psi/TechSpecs42/PSI%20Appendices.pdf:

ICD-9-CM Alcoholism diagnosis codes:
2910
ALCOHOL WITHDRAWAL DELIRIUM
2911
ALCOHOL AMNESTIC SYNDROME
2912
OTHER ALCOHOLIC DEMENTIA
2913
ALCOHOL WITHDRAWAL HALLUCINOSIS
2914
IDIOSYNCRATIC ALCOHOL INTOXICATION
2915
ALCOHOLIC JEALOUSY
29181
OTHER SPECIFIED ALCOHOLIC PSYCHOSES, ALCOHOL WITHDRAWAL
29182
ALCOHOL INDUCED SLEEP DISORDERS OCT05-
29189
OTHER SPECIFIED ALCOHOLIC PSYCHOSES, OTHER
2919
UNSPECIFIED ALCOHOLIC PSYCHOSIS
30300
ACUTE ALCOHOLIC INTOXICATION - UNSPECIFIED
30301
ACUTE ALCOHOLIC INTOXICATION - CONTINUOUS
30302
ACUTE ALCOHOLIC INTOXICATION - EPISODIC
30303
ACUTE ALCOHOLIC INTOXICATION - IN REMISSION
30390
OTHER AND UNSPECIFIED ALCOHOL DEPENDENCE - UNSPECIFIED
30391

OTHER AND UNSPECIFIED ALCOHOL DEPENDENCE - CONTINUOUS
30392
OTHER AND UNSPECIFIED ALCOHOL DEPENDENCE - EPISODIC
30393
OTHER AND UNSPECIFIED ALCOHOL DEPENDENCE - IN REMISSION
30500
NONDEPENDENT ABUSE OF DRUGS, ALCOHOL ABUSE - UNSPECIFIED
30501
NONDEPENDENT ABUSE OF DRUGS, ALCOHOL ABUSE - CONTINUOUS
30502
NONDEPENDENT ABUSE OF DRUGS, ALCOHOL ABUSE - EPISODIC
30503
NONDEPENDENT ABUSE OF DRUGS, ALCOHOL ABUSE – IN REMISSION
4255
ALCOHOLIC CARDIOMYOPATHY
53530
ALCOHOLIC GASTRITIS, W/O MENTION OF HEMORRHAGE
53531
ALCOHOLIC GASTRITIS, W/ HEMORRHAGE
5710
ALCOHOLIC FATTY LIVER
5711
ACUTE ALCOHOLIC HEPATITIS
5712
ALCOHOLIC CIRRHOSIS OF LIVER
5713
ALCOHOLIC LIVER DAMAGE, UNSPECIFIED
9800
TOXIC EFFECT OF ALCOHOL, ETHYL ALCOHOL
9809
TOXIC EFFECT OF ALCOHOL, UNSPECIFIED ALCOHOL

ICD-9-CM Anemia diagnosis codes:
2800
SECONDARY TO BLOOD LOSS [CHRONIC]
2851
ACUTE POSTHEMORRHAGIC ANEMIA

2a.11 Stratification Details/Variables (*All information required to stratify the measure including the stratification variables, all codes, logic, and definitions***):**
User has an option to stratify by Gender, age (5-year age groups), race / ethnicity, primary payer, and custom stratifiers.

2a.12-13 Risk Adjustment Type: Risk adjustment method widely or commercially available

2a.14 Risk Adjustment Methodology/Variables (*List risk adjustment variables and describe conceptual models, statistical models, or other aspects of model or method***):**
The predicted value for each case is computed using a hierarchical model (logistic regression with hospital random effect) and covariates for gender, age in years (in 5-year age groups), modified CMS DRG and AHRQ Comorbidities. The reference population used in the model is the universe of discharges for states that participate in the HCUP State Inpatient Databases (SID) for the year 2007 (updated annually), a database consisting of 43 states and approximately 30 million adult discharges. The expected rate is computed as the sum of the predicted value for each case divided by the number of cases for the unit of analysis of interest (i.e., hospital, state, and region). The risk adjusted rate is computed using indirect standardization as the observed rate divided by the expected rate, multiplied by the reference population rate.

2a.15-17 Detailed risk model available Web page URL or attachment: URL None
http://qualityindicators.ahrq.gov/downloads/psi/PSI_Risk_Adjustment_Tables_(Version_4_2).pdf

2a.18-19 Type of Score: Rate/proportion

2a.20 Interpretation of Score: Better quality = Lower score

2a.21 Calculation Algorithm (*Describe the calculation of the measure as a flowchart or series of steps***):**
Each indicator is expressed as a rate, is defined as outcome of interest / population at risk or numerator / denominator. The AHRQ Quality Indicators (AHRQ QI) software performs five steps to produce the rates. 1) Discharge-level data is used to mark inpatient records containing the outcome of interest and 2) the population at risk. For provider indicators, the population at risk is also derived from hospital discharge records; for area indicators, the population at risk is derived from U.S. Census data. 3) Calculate observed rates. Using output from steps 1 and 2, rates are calculated for user-specified combinations of stratifiers. 4) Calculate expected rates. Regression coefficients from a reference population database are applied to the discharge records and aggregated to the provider or area level. 5) Calculate risk-adjusted rate. Use the indirect standardization to account for case-mix. 6) Calculate smoothed rate. A Univariate shrinkage factor is applied to the risk-adjusted rates. The shrinkage estimate reflects a reliability adjustment unique to each indicator. Full information on calculation algorithms and specifications can be found at http://qualityindicators.ahrq.gov/PSI_download.htm

2a.22 Describe the method for discriminating performance *(e.g., significance testing)***:**
Significance testing is not prescribed by the software. Users may calculate a confidence interval for the risk-adjusted rates and a posterior probability interval for the smoothed rates at a 95% or 99% level. Users may define the relevant benchmark and the methods of discriminating performance according to their application.

2a.23 Sampling (Survey) Methodology *If measure is based on a sample (or survey), provide instructions for obtaining the sample, conducting the survey and guidance on minimum sample size (response rate)*:
Not applicable

2a.24 Data Source (*Check the source(s) for which the measure is specified and tested)*
Administrative claims

2a.25 Data source/data collection instrument (*Identify the specific data source/data collection instrument, e.g. name of database, clinical registry, collection instrument, etc.***):**
The data source is hospital discharge data such as the HCUP State Inpatient Databases (SID) or equivalent using UB-04 coding standards. The data collection instrument is public-use AHRQ QI software available in SAS or Windows versions.

2a.26-28 Data source/data collection instrument reference web page URL or attachment: URL None
http://www.qualityindicators.ahrq.gov/software.htm

2a.29-31 Data dictionary/code table web page URL or attachment: URL None
http://www.qualityindicators.ahrq.gov/downloads/winqi/AHRQ_QI_Windows_Software_Documentation_V41a.pdf

2a.32-35 Level of Measurement/Analysis (*Check the level(s) for which the measure is specified and tested)*
Facility

2a.36-37 Care Settings (*Check the setting(s) for which the measure is specified and tested)*
Hospital/Acute Care Facility

2a.38-41 Clinical Services (*Healthcare services being measured, check all that apply*)
Clinicians: Physicians (MD/DO)

TESTING/ANALYSIS

2b. Reliability testing

2b.1 Data/sample *(description of data/sample and size)***:** AHRQ 2007 State Inpatient Databases (SID) with 4,000 hospitals and 30 million discharges

2b.2 Analytic Method *(type of reliability & rationale, method for testing)***:**
Literature review, expert panels and empirical analysis

2b.3 Testing Results *(reliability statistics, assessment of adequacy in the context of norms for the test*

2b
C☐
P☐
M☐
N☐

conducted):
PSI 4 A higher risk-adjusted mortality rate for death among surgical inpatients with serious treatable complications is associated with significantly higher costs. The AHRQ QIs have the advantage of taking the multidimensional nature of hospital quality into account. As the coefficients on the AHRQ QIs show, measures of hospital quality can have conflicting effects on hospital costs. A single measure that combines these effects into one variable offers less insight into hospital performance than the outcomes for each measure. [1]

Patient Safety Events Are Common at U.S. Hospitals: Between 2005 and 2007 there were 913,215 total patient safety events among Medicare beneficiaries. Common Patient Safety Events are Very Costly: Between 2005 and 2007 these patient safety events were associated with over $6.9 billion of wasted healthcare cost. Less Improvement Seen Among Most Common Events: Eight patient safety indicators showed improvement while seven indicators worsened in 2007 compared to 2005. Some of the most common and most serious indicators worsened, including decubitus ulcer (bed sores), sepsis, respiratory failure, deep vein thrombosis (blood clots in the legs), and pulmonary embolism (potentially fatal blood clots forming in the lungs). Approximately One-in-Ten Medicare Patients with Patient Safety Events Died: Between 2005 and 2007 there were 97,755 actual inhospital deaths that occurred among patients who experienced one or more of the 15 patient safety events. [2]

PSI 4: death among surgical inpatients with serious treatable complications was not included because many procedure codes are required. [3]

The initial translation (electronic mapping, review and revision by expert coder, programming of codes and testing on data from 1996-1998 [ICD 9-CM] to 1998-2006 [ICD-10-AM, through 4 editions]) found that differences between ICD-9-CM and ICD-10-AM datasets presented some challenges. After this phase, which was faithful to AHRQ´s case definitions, the indicators were refined for use with the condition onset flag, resulting in the AusPSIs. [4]

Principal Findings. Excess 90-day expenditures likely attributable to PSIs ranged from $646 for technical problems (accidental laceration, pneumothorax, etc.) to $28,218 for acute respiratory failure, with up to 20 percent of these costs incurred postdischarge. With a third of all 90-day deaths occurring postdischarge, the excess death rate associated with PSIs ranged from 0 to 7 percent. The excess 90-day readmission rate associated with PSIs ranged from 0 to 8 percent. Overall, 11 percent of all deaths, 2 percent of readmissions, and 2 percent of expenditures were likely due to these 14 PSIs. Conclusions. The effects of medical errors continue long after the patient leaves the hospital. Medical error studies that focus only on the inpatient stay can underestimate the impact of patient safety events by up to 20-30 percent. [5]

References
[1] Laditka JN, Laditka SB, Cornman CB. Evaluating hospital care for individuals with Alzheimer´s disease using inpatient quality indicators. Am J Alzheimers Dis Other Demen. 2005 Jan-Feb;20(1):27-36. PMID: 15751451.
[2] HealthGrades. Every 1.7 Minutes a Medicare Beneficiary Experiences a Patient Safety Event. Business Wire. Available on-line: http://www.allbusiness.com/government/government-bodies-offices/12279340-1.html. Accessed 1/11/2011.
[3] Hude Quan, MD, PhD; Saskia Drösler, MD; Vijaya Sundararajan, et al. Adaptation of AHRQ Patient Safety Indicators for Use in ICD-10 Administrative Data by an International Consortium. In Advances in Patient Safety: New Directions and Alternative Approaches (Vol. 1: Assessment). Henriksen K, Battles JB, Keyes MA, et al., editors. Rockville (MD): Agency for Healthcare Research and Quality; 2008 Aug. Bookshelf ID: NBK43634.
[4] McConchie S, Shepheard J, Waters S, McMillan AJ, Sundararajan V. The AusPSIs: the Australian version of the Agency of Healthcare Research and Quality patient safety indicators. Aust Health Rev. 2009 May;33(2):334-41. PMID: 19563325.
[5] Encinosa WE, Hellinger FJ. The impact of medical errors on ninety-day costs and outcomes: an examination of surgical patients. Health Serv Res. 2008 Dec;43(6):2067-85. Epub 2008 Jul 25. PMID: 18662169; DOI: 10.1111/j.1475-6773.2008.00882.x

2c. Validity testing

2c
C☐
P☐
M☐

2c.1 Data/sample *(description of data/sample and size)*: We restricted our analysis to 20 states (4) for which HCUP State Inpatient Databases (SID) were available. There were 1,601 nonfederal, urban, general hospitals

in those 20 states. Over 300 hospitals were eliminated from the sample because of key missing variables in the American Hospital Association (AHA) Annual Survey of Hospital data, which was also used for this study, or because they had missing observations for some of the OIs that we used. Thus, our sample consisted of 1,290 urban, acute-care hospitals for which complete data were available for 2001. [1]

The Agency for Healthcare Research and Quality Patient Safety Indicators (PSIs) were used to identify 14 PSIs among 161,004 surgeries. [5]

2c.2 Analytic Method *(type of validity & rationale, method for testing)*:
A likelihood ratio test of the hypothesis that the coefficients on all of these variables were equal to 0 (lambda) = 35.3, p< .01). [1]

We used propensity score matching and multivariate regression analyses to predict expenditures and outcomes attributable to the 14 PSIs. [5]

2c.3 Testing Results *(statistical results, assessment of adequacy in the context of norms for the test conducted)*:
PSI 4 A higher risk-adjusted mortality rate for death among surgical inpatients with serious treatable complications is associated with significantly higher costs. The AHRQ QIs have the advantage of taking the multidimensional nature of hospital quality into account. As the coefficients on the AHRQ QIs show, measures of hospital quality can have conflicting effects on hospital costs. A single measure that combines these effects into one variable offers less insight into hospital performance than the outcomes for each measure.[1]

Principal Findings. Excess 90-day expenditures likely attributable to PSIs ranged from $646 for technical problems (accidental laceration, pneumothorax, etc.) to $28,218 for acute respiratory failure, with up to 20 percent of these costs incurred postdischarge. With a third of all 90-day deaths occurring postdischarge, the excess death rate associated with PSIs ranged from 0 to 7 percent. The excess 90-day readmission rate associated with PSIs ranged from 0 to 8 percent. Overall, 11 percent of all deaths, 2 percent of readmissions, and 2 percent of expenditures were likely due to these 14 PSIs. Conclusions. The effects of medical errors continue long after the patient leaves the hospital. Medical error studies that focus only on the inpatient stay can underestimate the impact of patient safety events by up to 20-30 percent. [5]

References
[1] Laditka JN, Laditka SB, Cornman CB. Evaluating hospital care for individuals with Alzheimer´s disease using inpatient quality indicators. Am J Alzheimers Dis Other Demen. 2005 Jan-Feb;20(1):27-36. PMID: 15751451.
[5] Encinosa WE, Hellinger FJ. The impact of medical errors on ninety-day costs and outcomes: an examination of surgical patients. Health Serv Res. 2008 Dec;43(6):2067-85. Epub 2008 Jul 25. PMID: 18662169; DOI: 10.1111/j.1475-6773.2008.00882.

N☐

2d. Exclusions Justified

2d.1 Summary of Evidence supporting exclusion(s):
Exclusions remove cases where the outcome of interest is less likely to be preventable or more likely to be present on admission or with no or very low risk

2d.2 Citations for Evidence:
Updated citations will be presented in the May Steering Committee meeting

Measures of Patient Safety Based on Hospital Administrative Data -
The Patient Safety Indicators, August 2002
http://qualityindicators.ahrq.gov/downloads/technical/psi_technical_review.zip

2d.3 Data/sample *(description of data/sample and size)*: AHRQ 2007 State Inpatient Databases (SID) with 4,000 hospitals and 30 million adult discharges

2d.4 Analytic Method *(type analysis & rationale)*:
Expert panel and descriptive analyses stratified by exclusion categories

2d
C☐
P☐
M☐
N☐
NA☐

2d.5 Testing Results *(e.g., frequency, variability, sensitivity analyses)*:
Measures of Patient Safety Based on Hospital Administrative Data -
The Patient Safety Indicators, August 2002
http://qualityindicators.ahrq.gov/downloads/technical/psi_technical_review.zip

2e. Risk Adjustment for Outcomes/ Resource Use Measures

2e.1 Data/sample *(description of data/sample and size)*: AHRQ 2007 State Inpatient Databases (SID) with 4,000 hospitals and 30 million adult discharges

2e.2 Analytic Method *(type of risk adjustment, analysis, & rationale)*:
Risk-adjustment models use a standard set of categories based on readily available classification systems for demographics, severity of illness and comorbidities. Within each category, covariates are initially selected based on a minimum of 30 cases in the outcome of interest. Then a stepwise regression process on a development sample is used to select a parsimonious set of covariates where p<.05. Model is then tested on a validation sample

2e.3 Testing Results *(risk model performance metrics)*:
c 0.738

2e.4 If outcome or resource use measure is not risk adjusted, provide rationale: Not applicable

2e C☐ P☐ M☐ N☐ NA☐

2f. Identification of Meaningful Differences in Performance

2f.1 Data/sample from Testing or Current Use *(description of data/sample and size)*: AHRQ 2007 State Inpatient Databases (SID) with 4,000 hospitals and 30 million adult discharges

2f.2 Methods to identify statistically significant and practically/meaningfully differences in performance *(type of analysis & rationale)*:
Posterior probability distribution parameterized using the Gamma distribution

2f.3 Provide Measure Scores from Testing or Current Use *(description of scores, e.g., distribution by quartile, mean, median, SD, etc.; identification of statistically significant and meaningfully differences in performance)*:

5th	25th	Median	75th	95th
0.079961	0.104593	0.124460	0.146701	0.183056

2f C☐ P☐ M☐ N☐

2g. Comparability of Multiple Data Sources/Methods

2g.1 Data/sample *(description of data/sample and size)*: Not applicable

2g.2 Analytic Method *(type of analysis & rationale)*:
Not applicable

2g.3 Testing Results *(e.g., correlation statistics, comparison of rankings)*:
Not applicable

2g C☐ P☐ M☐ N☐ NA☐

2h. Disparities in Care

2h.1 If measure is stratified, provide stratified results *(scores by stratified categories/cohorts)*: [1] Although we did find overall disparities in care, we found that indicators for blacks, Hispanics, and Asians were not statistically worse than corresponding quality indicators for whites in the same hospital. Only a few hospitals provide lower quality of care to minorities than to whites.

[1] Darrell J. Gaskin, Christine S. Spencer, Patrick Richard, Gerard F. Anderson, Neil R. Powe and Thomas A. LaVeist. Do Hospitals Provide Lower-Quality Care To Minorities Than To Whites? Health Affairs, 27, no. 2 (2008): 518-527 doi: 10.1377/hlthaff.27.2.518

2h.2 If disparities have been reported/identified, but measure is not specified to detect disparities, provide follow-up plans:

2h C☐ P☐ M☐ N☐ NA☐

Not applicable	
TAP/Workgroup: What are the strengths and weaknesses in relation to the subcriteria for *Scientific Acceptability of Measure Properties?*	**2**
Steering Committee: Overall, to what extent was the criterion, *Scientific Acceptability of Measure Properties*, met? **Rationale:**	**2** **C** ☐ **P** ☐ **M** ☐ **N** ☐
3. USABILITY	
Extent to which intended audiences (e.g., consumers, purchasers, providers, policy makers) can understand the results of the measure and are likely to find them useful for decision making. (evaluation criteria)	**Eval Rating**
3a. Meaningful, Understandable, and Useful Information **3a.1 Current Use:** In use **3a.2 Use in a public reporting initiative (disclosure of performance results to the public at large)** (*If used in a public reporting initiative, provide name of initiative(s), locations, Web page URL(s). If not publicly reported, state the plans to achieve public reporting within 3 years*)**:** Arizona (NY QIO) Why Not the Best? http://www.http://whynotthebest.org/ Kentucky (Norton Healthcare, a hospital system) Norton Healthcare Quality Report http://www.nortonhealthcare.com/body.cfm?id=157 Kentucky (state hospital association) Kentucky Hospital Association Quality Data http://info.kyha.com/QualityData/IQISite/ Maine (state) Maine Health Data Organization http://gateway.maine.gov/mhdo2008Monahrq/home.html Minnesota (Minnesota Community Measurement) Minnesota Health Scores www.mnhealthscores.org Missouri (health care coalition) St Louis Area Business Health Coalition http://www.stlbhc.org/c_healthcare_4_3026553713.pdf Nevada (state hospital association) Nevada Hospital Association Hospital Performance http://www.nvhospitalquality.net/ New Hampshire (NY QIO) New York State Health Accountability Foundation http://nyshaf.org/juice/IPROSpikeChart.html New York (health care coalition) New York State Hospital Report Card	**3a** **C** ☐ **P** ☐ **M** ☐ **N** ☐

http://www.myhealthfinder.com/

Rhode Island (NY QIO)
Why Not the Best?
http://www.http://whynotthebest.org/

Washington (health care coalition)
Washington State Hospital Report Card
http://www.myhealthfinder.com/wa09/index.php

The measure is also reported on HCUPnet:
http://hcupnet.ahrq.gov/HCUPnet.jsp?Id=EB57801381F71C41&Form=MAINSEL&JS=Y&Action=%3E%3ENext%3E%3E&_MAINSEL=AHRQ%20Quality%20Indicators

This measure is used in the MONAHRQ system that is provided for public reporting and quality improvement throughout the United States: http://monahrq.ahrq.gov/

3a.3 **If used in other programs/initiatives (***If used in quality improvement or other programs/initiatives, name of initiative(s), locations, Web page URL(s). If not used for QI, state the plans to achieve use for QI within 3 years***):**
University Healthcare Consortium - An alliance of 103 academic medical centers and 219 of their affiliated hospitals. Reporting the AHRQ QIs to their member hospitals. (see www.uhc.edu. Note: measure results reported to hospitals; not reported on site).

Dallas Fort Worth Hospital Council – Reporting on measure results to over 70 hospitals in Texas (see www.dfwhc.ord. Note: measure results reported to hospitals; not reported on site).
Norton Healthcare - a multi-hospital system in Kentucky (see http://www.nortonhealthcare.com/about/Our_Performance/index.aspx)

Ministry Health Care - a multi-hospital system in Wisconsin (see http://ministryhealth.org/display/router.aspx. Note: measure results reported to hospitals; not reported on site).

Minnesota Hospital Association
http://www.mnhospitals.org/ Note: measure used in quality improvement. Not reported publicly by the association)

Premier - Premier´s "Quality Advisor" tool provides performance reports to approximately 650 hospitals for their use in monitoring and improving quality. Hospitals receive facility specific reports on this measure in Quality Advisor.

Testing of Interpretability (*Testing that demonstrates the results are understood by the potential users for public reporting and quality improvement*)
3a.4 **Data/sample** *(description of data/sample and size)***:** AHRQ 2007 State Inpatient Databases (SID) with 4,000 hospitals and 30 million adult discharges

3a.5 **Methods** *(e.g., focus group, survey, QI project)***:**
A research team from the School of Public Affairs, Baruch College, under contracts with the Department of Public Health, Weill Medical College and Battelle, Inc., has developed a pair of Hospital Quality Model Reports at the request of the Agency for Healthcare Research & Quality (AHRQ). These reports are designed specifically to report comparative information on hospital performance based on the AHRQ Quality Indicators (QIs). The work was done in close collaboration with AHRQ staff and the AHRQ Quality Indicators team.
The Model Reports (discussed immediately above) are based on:
• Extensive search and analysis of the literature on hospital quality measurement and reporting, as well as public reporting on health care quality more broadly;
• Interviews with quality measurement and reporting experts, purchasers, staff of purchasing coalitions, and executives of integrated health care delivery systems who are responsible for quality in their facilities;
• Two focus groups with chief medical officers of hospitals and/or systems and two focus groups with quality

managers from a broad mix of hospitals; • Four focus groups with members of the public who had recently experienced a hospital admission; and • Four rounds of cognitive interviews (a total of 62 interviews) to test draft versions of the two Model Reports with members of the public with recent hospital experience, basic computer literacy but widely varying levels of education. 3a.6 **Results** *(qualitative and/or quantitative results and conclusions)*: Given the above review of the literature and original research that was conducted, a Model report was the result that could help sponsors use the best evidence on public reports so they are most likely to have the desired effects on quality.	
3b/3c. Relation to other NQF-endorsed measures 3b.1 **NQF # and Title of similar or related measures:**	
(for NQF staff use) **Notes on similar/related endorsed or submitted measures:**	
3b. Harmonization If this measure is related to measure(s) already endorsed by NQF (e.g., same topic, but different target population/setting/data source or different topic but same target population): 3b.2 **Are the measure specifications harmonized? If not, why?**	**3b** C☐ P☐ M☐ N☐ NA ☐
3c. Distinctive or Additive Value 3c.1 **Describe the distinctive, improved, or additive value this measure provides to existing NQF-endorsed measures:** 5.1 **If this measure is similar to measure(s) already endorsed by NQF (i.e., on the same topic and the same target population), Describe why it is a more valid or efficient way to measure quality:**	**3c** C☐ P☐ M☐ N☐ NA ☐
TAP/Workgroup: What are the strengths and weaknesses in relation to the subcriteria for *Usability?*	**3**
Steering Committee: Overall, to what extent was the criterion, *Usability*, met? **Rationale:**	**3** C☐ P☐ M☐ N☐
4. FEASIBILITY	
Extent to which the required data are readily available, retrievable without undue burden, and can be implemented for performance measurement. (evaluation criteria)	Eval Rating
4a. Data Generated as a Byproduct of Care Processes 4a.1-2 **How are the data elements that are needed to compute measure scores generated?** Coding/abstraction performed by someone other than person obtaining original information (E.g., DRG, ICD-9 codes on claims, chart abstraction for quality measure or registry)	**4a** C☐ P☐ M☐ N☐
4b. Electronic Sources 4b.1 **Are all the data elements available electronically?** (*elements that are needed to compute measure scores are in defined, computer-readable fields, e.g., electronic health record, electronic claims*) Yes 4b.2 **If not, specify the near-term path to achieve electronic capture by most providers.**	**4b** C☐ P☐ M☐ N☐

4c. Exclusions **4c.1 Do the specified exclusions require additional data sources beyond what is required for the numerator and denominator specifications?** No **4c.2 If yes, provide justification.**	**4c** C☐ P☐ M☐ N☐ NA ☐
4d. Susceptibility to Inaccuracies, Errors, or Unintended Consequences **4d.1 Identify susceptibility to inaccuracies, errors, or unintended consequences of the measure and describe how these potential problems could be audited. If audited, provide results.** Coding professionals follow detail guidelines, are subject to training and credentialing requirements, peer review and audit.	**4d** C☐ P☐ M☐ N☐
4e. Data Collection Strategy/Implementation **4e.1 Describe what you have learned/modified as a result of testing and/or operational use of the measure regarding data collection, availability of data/missing data, timing/frequency of data collection, patient confidentiality, time/cost of data collection, other feasibility/ implementation issues:** None **4e.2 Costs to implement the measure** (*costs of data collection, fees associated with proprietary measures*)**:** Administrative data are collected as part of the routine operations. Some staff time is required to download and execute the software from the AHRQ webs site, which is available at no cost. **4e.3 Evidence for costs:** Administrative data are collected as part of the routine operations. Some staff time is required to download and execute the software from the AHRQ webs site, which is available at no cost. **4e.4 Business case documentation:** Administrative data are collected as part of the routine operations. Some staff time is required to download and execute the software from the AHRQ webs site, which is available at no cost.	**4e** C☐ P☐ M☐ N☐
TAP/Workgroup: What are the strengths and weaknesses in relation to the subcriteria for *Feasibility?*	**4**
Steering Committee: Overall, to what extent was the criterion, *Feasibility*, met? **Rationale:**	**4** C☐ P☐ M☐ N☐
RECOMMENDATION	
(for NQF staff use) **Check if measure is untested and only eligible for time-limited endorsement.**	**Time-limited** ☐
Steering Committee: Do you recommend for endorsement? **Comments:**	**Y☐** **N☐** **A☐**
CONTACT INFORMATION	
Co.1 Measure Steward (Intellectual Property Owner) **Co.1 Organization** Agency for Healthcare Research and Quality, 540 Gaither Road, Rockville, Maryland, 20850 **Co.2 Point of Contact** John, Bott, MSSW, MBA, John.Bott@AHRQ.hhs.gov, 301-427-1317-	

Measure Developer If different from Measure Steward
Co.3 Organization
Agency for Healthcare Research and Quality, 540 Gaither Road, Rockville, Maryland, 20850

Co.4 Point of Contact
John, Bott, MSSW, MBA, John.Bott@AHRQ.hhs.gov, 301-427-1317-

Co.5 Submitter If different from Measure Steward POC
John, Bott, MSSW, MBA, John.Bott@AHRQ.hhs.gov, 301-427-1317-, Agency for Healthcare Research and Quality

Co.6 Additional organizations that sponsored/participated in measure development
UC Davis,
Stanford University,
Battelle Memorial Institute'

ADDITIONAL INFORMATION

Workgroup/Expert Panel involved in measure development
Ad.1 Provide a list of sponsoring organizations and workgroup/panel members' names and organizations. Describe the members' role in measure development.
None

Ad.2 If adapted, provide name of original measure: None
Ad.3-5 If adapted, provide original specifications URL or attachment

Measure Developer/Steward Updates and Ongoing Maintenance
Ad.6 Year the measure was first released: 2003
Ad.7 Month and Year of most recent revision: 10, 2010
Ad.8 What is your frequency for review/update of this measure? Annual
Ad.9 When is the next scheduled review/update for this measure? 05, 2011

Ad.10 Copyright statement/disclaimers: The AHRQ QI software is publicly available; no copyright disclaimers

Ad.11 -13 Additional Information web page URL or attachment:

Date of Submission (*MM/DD/YY*)**:** 06/14/2011

NATIONAL QUALITY FORUM

Measure Evaluation 4.1
December 2009

This form contains the measure information submitted by stewards. Blank fields indicate no information was provided. Attachments also may have been submitted and are provided to reviewers. The subcriteria and most of the footnotes from the evaluation criteria are provided in Word comments within the form and will appear if your cursor is over the highlighted area. Hyperlinks to the evaluation criteria and ratings are provided in each section.

TAP/Workgroup (if utilized)**:** Complete all yellow highlighted areas of the form. Evaluate the extent to which each subcriterion is met. Based on your evaluation, summarize the strengths and weaknesses in each section.

Note: *If there is no TAP or workgroup, the SC also evaluates the subcriteria (yellow highlighted areas).*

Steering Committee: Complete all pink highlighted areas of the form. Review the workgroup/TAP assessment of the subcriteria, noting any areas of disagreement; then evaluate the extent to which each major criterion is met; and finally, indicate your recommendation for the endorsement. Provide the rationale for your ratings.

Evaluation ratings of the extent to which the criteria are met
C = Completely (unquestionably demonstrated to meet the criterion)
P = Partially (demonstrated to partially meet the criterion)
M = Minimally (addressed BUT demonstrated to only minimally meet the criterion)
N = Not at all (NOT addressed; OR incorrectly addressed; OR demonstrated to NOT meet the criterion)
NA = Not applicable (only an option for a few subcriteria as indicated)

(for NQF staff use) **NQF Review #:** 1536 **NQF Project:** Surgery Endorsement Maintenance 2010
MEASURE DESCRIPTIVE INFORMATION
De.1 **Measure Title:** Cataracts: Improvement in Patient's Visual Function within 90 Days Following Cataract Surgery
De.2 **Brief description of measure:** Percentage of patients aged 18 years and older who had cataract surgery and had improvement in visual function achieved within 90 days following the cataract surgery
1.1-2 **Type of Measure:** Outcome De.3 **If included in a composite or paired with another measure, please identify composite or paired measure** Composite measure including existing PQRI measures Measures 191 – 20/40 or better visual acuity within 90 days following cataract surgery and 192 – complications within 30 days of cataract surgery requiring additional surgical procedures, and another new measure: Cataracts: Patient Satisfaction within 90 Days Following Cataract Surgery
De.4 **National Priority Partners Priority Area:** Patient and family engagement De.5 **IOM Quality Domain**: Patient-centered De.6 **Consumer Care Need:** Getting better

CONDITIONS FOR CONSIDERATION BY NQF	
Four conditions must be met before proposed measures may be considered and evaluated for suitability as voluntary consensus standards:	NQF Staff
A. The measure is in the public domain or an intellectual property (measure steward agreement) is signed. *Public domain only applies to governmental organizations. All non-government organizations must sign a measure steward agreement even if measures are made publicly and freely available.* A.1 **Do you attest that the measure steward holds intellectual property rights to the measure and the right to use aspects of the measure owned by another entity (e.g., risk model, code set)?** Yes A.2 **Indicate if Proprietary Measure** (*as defined in measure steward agreement*)**:** A.3 **Measure Steward Agreement:** Agreement will be signed and submitted prior to or at the time of measure submission	**A** Y☐ N☐

A.4 **Measure Steward Agreement attached:** txNQFMeasureStewardAgreement_020309_Final.pdf	
B. The measure owner/steward verifies there is an identified responsible entity and process to maintain and update the measure on a schedule that is commensurate with the rate of clinical innovation, but at least every 3 years. Yes, information provided in contact section	**B** Y☐ N☐
C. The intended use of the measure includes both public reporting and quality improvement. ►**Purpose:** Payment Program, Public Reporting, Quality Improvement (Internal to the specific organization), Quality Improvement with Benchmarking (external benchmarking to multiple organizations)	**C** Y☐ N☐
D. The requested measure submission information is complete. Generally, measures should be fully developed and tested so that all the evaluation criteria have been addressed and information needed to evaluate the measure is provided. Measures that have not been tested are only potentially eligible for a time-limited endorsement and in that case, measure owners must verify that testing will be completed within 12 months of endorsement. D.1**Testing:** Yes, fully developed and tested D.2 **Have NQF-endorsed measures been reviewed to identify if there are similar or related measures?** Yes	**D** Y☐ N☐
(for NQF staff use) **Have all conditions for consideration been met?** **Staff Notes to Steward** (*if submission returned*)**:**	**Met** Y☐ N☐
Staff Notes to Reviewers (*issues or questions regarding any criteria*)**:**	
Staff Reviewer Name(s):	

TAP/Workgroup Reviewer Name:	
Steering Committee Reviewer Name:	
1. IMPORTANCE TO MEASURE AND REPORT	
Extent to which the specific measure focus is important to making significant gains in health care quality (safety, timeliness, effectiveness, efficiency, equity, patient-centeredness) and improving health outcomes for a specific high impact aspect of healthcare where there is variation in or overall poor performance. ***Measures must be judged to be important to measure and report*** *in order to be evaluated against the remaining criteria.* (evaluation criteria) **1a. High Impact**	**Eval Rating**
(for NQF staff use) **Specific NPP goal**:	
1a.1 **Demonstrated High Impact Aspect of Healthcare:** Affects large numbers, Frequently performed procedure, Leading cause of morbidity/mortality, High resource use, Patient/societal consequences of poor quality 1a.2 1a.3 **Summary of Evidence of High Impact:** Cataracts are the leading cause of blindness worldwide and remain an important cause of blindness and visual impairment in the United States, accounting for approximately 50% of visual impairment in adults over the age of 40. Cataracts are the leading cause of treatable blindness among Americans of African descent age 40 and older and are the leading cause of visual impairment among Americans of African, Hispanic/Latino, and European descent. Cataract surgery with IOL implantation was the most frequently performed operation and the single largest expenditure for any Part B surgical procedure in the Medicare program, calculated by Part B procedure codes based on allowed charges. In 2008 (latest year available), payment for cataract was $2.1 billion, which is 1.8% of total allowed charges. 1a.4 **Citations for Evidence of High Impact:** 1. Congdon N, O´Colmain B, Klaver CC, et al. Causes and prevalence of visual impairment among adults in the United States. Arch Ophthalmol 2004;122:477-85. 2. Cotter SA, Varma R, Ying-Lai M, et al. Causes of low vision and blindness in adult Latinos: the Los Angeles Latino Eye Study. Ophthalmology 2006;113:1574-82.	**1a** C☐ P☐ M☐ N☐

3. Centers for Medicare and Medicaid Services. Medicare leading Part B procedure codes based on allowed charges: calendar year 2010. Available at: www.cms.hhs.gov/datacompendium/. Accessed December 10, 2010.

1b. Opportunity for Improvement

1b.1 **Benefits (improvements in quality) envisioned by use of this measure:** The benefits are to enhance improvement of visual function of patients receiving cataract surgery. The primary indication for surgery is visual function that no longer meets the patient's needs and for which cataract surgery provides a reasonable likelihood of improved vision.

1b.2 **Summary of data demonstrating performance gap (variation or overall poor performance) across providers:**
This is an outcome of surgery indicator of direct relevance and import to patients, their families and referring providers. The available evidence suggests that cataract surgery achieves this in about 90% of patients. While the potential for improvement is seemingly small, the volume of cataract surgery in the U.S. of over 2.8 million surgeries means that the impact could affect more than 280,000 patients per year. Ideally, performance on this indicator would be as high as possible, with lower rates suggestive of opportunities for improvement.

1b.3 **Citations for data on performance gap:**
1. Monestam E, Wachtmeister L. Impact of cataract surgery on visual acuity and subjective functional outcomes: a population-based study in Sweden. Eye 1999; 13:711-19.
2. Steinberg EP, Tielsch JM, Schein OD, et al. National study of cataract surgery outcomes. Variation in 4-month postoperative outcomes as reflected in multiple outcome measures. Ophthalmology 1994; 101:1131-40; discussion 1140-1.
3. Lundström M, Brege KG, Florén I, et al. Impaired visual function after cataract surgery assessed using the Catquest questionnaire. J Cataract Refract Surg 2000; 26:101–8.
4. Lum F, Schein O, Schachat AP, et al. Initial two years of experience with the AAO National Eyecare Outcomes Network (NEON) cataract surgery database. Ophthalmology 2000; 107:691-7.
5. Lum F, Schachat AP, Jampel HD. The development and demise of a cataract surgery database. The Joint Commission Journal on Quality Improvement 2202; 28:108-114.
6. Mozaffarieh M, Krepler K, Heinzl H et al. Visual function, quality of life and patient satisfaction after ophthalmic surgery: a comparative study. Ophthalmologica 2004; 218:26-30.

1b.4 **Summary of Data on disparities by population group:**

1b.5 **Citations for data on Disparities:**

1b
C☐
P☐
M☐
N☐

1c. Outcome or Evidence to Support Measure Focus

1c.1 **Relationship to Outcomes** (*For non-outcome measures, briefly describe the relationship to desired outcome. For outcomes, describe why it is relevant to the target population*)**:** The multiple components of visual function include central near, intermediate, and distance visual acuity; peripheral vision; visual search; binocular vision; depth perception; contrast sensitivity; perception of color; adaptation; and visual processing speed. Visual function also can be measured in terms of functional disability caused by visual impairment. Many activities of daily living require function of more than one of these visual components. Improved function and quality of life are the treatment outcomes that are most critical and applicable to the patient.

1c.2-3. **Type of Evidence:** Evidence-based guideline

1c.4 **Summary of Evidence** (*as described in the criteria; for outcomes, summarize any evidence that healthcare services/care processes influence the outcome*)**:**
In well-designed observational studies, cataract surgery consistently has been shown to have a significant impact on vision-dependent function; up to 90% of patients undergoing first-eye cataract surgery note improvement in functional status and satisfaction with vision. Several studies have reported an association

1c
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between improved visual function after cataract surgery and an improved health-related quality of life. Visual function plays an important role in physical function and well-being, particularly in terms of mobility. The loss of visual function in the elderly is associated with a decline in physical and mental functioning as well as in independence in activities of daily living, including night-time driving, daytime driving, community activities, and home activities. A long-term (10-year) evaluation of patients in the Blue Mountain Study found that cataract surgery patients had a significant improvement in the mental health domain scores with SF-36 evaluation. Cataract surgery may also improve insomnia.

Visual impairment is an important risk factor for falls and for hip fracture; poor depth perception and decreased contrast sensitivity has been found to increase independently the risk of hip fracture. In a randomized controlled trial, first-eye cataract surgery was found to reduce the rate of falling and fracture over a 12-month period. Similar improvement following second eye surgery has also been confirmed. Visual impairment, in particular a decrease of visual acuity and contrast sensitivity, has been shown to be associated with difficulties in driving. Drivers with visually significant cataracts were 2.5 times more likely to have had an at-fault involvement in a motor vehicle crash over a 5-year period compared with drivers without cataracts. When older adults with cataracts who have undergone surgery are compared with those who did not undergo surgery, motor vehicle crash rates in the 4 to 6 years of follow-up were halved in the surgery group.

One large study found that in visual function assessment pre- and postoperatively, the largest improvements were noted for “driving during the day,” “self-care activities,” and “driving during the night.”

In summary, there are numerous studies showing that physical function, emotional well-being, safety and overall quality of life can be enhanced when visual function is restored by cataract extraction

Improved visual function as a result of cataract surgery includes the following:

The multiple components of visual function include central near, intermediate, and distance visual acuity; peripheral vision; visual search; binocular vision; depth perception; contrast sensitivity; perception of color; adaptation; and visual processing speed.93-95 Visual function also can be measured in terms of functional disability caused by visual impairment. Many activities of daily living require function of more than one of these visual components.

Improved function and quality of life are the treatment outcomes that are most critical and applicable to the patient. In well-designed observational studies, cataract surgery consistently has been shown to have a significant impact on vision-dependent function; up to 90% of patients undergoing first-eye cataract surgery note improvement in functional status and satisfaction with vision. Several studies have reported an association between improved visual function after cataract surgery and an improved health-related quality of life. Visual function plays an important role in physical function and well-being, particularly in terms of mobility. The loss of visual function in the elderly is associated with a decline in physical and mental functioning as well as in independence in activities of daily living, including night-time driving, daytime driving, community activities, and home activities. A long-term (10-year) evaluation of patients in the Blue Mountain Study found that cataract surgery patients had a significant improvement in the mental health domain scores with SF-36 evaluation. Cataract surgery may also improve insomnia.

Visual impairment is an important risk factor for falls and for hip fracture122; poor depth perception and decreased contrast sensitivity has been found to increase independently the risk of hip fracture. In a randomized controlled trial, first-eye cataract surgery was found to reduce the rate of falling and fracture over a 12-month period. Similar improvement following second eye surgery has also been confirmed. Visual impairment, in particular a decrease of visual acuity and contrast sensitivity, has been shown to be associated with difficulties in driving. Drivers with visually significant cataracts were 2.5 times more likely to have had an at-fault involvement in a motor vehicle crash over a 5-year period compared with drivers without cataracts. When older adults with cataracts who have undergone surgery are compared with those who did not undergo surgery, motor vehicle crash rates in the 4 to 6 years of follow-up were halved in the surgery group.

One large study found that in visual function assessment pre- and postoperatively, the largest improvements were noted for “driving during the day,” “self-care activities,” and “driving during the night.”

In summary, there are numerous studies showing that physical function, emotional well-being, safety and overall quality of life can be enhanced when visual function is restored by cataract extraction

Improved visual function as a result of cataract surgery includes the following:

- Better optically corrected vision
- Better uncorrected vision with reduced spectacle dependence
- Increased ability to read or do near work
- Reduced glare
- Improved ability to function in dim levels of light

- Improved depth perception and binocular vision by elimination of anisometropia and achievement of good functional acuity in both eyes
- Improved color vision

Improved physical function as a critical outcome of cataract surgery includes the following:

- Increased ability to perform activities of daily living
- Increased ability to continue or resume an occupation
- Increased mobility (walking, driving)
- Reduced mortality

Improved mental health and emotional well-being as a second critical outcome of cataract surgery includes the following benefits:

- Improved self-esteem and independence
- Increased ability to avoid injury
- Increased social contact and ability to participate in social activities
- Relief from fear of blindness

1c.5 Rating of strength/quality of evidence (*also provide narrative description of the rating and by whom***):**
Not rated in guideline because it does not serve as a treatment recommendation

1c.6 Method for rating evidence: The panel rated each recommendation on the strength of evidence in the available literature to support the recommendation made. The "ratings of strength of evidence" also are divided into three levels.
Level I includes evidence obtained from at least one properly conducted, well-designed, randomized controlled trial. It could include meta-analyses of randomized controlled trials.
Level II includes evidence obtained from the following:

- Well-designed controlled trials without randomization
- Well-designed cohort or case-control analytic studies, preferably from more than one center
- Multiple-time series with or without the intervention

Level III includes evidence obtained from one of the following:

- Descriptive studies
- Case reports
- Reports of expert committees/organizations (e.g., PPP panel consensus with peer review)

The I, II and III can also be correlated with the USPSTF system of high, moderate and low.

1c.7 Summary of Controversy/Contradictory Evidence:

1c.8 Citations for Evidence (*other than guidelines***):**
1.Brenner MH, Curbow B, Javitt JC, et al. Vision change and quality of life in the elderly. Response to cataract surgery and treatment of other chronic ocular conditions. Arch Ophthalmol 1993;111:680-5.
2. Sloane ME, Ball K, Owsley C, et al. The Visual Activities Questionnaire: developing an instrument for assessing problems in everyday visual tasks. Technical Digest, Noninvasive Assessment of the Visual System 1992;1:26-9.
3. Datta S, Foss AJ, Grainge MJ, et al. The importance of acuity, stereopsis, and contrast sensitivity for health-related quality of life in elderly women with cataracts. Invest Ophthalmol Vis Sci 2008;49:1-6.
4 Steinberg EP, Tielsch JM, Schein OD, et al. The VF-14. An index of functional impairment in patients with cataract. Arch Ophthalmol 1994;112:630-8.
5. Bilbao A, Quintana JM, Escobar A, et al. Responsiveness and clinically important differences for the VF-14 index, SF-36, and visual acuity in patients undergoing cataract surgery. Ophthalmology 2009;116:418-24.
6. Ishii K, Kabata T, Oshika T. The impact of cataract surgery on cognitive impairment and depressive mental status in elderly patients. Am J Ophthalmol 2008;146:404-9.
7. Lundstrom M, Pesudovs K. Catquest-9SF patient outcomes questionnaire: nine-item short-form Rasch-scaled revision of the Catquest questionnaire. J Cataract Refract Surg 2009;35:504-13.
8. Gothwal VK, Wright TA, Lamoureux EL, Pesudovs K. Visual Activities Questionnaire: assessment of subscale validity for cataract surgery outcomes. J Cataract Refract Surg 2009;35:1961-9.
9. Schein OD, Steinberg EP, Javitt JC, et al. Variation in cataract surgery practice and clinical outcomes. Ophthalmology 1994;101:1142-52.

10. Mangione CM, Phillips RS, Lawrence MG, et al. Improved visual function and attenuation of declines in health-related quality of life after cataract extraction. Arch Ophthalmol 1994;112:1419-25.
11. Desai P, Minassian DC, Reidy A. National cataract surgery survey 1997-8: a report of the results of the clinical outcomes. Br J Ophthalmol 1999;83:1336-40.
12. McGwin G, Jr, Scilley K, Brown J, Owsley C. Impact of cataract surgery on self-reported visual difficulties: comparison with a no-surgery reference group. J Cataract Refract Surg 2003;29:941-8.
13. Monestam E, Wachtmeister L. Impact of cataract surgery on visual acuity and subjective functional outcomes: a population-based study in Sweden. Eye 1999;13 (Pt 6):711-9.
14. Steinberg EP, Tielsch JM, Schein OD, et al. National study of cataract surgery outcomes. Variation in 4-month postoperative outcomes as reflected in multiple outcome measures. Ophthalmology 1994;101:1131-40; discussion 40-1.
15. Harwood RH, Foss AJ, Osborn F, et al. Falls and health status in elderly women following first eye cataract surgery: a randomised controlled trial. Br J Ophthalmol 2005;89:53-9.
16. Gray CS, Karimova G, Hildreth AJ, et al. Recovery of visual and functional disability following cataract surgery in older people: Sunderland Cataract Study. J Cataract Refract Surg 2006;32:60-6.
17. Lee P, Smith JP, Kington R. The relationship of self-rated vision and hearing to functional status and well-being among seniors 70 years and older. Am J Ophthalmol 1999;127:447-52.
18. Lee PP, Spritzer K, Hays RD. The impact of blurred vision on functioning and well-being. Ophthalmology 1997;104:390-6.
19. Lundstrom M, Fregell G, Sjoblom A. Vision related daily life problems in patients waiting for a cataract extraction. Br J Ophthalmol 1994;78:608-11.
20. Broman AT, Munoz B, Rodriguez J, et al. The impact of visual impairment and eye disease on vision-related quality of life in a Mexican-American population: proyecto VER. Invest Ophthalmol Vis Sci 2002;43:3393-8.
21. Salive ME, Guralnik J, Glynn RJ, et al. Association of visual impairment with mobility and physical function. J Am Geriatr Soc 1994;42:287-92.
22. Foss AJ, Harwood RH, Osborn F, et al. Falls and health status in elderly women following second eye cataract surgery: a randomised controlled trial. Age Ageing 2006;35:66-71.
23. Laforge RG, Spector WD, Sternberg J. The relationship of vision and hearing impairment to one-year mortality and functional decline. J Aging Health 1992;4:126-48.
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1c.9 Quote the Specific guideline recommendation (*including guideline number and/or page number***):**
Cataract in the Adult Eye, 2005, American Academy of Ophthalmology
Page 9
Function and quality of life are the outcomes of treatment that are most critical and applicable to the patient.
In summary, these studies show that physical function, emotional well-being, safety, and overall quality of life can be enhanced when visual function is restored by cataract extraction.

1c.10 Clinical Practice Guideline Citation: American Academy of Ophthalmology. Cataract in the Adult Eye, Preferred Practice Pattern. San Francisco: American Academy of Ophthalmology, 2006. Available at: www.aao.org/ppp.
1c.11 National Guideline Clearinghouse or other URL:
http://www.guideline.gov/content.aspx?id=10173&search=cataract+and+cataract+2005+and+cataract+2006

1c.12 Rating of strength of recommendation (*also provide narrative description of the rating and by whom***):**

1c.13 Method for rating strength of recommendation (*If different from USPSTF system, also describe rating and how it relates to USPSTF)*:
The panel rated each recommendation according to its importance to the care process. This "importance to the care process" rating represents care that the panel thought would improve the quality of the patient's care in a meaningful way. The ratings of importance are divided into three levels.
- Level A, defined as most important
- Level B, defined as moderately important
- Level C, defined as relevant but not critical

The A, B, C ratings can be correlated with the USPSTF system of A, B, C for strength of recommendation.

1c.14 Rationale for using this guideline over others:
This guideline is the only United States guideline on cataract surgery contained in the National Guideline Clearinghouse.

TAP/Workgroup: What are the strengths and weaknesses in relation to the subcriteria for *Importance to Measure and Report?*

1

Steering Committee: Was the threshold criterion, *Importance to Measure and Report*, met?
Rationale:

1
Y☐
N☐

2. SCIENTIFIC ACCEPTABILITY OF MEASURE PROPERTIES

Extent to which the measure, as specified, produces consistent (reliable) and credible (valid) results about the quality of care when implemented. (evaluation criteria)

Eval Rating

2a. MEASURE SPECIFICATIONS

S.1 Do you have a web page where current detailed measure specifications can be obtained?
S.2 If yes, provide web page URL:

2a. Precisely Specified

2a.1 Numerator Statement (*Brief, text description of the numerator - what is being measured about the target population, e.g. target condition, event, or outcome***):**
Patients 18 years and older in sample who had improvement in visual function achieved within 90 days following cataract surgery, based on completing a pre-operative and post-operative visual function instrument

2a-specs
C☐
P☐
M☐
N☐

2a.2 Numerator Time Window (*The time period in which cases are eligible for inclusion in the numerator***):**
One year

2a.3 Numerator Details (*All information required to collect/calculate the numerator, including all codes, logic, and definitions***):**
Patients 18 years and older in sample who had an improvement in their visual function achieved within 90 days following cataract surgery

Patients in sample who completed a pre-operative and post-operative visual function instrument, and with the CPT Procedure Codes (with or without modifiers): 66840, 66850, 66852, 66920, 66930, 66940, 66982, 66983, 66984

2a.4 Denominator Statement (*Brief, text description of the denominator - target population being measured***):**
All patients aged 18 years and older in sample who had cataract surgery

2a.5 Target population gender: Female, Male
2a.6 Target population age range: 18 years and older

2a.7 Denominator Time Window (*The time period in which cases are eligible for inclusion in the denominator***):**
One year

2a.8 Denominator Details (*All information required to collect/calculate the denominator - the target population being measured - including all codes, logic, and definitions***):**
Denominator (Eligible Population): All patients aged 18 years and older in sample who had cataract surgery

- CPT Procedure Codes (with or without modifiers): 66840, 66850, 66852, 66920, 66930, 66940, 66982, 66983, 66984

2a.9 Denominator Exclusions (*Brief text description of exclusions from the target population***):**

2a.10 Denominator Exclusion Details (*All information required to collect exclusions to the denominator, including all codes, logic, and definitions***):**

2a.11 Stratification Details/Variables (*All information required to stratify the measure including the stratification variables, all codes, logic, and definitions***):**
This measure can be stratified into two major groups: those patients with ocular co-morbidities and those patients without ocular co-morbidities. An improvement in visual function after cataract surgery would be expected in both groups, however the magnitude of the difference would vary by group. The Cataract Patient Outcomes Research Team found that an important preoperative patient characteristic that was independently associated with failure to improve on one of the outcomes measured (including the VF-14) was ocular comorbidity. The authors explained that this was expected, because it is reasonable to assume that other diseases that impair visual function would be correlated with a reduced improvement in functional status. The National Eye Care Outcomes Network also found that there were differences in the mean postooperative VF-14 scores across groups of patients with and without ocular co-morbidities, as seen in the table below. The study involving the Rasch-scaled short version of the VF-14 also found differences between the preoperative and postoperative visual function test scores and differences between preoperative and postoperative visual function tests, as seen below.

National Eyecare Outcomes Network

Mean VF-14 (postoperative)
- Total 92.7
- With ocular comorbidity 89.9
- Without ocular comorbidity 94.6

Rasch-Scaled Short Version of the VF-14

Patients without Ocular Comorbidity - Preop VF-8R - 68.87
Postop VF-8R - 86.22
Mean Diff = 17.35
Patients with Ocular Comorbidity - Preop VF-8R - 67.71
Postop VF-8R - 81.58
Mean Diff = 13.87

A list of codes for comorbidities can be found in the AMA PCPI measure for 20/40 visual acuity after cataract surgery:

Acute and subacute iridocyclitis	364.00
Acute and subacute iridocyclitis	364.01
Acute and subacute iridocyclitis	362.02
Acute and subacute iridocyclitis	364.03
Acute and subacute iridocyclitis	364.04
Acute and subacute iridocyclitis	364.05
Amblyopia	368.01
Amblyopia	368.02
Amblyopia	368.03
Burn confined to eye and adnexa	940.0
Burn confined to eye and adnexa	940.1
Burn confined to eye and adnexa	940.2
Burn confined to eye and adnexa	940.3
Burn confined to eye and adnexa	940.4
Burn confined to eye and adnexa	940.5
Burn confined to eye and adnexa	940.9
Cataract secondary to ocular disorders	366.32
Cataract secondary to ocular disorders	366.33
Certain types of iridocyclitis	364.21
Certain types of iridocyclitis	364.22
Certain types of iridocyclitis	364.23
Certain types of iridocyclitis	364.24
Certain types of iridocyclitis	364.3
Choroidal degenerations	363.43
Choroidal detachment	363.72
Choroidal hemorrhage and rupture	363.61
Choroidal hemorrhage and rupture	363.62
Choroidal hemorrhage and rupture	363.63
Chorioretinal scars	363.30
Chorioretinal scars	363.31
Chorioretinal scars	363.32
Chorioretinal scars	363.33
Chorioretinal scars	363.35
Chronic iridocyclitis	364.10
Chronic iridocyclitis	364.11
Cloudy cornea	371.01
Cloudy cornea	371.02
Cloudy cornea	371.03
Cloudy cornea	371.04
Corneal edema	371.20
Corneal edema	371.21
Corneal edema	371.22
Corneal edema	371.23
Corneal edema	371.43
Corneal edema	371.44
Corneal opacity and other disorders of cornea	371.00
Corneal opacity and other disorders of cornea	371.03

Corneal opacity and other disorders of cornea	371.04
Degenerative disorders of globe	360.20
Degenerative disorders of globe	360.21
Degenerative disorders of globe	360.23
Degenerative disorders of globe	360.24
Degenerative disorders of globe	360.29
Degeneration of macula and posterior pole	362.50
Degeneration of macula and posterior pole	362.51
Degeneration of macula and posterior pole	362.52
Degeneration of macula and posterior pole	362.53
Degeneration of macula and posterior pole	362.54
Degeneration of macula and posterior pole	362.55
Degeneration of macula and posterior pole	362.56
Degeneration of macula and posterior pole	362.57
Disseminated chorioretinitis and disseminated retinochoroiditis	363.10
Disseminated chorioretinitis and disseminated retinochoroiditis	363.11
Disseminated chorioretinitis and disseminated retinochoroiditis	363.12
Disseminated chorioretinitis and disseminated retinochoroiditis	363.13
Disseminated chorioretinitis and disseminated retinochoroiditis	363.14
Disseminated chorioretinitis and disseminated retinochoroiditis	363.15
Diabetic retinopathy	362.01
Diabetic retinopathy	362.02
Diabetic retinopathy	362.03
Diabetic retinopathy	362.04
Diabetic retinopathy	362.05
Diabetic retinopathy	362.06
Diabetic macular edema	362.07
Disorders of optic chiasm	377.51
Disorders of optic chiasm	377.52
Disorders of optic chiasm	377.53
Disorders of optic chiasm	377.54
Disorders of visual cortex	377.75
Focal chorioretinitis and focal retinochoroiditis	363.00
Focal chorioretinitis and focal retinochoroiditis	363.01
Focal chorioretinitis and focal retinochoroiditis	363.03
Focal chorioretinitis and focal retinochoroiditis	363.04
Focal chorioretinitis and focal retinochoroiditis	363.05
Focal chorioretinitis and focal retinochoroiditis	363.06
Focal chorioretinitis and focal retinochoroiditis	363.07
Focal chorioretinitis and focal retinochoroiditis	363.08
Glaucoma	365.10
Glaucoma	365.11
Glaucoma	365.12
Glaucoma	365.13
Glaucoma	365.14
Glaucoma	365.15
Glaucoma	365.20
Glaucoma	365.21
Glaucoma	365.22
Glaucoma	365.23
Glaucoma	365.24
Glaucoma	365.31
Glaucoma	365.32
Glaucoma	365.51
Glaucoma	365.52
Glaucoma	365.59
Glaucoma associated with congenital anomalies, dystrophies, and systemic syndromes	365.41
Glaucoma associated with congenital anomalies, dystrophies, and systemic syndromes	365.42

Glaucoma associated with congenital anomalies, dystrophies, and systemic syndromes	365.43
Glaucoma associated with congenital anomalies, dystrophies, and systemic syndromes	365.44
Glaucoma associated with congenital anomalies, dystrophies, and systemic syndromes	365.60
Glaucoma associated with congenital anomalies, dystrophies, and systemic syndromes	365.61
Glaucoma associated with congenital anomalies, dystrophies, and systemic syndromes	365.62
Glaucoma associated with congenital anomalies, dystrophies, and systemic syndromes	365.63
Glaucoma associated with congenital anomalies, dystrophies, and systemic syndromes	365.64
Glaucoma associated with congenital anomalies, dystrophies, and systemic syndromes	365.65
Glaucoma associated with congenital anomalies, dystrophies, and systemic syndromes	365.81
Glaucoma associated with congenital anomalies, dystrophies, and systemic syndromes	365.82
Glaucoma associated with congenital anomalies, dystrophies, and systemic syndromes	365.83
Glaucoma associated with congenital anomalies, dystrophies, and systemic syndromes	365.89
Glaucoma associated with congenital anomalies, dystrophies, and systemic syndromes	365.9
Hereditary corneal dystrophies	371.50
Hereditary corneal dystrophies	371.51
Hereditary corneal dystrophies	371.52
Hereditary corneal dystrophies	371.53
Hereditary corneal dystrophies	371.54
Hereditary corneal dystrophies	371.55
Hereditary corneal dystrophies	371.56
Hereditary corneal dystrophies	371.57
Hereditary corneal dystrophies	371.58
Hereditary choroidal dystrophies	363.50
Hereditary choroidal dystrophies	363.51
Hereditary choroidal dystrophies	363.52
Hereditary choroidal dystrophies	363.53
Hereditary choroidal dystrophies	363.54
Hereditary choroidal dystrophies	363.55
Hereditary choroidal dystrophies	363.56
Hereditary choroidal dystrophies	363.57
Hereditary retinal dystrophies	362.70
Hereditary retinal dystrophies	362.71
Hereditary retinal dystrophies	362.72
Hereditary retinal dystrophies	362.73
Hereditary retinal dystrophies	362.74
Hereditary retinal dystrophies	362.75
Hereditary retinal dystrophies	362.76
High myopia	360.20
High myopia	360.21
Injury to optic nerve and pathways	950.0
Injury to optic nerve and pathways	950.1
Injury to optic nerve and pathways	950.2
Injury to optic nerve and pathways	950.3
Injury to optic nerve and pathways	950.9
Keratitis	370.03
Moderate or severe impairment, better eye, profound impairment lesser eye	369.10
Moderate or severe impairment, better eye, profound impairment lesser eye	369.11
Moderate or severe impairment, better eye, profound impairment lesser eye	369.12
Moderate or severe impairment, better eye, profound impairment lesser eye	369.13
Moderate or severe impairment, better eye, profound impairment lesser eye	369.14
Moderate or severe impairment, better eye, profound impairment lesser eye	369.15
Moderate or severe impairment, better eye, profound impairment lesser eye	369.16
Moderate or severe impairment, better eye, profound impairment lesser eye	369.17
Moderate or severe impairment, better eye, profound impairment lesser eye	369.18
Nystagmus and iother irregular eye movements	379.51
Open wound of eyeball	871.0
Open wound of eyeball	871.1
Open wound of eyeball	871.2

Open wound of eyeball	871.3
Open wound of eyeball	871.4
Open wound of eyeball	871.5
Open wound of eyeball	871.6
Open wound of eyeball	871.7
Open wound of eyeball	871.9
Optic atrophy	377.10
Optic atrophy	377.11
Optic atrophy	377.12
Optic atrophy	377.13
Optic atrophy	377.14
Optic atrophy	377.15
Optic atrophy	377.16
Optic neuritis	377.30
Optic neuritis	377.31
Optic neuritis	377.32
Optic neuritis	377.33
Optic neuritis	377.34
Optic neuritis	377.39
Other background retinopathy and retinal vascular changes	362.12
Other background retinopathy and retinal vascular changes	362.16
Other background retinopathy and retinal vascular changes	362.18
Other corneal deformities	371.70
Other corneal deformities	371.71
Other corneal deformities	371.72
Other corneal deformities	371.73
Other disorders of optic nerve	377.41
Other disorders of sclera	379.11
Other disorders of sclera	379.12
Other endophthalmitis	360.11
Other endophthalmitis	360.12
Other endophthalmitis	360.13
Other endophthalmitis	360.14
Other endophthalmitis	360.19
Other retinal disorders	362.81
Other retinal disorders	362.82
Other retinal disorders	362.83
Other retinal disorders	362.84
Other retinal disorders	362.85
Other retinal disorders	362.89
Other and unspecified forms of chorioretinitis and retinochoroiditis	363.20
Other and unspecified forms of chorioretinitis and retinochoroiditis	363.21
Other and unspecified forms of chorioretinitis and retinochoroiditis	363.22
Prior penetrating keratoplasty	371.60
Prior penetrating keratoplasty	371.61
Prior penetrating keratoplasty	371.62
Profound impairment, both eyes	369.00
Profound impairment, both eyes	369.01
Profound impairment, both eyes	369.02
Profound impairment, both eyes	369.03
Profound impairment, both eyes	369.04
Profound impairment, both eyes	369.05
Profound impairment, both eyes	369.06
Profound impairment, both eyes	369.07
Profound impairment, both eyes	369.08
Purulent endophthalmitis	360.00
Purulent endophthalmitis	360.01
Purulent endophthalmitis	360.02

Purulent endophthalmitis	360.03
Purulent endophthalmitis	360.04
Retinal detachment with retinal defect	361.00
Retinal detachment with retinal defect	361.01
Retinal detachment with retinal defect	361.02
Retinal detachment with retinal defect	361.03
Retinal detachment with retinal defect	361.04
Retinal detachment with retinal defect	361.05
Retinal detachment with retinal defect	361.06
Retinal detachment with retinal defect	361.07
Retinal vascular occlusion	362.31
Retinal vascular occlusion	362.32
Retinal vascular occlusion	362.35
Retinal vascular occlusion	362.36
Retinopathy of prematurity	362.21
Scleritis and episcleritis	379.04
Scleritis and episcleritis	379.05
Scleritis and episcleritis	379.06
Scleritis and episcleritis	379.07
Scleritis and episcleritis	379.09
Separation of retinal layers	362.41
Separation of retinal layers	362.42
Separation of retinal layers	362.43
Uveitis	360.11
Uveitis	360.12
Visual field defects	368.41

References:
1. Schein OD, Steinberg EP, Cassard SD et al. Predictors of outcome in patients who underwent cataract surgery. Ophthalmology 1995; 102:817-23.
2. Lum F, Schachat AP, Jampel HD.The development and demise of a cataract surgery database. Jt Comm J Qual Improv. 2002 Mar;28(3):108-14.
3. Gothwal VK, Wright TA, Lamoureux EL, Pesudovs K. Measuring outcomes of cataract surgery using the Visual Function Index-14. J Cataract Refract Surg 2010; 36:1181-8.

2a.12-13 **Risk Adjustment Type:** No risk adjustment necessary

2a.14 **Risk Adjustment Methodology/Variables (***List risk adjustment variables and describe conceptual models, statistical models, or other aspects of model or method***):**
A risk adjustment methodology is not necessary if the stratification schema is utilized, as described above.

2a.15-17 **Detailed risk model available Web page URL or attachment:**

2a.18-19 **Type of Score:** Rate/proportion
2a.20 **Interpretation of Score:** Better quality = Higher score
2a.21 **Calculation Algorithm (***Describe the calculation of the measure as a flowchart or series of steps***):**
The calculation of the measure would be determination of the number of patients in the sample who demonstrated improvement in visual function based on the pre-operative and post-operative visual function instrument over the number of patients in the sample who had cataract surgery.

Currently in the scientific literature, there is no well-established method to define a threshold or interval that indicates improvement on the VF-8R. The Rasch scale has found to be more sensitive to change than the VF-14 in longitudinal studies and has a different scale for scoring than the VF-14. The VF-14 is based on summative scoring, which has no rationale for how numerical values are assigned and how a summary score is produced, and does not give a sense of the degree of change. The Rasch model is based on Item Response theory,which is based on item difficulty in relationship to an individual´s ability and weighs the overall score accordingly, providing a gain in precision. Thus any difference between the pre-operative and post-operative scores on the VF-8R would indicate an improvement in functional activities. The average difference found between pre-operative and post-operative assessment on the VF-8R was 15.39 (Standard

error = 2.66).

In the literature, there have been two studies looking at the clinically important differences for the VF-14 index. One study found that the minimal clinically important difference was 15.57; another study found that the minimally clinically important difference was 5.5.

References:
1. Bilbao A, Quintana JM, Escobar A et al. Responsiveness and Clinically Important Differences for the VF-14 Index, SF-36 and Visual Acuity in Patients Undergoing Cataract Surgery. Ophthalmology 2009; 116:418-424.
2. Las Hayas C, Bilbao A, Quintana J et al. A comparison of standard scoring versus Rasch scoring of the Visual Function-14 in patients with cataracts. IOVS 2011 in press.

2a.22 Describe the method for discriminating performance *(e.g., significance testing)*:
Methods would include comparison of means and percentiles, and analysis of variance against established benchmarks in the literature.

2a.23 Sampling (Survey) Methodology *If measure is based on a sample (or survey), provide instructions for obtaining the sample, conducting the survey and guidance on minimum sample size (response rate)*:
For this physician-level measure, it is anticipated to be used as a group or composite measure. Utilizing a sample, work in the field has indicated that a sample size of 30 patients would be adequate for typical practice sizes. Based on the Central Limit Theorem, the distribution of an average will tend to be normal with a sample size of 30. This is also the sample size utilized for CMS measure group reporting in PQRS. Therefore, a sample size of 30 patients is proposed. This would make the burden manageable on physicians´ practices and patients and optimize the response rates. The American Academy of Ophthalmology has a registry for PQRS measures. This survey instrument could be incorporated into the registry and patients could access the web portal in order to enter their results of the visual function instrument. other options could be provided for mail and phone administered surveys. This would alleviate any concerns of bias being introduced by having the patient fill it out in the physician´s office.

2a.24 Data Source (*Check the source(s) for which the measure is specified and tested)*
Patient Reported Data/Survey

2a.25 Data source/data collection instrument (*Identify the specific data source/data collection instrument, e.g. name of database, clinical registry, collection instrument, etc.*)**:**
«data_source_instrument»

2a.26-28 Data source/data collection instrument reference web page URL or attachment: Attachment VF8 Pesudovs.pdf

2a.29-31 Data dictionary/code table web page URL or attachment:

2a.32-35 Level of Measurement/Analysis (*Check the level(s) for which the measure is specified and tested)*
Clinician : Individual

2a.36-37 Care Settings (*Check the setting(s) for which the measure is specified and tested)*
Ambulatory Care : Ambulatory Surgery Center (ASC), Ambulatory Care : Clinic/Urgent Care, Ambulatory Care : Clinician Office

2a.38-41 Clinical Services (*Healthcare services being measured, check all that apply*)
Clinicians: Physicians (MD/DO)

TESTING/ANALYSIS

2b. Reliability testing — **2b** C☐ P☐

2b.1 Data/sample *(description of data/sample and size)*: There are several validated instruments to

measure visual function that are available for use. We are proposing use of one such instrument, the Rasch-scaled Short Version of the VF-14 is described here for which reliability and validity testing have been performed. The VF-14 is a health status measurement listed by the Agency for Healthcare Research and Quality (www.ahrq.gov/clinic/out2res/outcom5.htm#/) as an instrument tested for reliability and validity in their Patient Outcomes Research Team studies and identified as a discriminative and evaluative health status measurement instrument. If there is greater detail needed on the reliability and validity testing of the VF-14 itself, please let us know. References are listed below.

M☐
N☐

In the following, we describe the testing performed on the Rasch-scaled Short Version, otherwise referred to as the VF-8R. In this study, the purpose was to determine which version of the Visual Function Index-14 most precisely measured cataract surgery outcomes, to rescale the VF-14 using Rasch analysis and to create a short-form version. Participants were selected from the cataract surgery waiting list at the Flinders Medical Centre, Adelaide, Australia. All patients had cataract surgery performed using phacoemulsification with intraocular lens placement. The eligibility criteria were age 18 years or older, ability to provide written informed consent, and English-speaking. There were two patient populations. The first cohort were preoperative cataract patients, whose data were used for the Rasch analysis to refine the VF-14, called the development group. The second cohort were patients whose results were used to measure the outcomes of cataract surgery, called the outcomes group. The instrument was mailed to 414 patients, of whom 210 returned the completed questionnaire preoperatively (development group), and 51 of the 81 patients postoperatively returned the questionnaire (outcomes group). In the development group (n= 210), the mean age was 74.3 years, 42% were male, and 58% were female, 48% had a ocular comorbidity and 84% had a systemic comorbidity. In the outcomes group (n = 51), the mean age was 73.0 years, 57% were male and 43% were female, 59% had ocular comorbidity, and 78% had a systemic comorbidity.

The reference for the visual function instrument described here (VF-8R)is:

1. Gothwal VK, Wright TA, Lamoureux EL, and Pesudovs K. Measuring outcomes of cataract surgery using the Visual Function Index-14. J Cataract Refract Surg 2010; 36:1181-1188.

A reference describing more of the Rasch analysis is:

1. Lamoureux EL, Pesudovs K, Thumboo J, Saw S-M, and Wong T.Y. An evaluation of the reliability and validity of the Visual Functioning Questionnaire (VF-11) Using Rasch Analysis in an Asian population. Invest Ophthalmol Vis Sci 2009; 50:2607-13.

Original references for the VF-14 include:

1. Steinberg EP, Tielsch JM, Schein OD, Javitt JC, Sharkey P, Cassard SD, Legro MW, Diener-West M, Bass EB, Damiano AM, et al. The VF-14. An index of functional impairment in patients with cataract. Arch Ophthalmol. 1994 May;112(5):630-8.1.

2. Cassard SD, Patrick DL, Damiano AM, Legro MW, Tielsch JM, Diener-West M, Schein OD, Javitt JC, Bass EB, Steinberg EP. Reproducibility and responsiveness of the VF-14. An index of functional impairment in patients with cataracts. Arch Ophthalmol. 1995 Dec;113(12):1508-13.

3. Schein OD, Steinberg EP, Cassard SD, Tielsch JM, Javitt JC, Sommer A. Predictors of outcome in patients who underwent cataract surgery. Ophthalmology. 1995 May;102(5):817-23.

4. Damiano AM, Steinberg EP, Cassard SD, Bass EB, Diener-West M, Legro MW, Tielsch J, Schein OD, Javitt J, Kolb M. Comparison of generic versus disease-specific measures of functional impairment in patients with cataract. Med Care. 1995 Apr;33(4 Suppl):AS120-30.

5. Steinberg EP, Tielsch JM, Schein OD, Javitt JC, Sharkey P, Cassard SD, Legro MW, Diener-West M, Bass EB, Damiano AM, et al. National study of cataract surgery outcomes. Variation in 4-month postoperative outcomes as reflected in multiple outcome measures. Ophthalmology. 1994 Jun;101(6):1131-40; discussion 1140-1.

2b.2 Analytic Method *(type of reliability & rationale, method for testing)*:

In summary, Rasch analysis was used to re-define the VF-14 into two valid forms, the VF-11R and VF-8R form. Then, the ability of the different versions of the VF-14 to discriminate outcomes of cataract surgery was compared with the standard VF-14, using the relative precision method.

Rasch analysis: The Rasch model, where the total score summarizes completely a person´s standing on a variable, arises from a more fundamental requirement: that the comparison of two people is independent of which items may be used within the set of items assessing the same variable. Thus the Rasch model is taken as a criterion for the structure of the responses, rather than a mere statistical description of the responses. For example, the comparison of the performance of two students´ work marked by different graders should be independent of the graders.

In this case it is considered that the researcher is deliberately developing items that are valid for the purpose and that meet the Rasch requirements of invariance of comparisons.

Analyzing data according to the Rasch model, that is, conducting a Rasch analysis, gives a range of details for checking whether or not adding the scores is justified in the data. This is called the test of fit between the data and the model. If the invariance of responses across different groups of people does not hold, then taking the total score to characterize a person is not justified. Of course, data never fit the model perfectly, and it is important to consider the fit of data to the model with respect to the uses to be made of the total scores. If the data do fit the model adequately for the purpose, then the Rasch analysis also linearises the total score, which is bounded by 0 and the maximum score on the items, into measurements. The linearised value is the location of the person on the unidimensional continuum - the value is called a parameter in the model and there can be only one number in a unidimensional framework. This parameter can then be used in analysis of variance and regression more readily than the raw total score which has floor and ceiling effects. Relative precision is a ratio of pairwise F statistics. The extent to which the relative precision ratio differs from 1.0 indicates the extent to which scoring methods differed in their ability to detect change in scores; values greater than 1.0 indicate an increase in precision.

2b.3 **Testing Results** *(reliability statistics, assessment of adequacy in the context of norms for the test conducted)*:
Results for the VF-8R: Mean item location = 0; mean person location = 1.97 and principal components analysis (eigenvalue) = 1.6; relative precision to the VF-14 = 2.25;

Results for the VF-14: (based on 552 patients who underwent cataract surgery in one eye and completed a 4 month postoperative survey) Highly reproducible,w ith an intraclass correlation coefficient of 0.79 when patient-rated criteria were used to define stable patients.

2c. Validity testing

2c.1 **Data/sample** *(description of data/sample and size)*: The VF-14 was mailed to 414 patients, of whom 210 returned the completed questionnaire, and 51 returned the VF-15 postoperatively. The mean age of the patients submitting preoperative VF-14 scores was 74.3 years. In this group, 42% were male, and 58% were female, 48% had a ocular comorbidity and 84% had a systemic comorbidity.

2c.2 **Analytic Method** *(type of validity & rationale, method for testing)*:
Content validity was evaluated by using person and item fit residual statistics. It is expected that the mean and SD values approximate 0 and 1, respectively. An estimate of overall scale functioning is the person separation reliability (PSR) index. This is linked to the targeting of the scale, because it differentiates the number of statistically distinct groups of respondents that can be identified by this trait. In other words, this can demonstrate if an instrument can discriminate among different levels of the patient´s visual functioning.

Also, ANOVA was used to see if the change in preoperative to postoperative score for the original VF-14 and the shortened version differed significantly from zero. The F statistic with a $P < 0.05$ was then considered significant. Then relative precision as described above was used to evaluate how well the different versions of VF-14 discriminated between visual functioning in the preoperative period compared with the postoperative period.

2c.3 **Testing Results** *(statistical results, assessment of adequacy in the context of norms for the test*

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conducted): Person separation = 2.29 (the minimum acceptable value is 2.0) ; Misfitting items = 0; (ideal value = 0) Overall, the VF-8R showed the following results for cataract surgery patients: Mean preoperative score and standard error - 67.75, SE = 2.36 Mean postoperative score and standard error - 83.15, SE = 2.43 Mean difference preop vs. postop and standard error - 15.39, SE = 2.66 F statistic 20.67 Relative precision 2.25 The overall results of the testing found these benefits of using the VF-8R over the original VF-14: 1) all items measure a single construct of visual functioning, which is a desirable measurement property and unlike the original VF-14 which has more than a single construct; 2) it has better measurement precision for distinguishing outcomes (125% gain in relative precision) than the original VF-14; 3) it has other similar psychometric properties to the original VF-14. Testing Results for the VF-14 (from the original VF-14 publications): (based on 552 patients who underwent cataract surgery in one eye and completed a 4 month postoperative survey): high internal consistency with a Cronbach´s a = 0.85, with item-to-total correlations ranging from 0.32 to 0.61. It was also found to be three times more responsive to a change in vision than a generic health status measure (Sickness Impact Profile) with an impact size of approximately 1.00 to 0.30, respectively. The criterion validity was assessed by examining the correlation between the VF-14 scores and several other measures of vision. The correlation between the VF-14 score and self-reported trouble with vision and overall satisfaction with vision (0.45 and 0.34, respectively) were higher than correlations between several measures of visual acuity and trouble or satisfaction with vision.	
2d. Exclusions Justified **2d.1 Summary of Evidence supporting exclusion(s):** **2d.2 Citations for Evidence:** **2d.3 Data/sample** *(description of data/sample and size)*: **2d.4 Analytic Method** *(type analysis & rationale)*: **2d.5 Testing Results** *(e.g., frequency, variability, sensitivity analyses)*:	**2d** C☐ P☐ M☐ N☐ NA☐
2e. Risk Adjustment for Outcomes/ Resource Use Measures **2e.1 Data/sample** *(description of data/sample and size)*: There is no risk adjustment strategy necessary given that a stratification of results is proposed. **2e.2 Analytic Method** *(type of risk adjustment, analysis, & rationale)*: **2e.3 Testing Results** *(risk model performance metrics)*: **2e.4 If outcome or resource use measure is not risk adjusted, provide rationale:**	**2e** C☐ P☐ M☐ N☐ NA☐
2f. Identification of Meaningful Differences in Performance **2f.1 Data/sample from Testing or Current Use** *(description of data/sample and size)*: The VF-14 was mailed to 414 patients, of whom 210 returned the completed questionnaire, and 51 returned the VF-15	**2f** C☐ P☐ M☐

postoperatively. The mean age of the patients submitting preoperative VF-14 scores was 74.3 years. In this group, 42% were male, and 58% were female, 48% had a ocular comorbidity and 84% had a systemic comorbidity.

2f.2 Methods to identify statistically significant and practically/meaningfully differences in performance *(type of analysis & rationale)*:
The VF-8 preoperative and postoperative scores for patients with ocular comorbidity (30) and for patients without ocular comorbidity (20) were compared in terms of mean scores and standard errors.

2f.3 Provide Measure Scores from Testing or Current Use *(description of scores, e.g., distribution by quartile, mean, median, SD, etc.; identification of statistically significant and meaningfully differences in performance)*:
The group with ocular comorbidity had a mean preoperative and postoperative + SE score of 67.71 + 3.29 and 81.58 + 3.57, respectively. The mean difference preop vs. postop was 13.87 + 3.81. The F Statistic was 8.15. The group without ocular comorbidity had a mean preoperative and postoperative + SE score of 68.87 + 3.36 and 86.22 + 3.03, respectively. The mean difference preop vs. postop was 17.35 + 3.72 and the F Statistic was 14.70.

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2g. Comparability of Multiple Data Sources/Methods

2g.1 Data/sample *(description of data/sample and size)*: The VF-14 can be interviewed-administered, and self-administered. There don´t appear to be peer-reviewed reports comparing the interviewed-administered and the self-administered versions of the VF-14. However, there are at least two peer-reviewed reports demonstrating the validity and responsiveness of the self-administered VF-14 in the literature.

One study evaluated the validity and responsiveness of two self-administered instruments, the VF-14 and the Quality of Well-Being Scale. This was performed in 233 adults who had small-incision phacoemulsification cataract surgery in a Southern California Health Maintenance Organization. The mean age of patients was 72.5 years old, and 60.5% were men. Approximately 50% of the patients had ocular morbidities and 82% had at least one chronic illness.

A second study tested the validity of the self-administered VF-14 in a group of patients with retinal disease. The patient population were 547 patients attending the Vancouver General Hospital Eye Care Centre. 48% were female and 52% were male. The mean age of the group was 55 years, ranging from 16 to 95 years old.

References
1. Rosen PN, Kaplan Rn, David K. Measuring outcomes of cataract surgery using the Quality of Well-Being Scale and VF-14 Visual Function Index. J Cataract Refract Surg 2005; 31:369-78.
2. Linder M, Chang TS, Scott IU et al. Validity of the Visual Function Index (VF-14) in Patients with Retinal Disease. Arch Ophthalmol 1999; 117:1611-16.

2g.2 Analytic Method *(type of analysis & rationale)*:
One study evaluated the validity and responsiveness of two self-administered instruments, the VF-14 and the Quality of Well-Being Scale. Bivariate analysis was performed on the effect of cataract surgery on the VF-14 score using Pearson correlations and independent and paired t tests. One-way analysis of variance was used to test the VF-14 in discriminating between categories of satisfaction and trouble with vision.

A second study tested the validity of the self-administered VF-14 in a group of patients with retinal disease. Criterion validity was evaluated through measurement of the Spearman correlation coefficients between VF-14 score and the global self-assessments scales within the VF-14: amount of trouble with vision, level of satisfaction with vision and overall quality of vision. Also, the Spearman correlations between the VF-14 score and the global scores were compared with the correlation of visual acuity scores and the global scales.

2g.3 Testing Results *(e.g., correlation statistics, comparison of rankings)*:
One study evaluated the validity and responsiveness of two self-administered instruments, the VF-14 and the Quality of Well-Being Scale. The VF-14 was found to correlate significantly with self-reported

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satisfaction and trouble with vision, and responsive to improvements in quality of life after cataract surgery. The postoperative correlations of the VF-14 were as follows: Trouble with vision r = .520 (p<.01) Self vision rating r = .497 (p<.01) Satisfaction with vision r = .462 (p<.01) Satisfaction with surgery result r = .460 (p<.01) Visual symptoms r = .465 (p<.01) Visual acuity of operated eye r = .157 (p<.05) A second study tested the validity of the self-administered VF-14 in a group of patients with retinal disease. The Cronbach alpha coefficient for the sample was 0.91, indicating high internal consistency. The results showed that the VF-14 had a moderately strong association with patient self-rating of the amount of trouble with vision, satisfaction with vision and overall quality of vision. This was stronger than the associations found with a more general health status instrument, the Short-Form Health Survey. The VF-14 was also correlated with visual acuity. The correlations were as follows: VF-14 score - Visual acuity better eye -0.34 (p= .001) Visual acuity worse eye -0.43 (p= .001) Average visual acuity -0.45 (p= .001) WMAR (weighted average logMar) visual acuity -0.45 (p = .001) Overall quality of vision scale 0.50 (p = .001) Satisfaction with vision scale 0.43 (p = .001) Trouble with vision scale -0.63 (p = .001)	
2h. Disparities in Care **2h.1 If measure is stratified, provide stratified results** *(scores by stratified categories/cohorts)*: The stratified results are as follows: Rasch-Scaled Short Version of the VF-14 Results by Stratification Group with Ocular Comorbidity: The group with ocular comorbidity had a mean preoperative and postoperative + SE score of 67.71 + 3.29 and 81.58 + 3.57, respectively. The mean difference preop vs. postop was 13.87 + 3.81. The F Statistic was 8.15. Group without Ocular Comorbidity: The group without ocular comorbidity had a mean preoperative and postoperative + SE score of 68.87 + 3.36 and 86.22 + 3.03, respectively. The mean difference preop vs. postop was 17.35 + 3.72 and the F Statistic was 14.70. **2h.2 If disparities have been reported/identified, but measure is not specified to detect disparities, provide follow-up plans:**	**2h** C☐ P☐ M☐ N☐ NA☐
TAP/Workgroup: What are the strengths and weaknesses in relation to the subcriteria for *Scientific Acceptability of Measure Properties?*	**2**
Steering Committee: Overall, to what extent was the criterion, *Scientific Acceptability of Measure Properties*, met? **Rationale:**	***2*** **C☐** **P☐** **M☐** **N☐**
3. USABILITY	
Extent to which intended audiences (e.g., consumers, purchasers, providers, policy makers) can understand the results of the measure and are likely to find them useful for decision making. (evaluation criteria)	**Eval Rating**

3a. Meaningful, Understandable, and Useful Information **3a.1 Current Use:** Not in use but testing completed **3a.2 Use in a public reporting initiative (disclosure of performance results to the public at large)** (*If used in a public reporting initiative, provide name of initiative(s), locations, Web page URL(s). If not publicly reported, state the plans to achieve public reporting within 3 years*)**:** The plans are to have this used in a public reporting initiative within the next 3 years: the Centers for Medicare and Medicaid Services Physician Quality Reporting System. **3a.3 If used in other programs/initiatives (***If used in quality improvement or other programs/initiatives, name of initiative(s), locations, Web page URL(s). If not used for QI, state the plans to achieve use for QI within 3 years***):** The plan is to use this with the American Academy of Ophthalmology´s Ophthalmic Patient Outcomes Database for quality improvement purposes within 3 years´ time. **Testing of Interpretability** (*Testing that demonstrates the results are understood by the potential users for public reporting and quality improvement*) **3a.4 Data/sample** *(description of data/sample and size)***:** **3a.5 Methods** *(e.g., focus group, survey, QI project)***:** **3a.6 Results** *(qualitative and/or quantitative results and conclusions)***:**	**3a** C☐ P☐ M☐ N☐
3b/3c. Relation to other NQF-endorsed measures **3b.1 NQF # and Title of similar or related measures:**	
(for NQF staff use) **Notes on similar/related endorsed or submitted measures:**	
3b. Harmonization If this measure is related to measure(s) already endorsed by NQF (e.g., same topic, but different target population/setting/data source or different topic but same target population): **3b.2 Are the measure specifications harmonized? If not, why?**	**3b** C☐ P☐ M☐ N☐ NA☐
3c. Distinctive or Additive Value **3c.1 Describe the distinctive, improved, or additive value this measure provides to existing NQF-endorsed measures:** **5.1 If this measure is similar to measure(s) already endorsed by NQF (i.e., on the same topic and the same target population), Describe why it is a more valid or efficient way to measure quality:**	**3c** C☐ P☐ M☐ N☐ NA☐
TAP/Workgroup: What are the strengths and weaknesses in relation to the subcriteria for *Usability?*	**3**
Steering Committee: Overall, to what extent was the criterion, *Usability*, met? **Rationale:**	**3** C☐ P☐ M☐ N☐
4. FEASIBILITY	
Extent to which the required data are readily available, retrievable without undue burden, and can be implemented for performance measurement. (evaluation criteria)	**Eval Rating**

4a. Data Generated as a Byproduct of Care Processes **4a.1-2 How are the data elements that are needed to compute measure scores generated?** Survey	**4a** C☐ P☐ M☐ N☐
4b. Electronic Sources **4b.1 Are all the data elements available electronically?** (*elements that are needed to compute measure scores are in defined, computer-readable fields, e.g., electronic health record, electronic claims*) No **4b.2 If not, specify the near-term path to achieve electronic capture by most providers.** A web-based survey instrument could be used and results uploaded into a data registry. Paper survey instruments could be scanned and incorporated into a data registry. The registry could calculate the results and provide these results as feedback to the physicians and as quality measures to the CMS PQRS.	**4b** C☐ P☐ M☐ N☐
4c. Exclusions **4c.1 Do the specified exclusions require additional data sources beyond what is required for the numerator and denominator specifications?** No **4c.2 If yes, provide justification.**	**4c** C☐ P☐ M☐ N☐ NA☐
4d. Susceptibility to Inaccuracies, Errors, or Unintended Consequences **4d.1 Identify susceptibility to inaccuracies, errors, or unintended consequences of the measure and describe how these potential problems could be audited. If audited, provide results.** This is reliant on patient´s assessment of their status prior to and after cataract surgery, and therefore, any errors or biases in their self-evaluations. Also, there could be unintended consequences that surgeons would tend to avoid operating on candidate patients likely not to report improved visual function because of pre-existing ocular diseases. To mitigate the risk of the latter unintended consequence, we are proposing a sample size of 30. There is also the potential for biases introduced if the patient fills out the survey in the physician´s office or is contacted by the physician´s office to follow up on the survey. One strategy to minimize this bias is to have the visual function instrument administered through a third party, e.g., the Academy´s data registry which could provide a web portal for patients to fill out the visual function instruments or other options such as a mail or phone administered survey.	**4d** C☐ P☐ M☐ N☐
4e. Data Collection Strategy/Implementation **4e.1 Describe what you have learned/modified as a result of testing and/or operational use of the measure regarding data collection, availability of data/missing data, timing/frequency of data collection, patient confidentiality, time/cost of data collection, other feasibility/ implementation issues:** There is a burden upon the office practice to survey patients pre and post cataract surgery. The majority of these patients are elderly, and they may require assistance/prompting in responding to the surveys. This then will entail time taken out by the practice staff. The follow-up survey also requires close attention. Therefore, we have proposed a minimal sampling size of 30, which will reduce the burden on physicians´ practice and optimize the response rates. The survey would be administered by a third party (a registry for reporting of PQRS measures sponsored by the American Academy of Ophthalmology) to prevent or minimize bias which might be introduced if it is an in-office paper survey with questions asked by the office staff. Options would be provided to the patient, either online survey, mail survey or phone survey, depending on their preferences and abilities, because these patients are elderly and have visual impairment. **4e.2 Costs to implement the measure** (*costs of data collection, fees associated with proprietary measures*)**:** There are costs of data collection and follow up of patients who haven´t filled out the surveys. There are no fees associated with proprietary measures. Therefore, we have proposed a sample size of 30, which will	**4e** C☐ P☐ M☐ N☐

reduce the burden of these costs. 4e.3 **Evidence for costs:** 4e.4 **Business case documentation:**	
TAP/Workgroup: What are the strengths and weaknesses in relation to the subcriteria for *Feasibility?*	**4**
Steering Committee: Overall, to what extent was the criterion, *Feasibility*, met? **Rationale:**	**4** **C☐** **P☐** **M☐** **N☐**
RECOMMENDATION	
(for NQF staff use) **Check if measure is untested and only eligible for time-limited endorsement.**	**Time-limited ☐**
Steering Committee: Do you recommend for endorsement? **Comments:**	**Y☐** **N☐** **A☐**

CONTACT INFORMATION

Co.1 **Measure Steward (Intellectual Property Owner)**
Co.1 **Organization**
American Academy of Ophthalmology and Hoskins Center for Quality Eye Care, 655 Beach Street, San Francisco, California, 94109-1336

Co.2 **Point of Contact**
Flora, Lum, M.D., flum@aao.org, 415-561-8592-

Measure Developer If different from Measure Steward
Co.3 **Organization**
American Academy of Ophthalmology and Hoskins Center for Quality Eye Care, 655 Beach Street, San Francisco, California, 94109-1336

Co.4 **Point of Contact**
Flora, Lum, M.D., flum@aao.org, 415-561-8592-

Co.5 **Submitter If different from Measure Steward POC**
Flora, Lum, M.D., flum@aao.org, 415-561-8592-, American Academy of Ophthalmology and Hoskins Center for Quality Eye Care

Co.6 **Additional organizations that sponsored/participated in measure development**
American Society of Cataract and Refractive Surgery

ADDITIONAL INFORMATION

Workgroup/Expert Panel involved in measure development
Ad.1 **Provide a list of sponsoring organizations and workgroup/panel members' names and organizations. Describe the members' role in measure development.**
Priscilla Arnold, MD; David Chang, MD, Kevin Miller, MD, John Thompson, MD, Leon Herndon, MD

The group developed and reviewed the measure specifications

Ad.2 **If adapted, provide name of original measure:**
Ad.3-5 **If adapted, provide original specifications URL or attachment**

Measure Developer/Steward Updates and Ongoing Maintenance
Ad.6 **Year the measure was first released:** 2010

Ad.7 Month and Year of most recent revision: 12, 2010 **Ad.8 What is your frequency for review/update of this measure?** Every 3 years **Ad.9 When is the next scheduled review/update for this measure?** 12, 2013
Ad.10 Copyright statement/disclaimers: Copyright by the American Academy of Ophthalmology 2010
Ad.11 -13 Additional Information web page URL or attachment: Attachment visual functionand patient satisfaction measure Nov 2010.doc
Date of Submission (*MM/DD/YY*)**:** 06/10/2011

NATIONAL QUALITY FORUM

Measure Evaluation 4.1
December 2009

This form contains the measure information submitted by stewards. Blank fields indicate no information was provided. Attachments also may have been submitted and are provided to reviewers. The subcriteria and most of the footnotes from the evaluation criteria are provided in Word comments within the form and will appear if your cursor is over the highlighted area. Hyperlinks to the evaluation criteria and ratings are provided in each section.

TAP/Workgroup (if utilized)**:** Complete all yellow highlighted areas of the form. Evaluate the extent to which each subcriterion is met. Based on your evaluation, summarize the strengths and weaknesses in each section.

Note: *If there is no TAP or workgroup, the SC also evaluates the subcriteria (yellow highlighted areas).*

Steering Committee: Complete all pink highlighted areas of the form. Review the workgroup/TAP assessment of the subcriteria, noting any areas of disagreement; then evaluate the extent to which each major criterion is met; and finally, indicate your recommendation for the endorsement. Provide the rationale for your ratings.

Evaluation ratings of the extent to which the criteria are met
C = Completely (unquestionably demonstrated to meet the criterion)
P = Partially (demonstrated to partially meet the criterion)
M = Minimally (addressed BUT demonstrated to only minimally meet the criterion)
N = Not at all (NOT addressed; OR incorrectly addressed; OR demonstrated to NOT meet the criterion)
NA = Not applicable (only an option for a few subcriteria as indicated)

(for NQF staff use) **NQF Review #:** 1549 **NQF Project:** Surgery Endorsement Maintenance 2010
MEASURE DESCRIPTIVE INFORMATION
De.1 **Measure Title:** Cataracts: Patient Satisfaction within 90 Days Following Cataract Surgery
De.2 **Brief description of measure:** Percentage of patients aged 18 years and older who had cataract surgery and were satisfied with their care within 90 days following the cataract surgery
1.1-2 **Type of Measure:** Patient Engagement/Experience De.3 **If included in a composite or paired with another measure, please identify composite or paired measure** This is intended to be included in a composite measure for cataract surgery to provide a comprehensive evaluation of both the clinical and patient-centered outcomes. This group includes approved NQF measures and PQRI measures Measures 191 – 20/40 or better visual acuity within 90 days following cataract surgery and 192 – complications within 30 days of cataract surgery requiring additional surgical procedures, and a newly submitted measure: Improvement in Patient's Visual Function within 90 Days Following Cataract Surgery
De.4 **National Priority Partners Priority Area:** Patient and family engagement De.5 **IOM Quality Domain**: Patient-centered De.6 **Consumer Care Need:** Getting better

CONDITIONS FOR CONSIDERATION BY NQF	
Four conditions must be met before proposed measures may be considered and evaluated for suitability as voluntary consensus standards:	NQF Staff
A. The measure is in the public domain or an intellectual property (measure steward agreement) is signed. *Public domain only applies to governmental organizations. All non-government organizations must sign a measure steward agreement even if measures are made publicly and freely available.* A.1 **Do you attest that the measure steward holds intellectual property rights to the measure and the right to use aspects of the measure owned by another entity (e.g., risk model, code set)?** Yes A.2 **Indicate if Proprietary Measure** (*as defined in measure steward agreement*)**:** A.3 **Measure Steward Agreement:** Agreement will be signed and submitted prior to or at the time of	**A** Y☐ N☐

measure submission A.4 **Measure Steward Agreement attached:** txNQFMeasureStewardAgreement_020309_Final-634278446871486346.pdf	
B. The measure owner/steward verifies there is an identified responsible entity and process to maintain and update the measure on a schedule that is commensurate with the rate of clinical innovation, but at least every 3 years. Yes, information provided in contact section	**B** Y☐ N☐
C. The intended use of the measure includes both public reporting and quality improvement. ►**Purpose:** Payment Program, Public Reporting, Quality Improvement (Internal to the specific organization), Quality Improvement with Benchmarking (external benchmarking to multiple organizations)	**C** Y☐ N☐
D. The requested measure submission information is complete. Generally, measures should be fully developed and tested so that all the evaluation criteria have been addressed and information needed to evaluate the measure is provided. Measures that have not been tested are only potentially eligible for a time-limited endorsement and in that case, measure owners must verify that testing will be completed within 12 months of endorsement. D.1**Testing:** Yes, fully developed and tested D.2 **Have NQF-endorsed measures been reviewed to identify if there are similar or related measures?** Yes	**D** Y☐ N☐
(for NQF staff use) **Have all conditions for consideration been met?** **Staff Notes to Steward** (*if submission returned*)**:**	**Met** Y☐ N☐
Staff Notes to Reviewers (*issues or questions regarding any criteria*)**:**	
Staff Reviewer Name(s):	

TAP/Workgroup Reviewer Name:	
Steering Committee Reviewer Name:	
1. IMPORTANCE TO MEASURE AND REPORT	
Extent to which the specific measure focus is important to making significant gains in health care quality (safety, timeliness, effectiveness, efficiency, equity, patient-centeredness) and improving health outcomes for a specific high impact aspect of healthcare where there is variation in or overall poor performance. ***Measures must be judged to be important to measure and report*** *in order to be evaluated against the remaining criteria.* (evaluation criteria) **1a. High Impact**	**Eval Rating**
(for NQF staff use) **Specific NPP goal**:	
1a.1 **Demonstrated High Impact Aspect of Healthcare:** Affects large numbers, Frequently performed procedure, Leading cause of morbidity/mortality, High resource use 1a.2 1a.3 **Summary of Evidence of High Impact:** Cataracts are the leading cause of blindness worldwide and remain an important cause of blindness and visual impairment in the United States, accounting for approximately 50% of visual impairment in adults over the age of 40. Cataracts are the leading cause of treatable blindness among Americans of African descent age 40 and older and are the leading cause of visual impairment among Americans of African, Hispanic/Latino, and European descent. Cataract surgery with IOL implantation was the most frequently performed operation and the single largest expenditure for any Part B surgical procedure in the Medicare program, calculated by Part B procedure codes based on allowed charges. In 2008 (latest year available), payment for cataract was $2.1 billion, which is 1.8% of total allowed charges. 1a.4 **Citations for Evidence of High Impact:** 1. Congdon N, O´Colmain B, Klaver CC, et al. Causes and prevalence of visual impairment among adults in the United States. Arch Ophthalmol 2004;122:477-85. 2. Cotter SA, Varma R, Ying-Lai M, et al. Causes of low vision and blindness in adult Latinos: the Los	**1a** C☐ P☐ M☐ N☐

Angeles Latino Eye Study. Ophthalmology 2006;113:1574-82.
3. Centers for Medicare and Medicaid Services. Medicare leading Part B procedure codes based on allowed charges: calendar year 2010. Available at: www.cms.hhs.gov/datacompendium/. Accessed December 10, 2010.

1b. Opportunity for Improvement

1b.1 **Benefits (improvements in quality) envisioned by use of this measure:** The benefits are to enhance satisfaction of patients receiving cataract surgery. The primary indication of surgery is visual function that no longer meets the patient´s needs and for which cataract surgery provides a reasonable likelihood of improved vision, leading to satisfaction.

1b.2 **Summary of data demonstrating performance gap (variation or overall poor performance) across providers:**
This is an outcome of surgery indicator of direct relevance and importance to patients, their families and referring providers. The available evidence suggests that satisfaction with cataract surgery is found in about 90% of patients surveyed. While the potential for improvement appears seemingly small, the volume of cataract surgery in the U.S. of over 2.8 million surgeries means that the impact could affect more than 280,000 patients per year. Ideally, performance on this indicator would be as high as possible,with lower rates suggestive of opportunities for improvement.

1b.3 **Citations for data on performance gap:**
1. Mozaffarieh M, Krepler K, Heinzl H et al. Visual function, quality of life and patient satisfaction after ophthalmic surgery: a comparative study. Ophthalmologica 2004; 218:26-30.
2. Lledo R, Rodriguez T, Fontenia JR et al. Cataract surgery: An analysis of patient satisfaction with medical care. International Ophthalmology 22:227-32.
3. Lum F, Schein O, Schachat AP, et al. Initial two years of experience with the AAO National Eyecare Outcomes Network (NEON) cataract surgery database. Ophthalmology 2000; 107:691-7.
4. Lum F, Schachat AP, Jampel HD. The development and demise of a cataract surgery database. The Joint Commission Journal on Quality Improvement 2202; 28:108-114.

1b.4 **Summary of Data on disparities by population group:**

1b.5 **Citations for data on Disparities:**

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1c. Outcome or Evidence to Support Measure Focus

1c.1 **Relationship to Outcomes** (*For non-outcome measures, briefly describe the relationship to desired outcome. For outcomes, describe why it is relevant to the target population*)**:** Patient satisfaction is a relevant, patient-centered patient experience type outcome for cataract surgery.

1c.2-3. **Type of Evidence:** Evidence-based guideline

1c.4 **Summary of Evidence** (*as described in the criteria; for outcomes, summarize any evidence that healthcare services/care processes influence the outcome*)**:**
Several constructs have been found to be associated with patient satisfaction, with the physician having control over several of these. Some of these constructs include: physician-patient communication, information, accessibility, quality of medical care and outcomes, premises, professional care, length of communication, caring/trust, interpersonal skills, affordability of care, etc. Physician-patient communications and patient´s understanding of expectations and outcomes is a critical construct.

In the focus groups conducted for the S-CAHPS instrument, the following three constructs were identified as drivers of surgical care experience (good or bad):
1. surgeon´s interpersonal skills and behaviors
2. surgeon´s expertise/technical competence
3. surgeon´s skill in communicating and providing health information and patient education

1c
C☐
P☐
M☐
N☐

1c.5 Rating of strength/quality of evidence (*also provide narrative description of the rating and by whom*):
Not rated in guideline because it does not serve as a treatment recommendation

1c.6 Method for rating evidence: The panel rated each recommendation on the strength of evidence in the available literature to support the recommendation made. The "ratings of strength of evidence" also are divided into three levels.
Level I includes evidence obtained from at least one properly conducted, well-designed, randomized controlled trial. It could include meta-analyses of randomized controlled trials.
Level II includes evidence obtained from the following:
- Well-designed controlled trials without randomization
- Well-designed cohort or case-control analytic studies, preferably from more than one center
- Multiple-time series with or without the intervention

Level III includes evidence obtained from one of the following:
- Descriptive studies
- Case reports
- Reports of expert committees/organizations (e.g., PPP panel consensus with peer review)

The I, II, and III can also be correlated with the USPSTF system of high, moderate and low.

1c.7 Summary of Controversy/Contradictory Evidence:

1c.8 Citations for Evidence (*other than guidelines*):
1. Schein OD, Steinberg EP, Javitt JC, et al. Variation in cataract surgery practice and clinical outcomes. Ophthalmology 1994;101:1142-52.
2. Mangione CM, Phillips RS, Lawrence MG, et al. Improved visual function and attenuation of declines in health-related quality of life after cataract extraction. Arch Ophthalmol 1994;112:1419-25.
3. Desai P, Minassian DC, Reidy A. National cataract surgery survey 1997-8: a report of the results of the clinical outcomes. Br J Ophthalmol 1999;83:1336-40.
4. McGwin G, Jr, Scilley K, Brown J, Owsley C. Impact of cataract surgery on self-reported visual difficulties: comparison with a no-surgery reference group. J Cataract Refract Surg 2003;29:941-8.
5. Colin J, El Kebir S, Eydoux E, Hoang-Xuan T, Rozot P, Weiser M. Assessment of patient satisfaction with outcomes of and ophthalmic care of cataract surgery. J Cataract Refract Surg. 2010 Aug;36(8):1373-9.
6. Nijkamp MD, Nuijts RM, Borne B, Webers CA, van der Horst F, Hendrikse F. Determinants of patient satisfaction after cataract surgery in 3 settings. J Cataract Refract Surg 2000 Sep;26(9):1379-88.

1c.9 Quote the Specific guideline recommendation (*including guideline number and/or page number*):
In well-designed observational studies, cataract surgery consistently has been shown to have a significant impact on vision-dependent function; up to 90% of patients undergoing first-eye cataract surgery note improvement in functional status and satisfaction with vision.

Also, the guideline outlines the ophthalmologist´s responsibility for communication to the patient:

The ophthalmologist who is to perform the cataract surgery has the following responsibilities:
- To examine the patient preoperatively (see Ophthalmic Evaluation).[A:III]
- To ensure that the evaluation accurately documents the symptoms, findings, and indications for treatment.[A:III]
- To obtain informed consent from the patient or the patient's surrogate decision maker after discussing the risks, benefits, and expected outcomes of surgery, including anticipated refractive outcome and the surgical experience.[A:III]
- To review the results of presurgical and diagnostic evaluations with the patient or the patient's surrogate decision maker.[A:III]
- To formulate a surgical plan, including selection of an appropriate IOL.[A:III]
- To formulate postoperative care plans and inform the patient or the patient's surrogate decision maker of these arrangements (setting of care, individuals who will provide care).[A:III]
- To afford the patient or the patient's surrogate decision maker the opportunity to discuss the costs associated with surgery.[B:III]

1c.10 Clinical Practice Guideline Citation: American Academy of Ophthalmology. Cataract in the Adult Eye, Preferred Practice Pattern. San Francisco: American Academy of Ophthalmology, 2006. Available at: www.aao.org/ppp. **1c.11 National Guideline Clearinghouse or other URL:** http://www.guideline.gov/content.aspx?id=10173&search=cataract+and+cataract+2005+and+cataract+2006 **1c.12 Rating of strength of recommendation** (*also provide narrative description of the rating and by whom*)**:** The ratings for communications to the patients are rated [A:III] which indicates the highest importance to care rating, based on expert opinion/consensus evidence. **1c.13 Method for rating strength of recommendation** (*If different from USPSTF system, also describe rating and how it relates to USPSTF)*: The panel rated each recommendation according to its importance to the care process. This "importance to the care process" rating represents care that the panel thought would improve the quality of the patient's care in a meaningful way. The ratings of importance are divided into three levels. - Level A, defined as most important - Level B, defined as moderately important - Level C, defined as relevant but not critical The A, B, C ratings can be correlated with the USPSTF system of A, B, C for strength of recommendation. **1c.14 Rationale for using this guideline over others:** This guideline is the only United States guideline on cataract surgery contained in the National Guideline Clearinghouse.	
TAP/Workgroup: What are the strengths and weaknesses in relation to the subcriteria for *Importance to Measure and Report?*	**1**
Steering Committee: Was the threshold criterion, *Importance to Measure and Report*, met? **Rationale:**	**1** **Y☐** **N☐**
2. SCIENTIFIC ACCEPTABILITY OF MEASURE PROPERTIES	
Extent to which the measure, as specified, produces consistent (reliable) and credible (valid) results about the quality of care when implemented. (evaluation criteria)	**Eval Rating**
2a. MEASURE SPECIFICATIONS	
S.1 Do you have a web page where current detailed measure specifications can be obtained? **S.2 If yes, provide web page URL:** **2a. Precisely Specified**	
2a.1 Numerator Statement (*Brief, text description of the numerator - what is being measured about the target population, e.g. target condition, event, or outcome*)**:** Patients 18 years and older in the sample who were satisfied with their care within 90 days following cataract surgery. **2a.2 Numerator Time Window** (*The time period in which cases are eligible for inclusion in the numerator*)**:** One year **2a.3 Numerator Details** (*All information required to collect/calculate the numerator, including all codes, logic, and definitions*)**:** Patients 18 years and older in the sample who were satisfied with their care within 90 days following cataract surgery based on a patient satisfaction instrument (S-CAHPS) Patients who were satisfied based on the patient satisfaction instrument (S-CAHPS) and CPT Procedure	**2a-specs** **C☐** **P☐** **M☐** **N☐**

Codes (with or without modifiers): 66840, 66850, 66852, 66920, 66930, 66940, 66982, 66983, 66984

2a.4 Denominator Statement (*Brief, text description of the denominator - target population being measured***):**
All patients aged 18 years and older in the sample who had cataract surgery

2a.5 Target population gender: Female, Male
2a.6 Target population age range: 18 years and older

2a.7 Denominator Time Window (*The time period in which cases are eligible for inclusion in the denominator***):**
One year

2a.8 Denominator Details (*All information required to collect/calculate the denominator - the target population being measured - including all codes, logic, and definitions***):**
All patients aged 18 years and older in the sample who had cataract surgery
- CPT Procedure Codes (with or without modifiers): 66840, 66850, 66852, 66920, 66930, 66940, 66982, 66983, 66984

2a.9 Denominator Exclusions (*Brief text description of exclusions from the target population***):**

2a.10 Denominator Exclusion Details (*All information required to collect exclusions to the denominator, including all codes, logic, and definitions***):**

2a.11 Stratification Details/Variables (*All information required to stratify the measure including the stratification variables, all codes, logic, and definitions***):**
No stratification

2a.12-13 Risk Adjustment Type: No risk adjustment necessary

2a.14 Risk Adjustment Methodology/Variables (*List risk adjustment variables and describe conceptual models, statistical models, or other aspects of model or method***):**

2a.15-17 Detailed risk model available Web page URL or attachment:

2a.18-19 Type of Score: Rate/proportion
2a.20 Interpretation of Score: Better quality = Higher score
2a.21 Calculation Algorithm (*Describe the calculation of the measure as a flowchart or series of steps***):**
The calculation of the measure would be determination of the number of patients who completed the patient satisfaction survey and were satisfied as the numerator over the number of patients in the sample.

Currently, there is no established method to define a threshold of "satisfaction" with the CAHPS instruments. CAHPS scores are actually normative scores; that is, they provide relative rankings rather than absolute rankings (where is a score is compared with an ´objective´ criterion). We would propose a threshold of the lowest 5% of scores, and then postulate that those individuals scoring above this threshold will have achieved satisfaction.

2a.22 Describe the method for discriminating performance *(e.g., significance testing)***:**
Methods would include comparison of means and percentiles and analysis of variance against established benchmarks in the literature.

2a.23 Sampling (Survey) Methodology *If measure is based on a sample (or survey), provide instructions for obtaining the sample, conducting the survey and guidance on minimum sample size (response rate)*:
For this physician-level measure, it is anticipated to be used as a group or composite measure. Utilizing a sample, work in the field has indicated that a sample size of 30 patients would be adequate for typical practice sizes. Based on the Central Limit Theorem, the distribution of an average will tend to be normal with a sample size of 30. This is also the sample size utilized for CMS measure group reporting in PQRS. Therefore, a sample size of 30 patients is proposed. The Academy has a registry for PQRS measures. This survey instrument could be incorporated into the registry and patients could access the web portal in order to enter their results of the satisfaction survey. Other options, such as mail surveys or phone administered

surveys, could also be offered, and entered into the registry. This would alleviate any concerns of bias being introduced by having the patient fill it out in the physician´s office.

2a.24 **Data Source (***Check the source(s) for which the measure is specified and tested)*
Patient Reported Data/Survey

2a.25 **Data source/data collection instrument (***Identify the specific data source/data collection instrument, e.g. name of database, clinical registry, collection instrument, etc.***):**
«data_source_instrument»

2a.26-28 **Data source/data collection instrument reference web page URL or attachment:** URL
https://www.cahps.ahrq.gov/content/products/sc/PROD_SC_Surgical_Care.asp?p=1021&s=213

2a.29-31 **Data dictionary/code table web page URL or attachment:**

2a.32-35 **Level of Measurement/Analysis** (*Check the level(s) for which the measure is specified and tested)*
Clinician : Individual

2a.36-37 **Care Settings (***Check the setting(s) for which the measure is specified and tested)*
Ambulatory Care : Ambulatory Surgery Center (ASC), Ambulatory Care : Clinician Office, Hospital/Acute Care Facility

2a.38-41 **Clinical Services** (*Healthcare services being measured, check all that apply*)
Clinicians: Physicians (MD/DO)

TESTING/ANALYSIS

2b. Reliability testing

2b.1 **Data/sample** *(description of data/sample and size)***:** The field test involved 96 surgeons in 33 different practices, representing a range of surgical specialties. A total of 5,627 adult patients were sent questionnaires, a total of 2,285 completed the questionnaire by mail. The major criteria for patient selection was having had a major surgery as defined by CPT codes with a 90 day global within 3 to 6 months prior to the start of the survey.

2b.2 **Analytic Method** *(type of reliability & rationale, method for testing)***:**
Surgeon-level reliability (that is, inter-rater reliability) is based on the theory that consumers who use the same surgeon should generally agree in their assessments of that surgeon. The reliability of aggregate surgeon scores increases with the ratio of between-to-within-surgeon variation in consumer assessments and with the number of respondents (which causes the within-surgeon-variance to shrink). This relationship of between- to within- surgeon variability was examined using analysis of variance with surgeon as the class variable and the consumer assessments as the dependent variable. Standard practice with CAHPS surveys is that surgeon-level reliabilities should be at least 0.25 and ideally greater than 0.40, corresponding to moderate and large effect sizes, respectively.
Internal consistency reliabilities were calculated using Cronbach´s coefficient alpha.

2b.3 **Testing Results** *(reliability statistics, assessment of adequacy in the context of norms for the test conducted)***:**
The testing results for surgeon-level reliability showed that for 3 out of 4 composites, the surgeon-level reliabilities were ideal. The results were as follows for the mail mode group: pre-surgical = 0.50; peri-operative = 0.67; post-surgical = 0.43 and office staff = 0.00. The reliability coefficient of 0 for the fourth composite means that this cannot be used to detect differences among surgeons in the quality of their office staff.
The internal consistency reliabilities were high for three of the four composites and compares favorably to those found for other CAHPS surveys.
The results were as follows for the mail mode group: pre-surgical = 0.82; peri-operative = 0.69; post-surgical = 0.90; and office staff = 0.88. The lower score for the peri-operative composite reflects the heterogeneity of the sample.

2b
C☐
P☐
M☐
N☐

2c. Validity testing

2c.1 **Data/sample** *(description of data/sample and size)*: The field test involved 96 surgeons in 33 different practices, representing a range of surgical specialties. A total of 5,627 adult patients were sent questionnaires, a total of 2,285 completed the questionnaire by mail. The major criteria for patient selection was having had a major surgery as defined by CPT codes with a 90 day global within 3 to 6 months prior to the start of the survey.

2c.2 **Analytic Method** *(type of validity & rationale, method for testing)*:
Structural equation modeling as implemented by PROC CALIS to evaluate the fit of the data to the structure around which the questionnaire was designed. The maximum likelihood estimation method was used, taking into account that simulation studies suggest that the ML method is likely to result in conservative estimates of model fit. These data were also treated as continuous, consistent with the observed imputed values that comprised a portion of the data. The goodness of fit of the model to the data was evaluated using chi-square, the comparative fit index (CFI), the non-normed fit index (NNFI) and the average root mean square residual approximation (RMSEA). Current practice with regard to these indicators of model fit is to: 1) report chi-square and p-values but not to reject models where the p-value is <0.05 in data sets greater than 250 observations; 2) require RMSEA to be less than 0.10 and ideally less than 0.06 and 3) require the CFI and NNFI to be greater than 0.90.
Exploratory factor analysis on the correlation matrix was used with the principle factor method with squared multiple correlations as initial communality estimates and oblique rotation (promax) with Kaiser normalization. In determining the number of factors, the following information was considered: 1) the number of eigen values greater than one; 2) the point at which additional factors explained a trivial amount of variance in the data as evidence by the scree plot; and 3) the interpretability of the rotated vector, based on simple structure. Simple structure was determined by the pattern fo factor loadings after rotation. An item was considered to be conforming to simple structure if it had comparatively larger loadings on one factor and smaller loadings on all others. Large loadings were considered to be those greater than 0.40 and small loadings to be no larger than half the size of the larger loading and less than 0.25.
The investigators reviewed the exploratory factor analysis and used the formative research to select among the candidate composite models. The hypothetical model to be evaluated by the confirmatory factor analysis included 15 items and specified 4 composites concerning the following: Presurgical care; perioperative care, post-surgical followup and quality of interactions with the surgeon´s office staff.

2c.3 **Testing Results** *(statistical results, assessment of adequacy in the context of norms for the test conducted)*:
The results show that the model fit the observed correlation matrix of the mail mode responses reasonably well. The results were X2 = 463, df = 74, CFI = 0.95, NNFI = 0.94 and RMSEA = 0.07. With the combined set of mail and web responses, the results also showed a good fit, with X2 = 513, df = 74, CFI = 0.95, NNFI = 0.93 and RMSEA = 0.06.

The results for the confirmatory factor analysis for the final model found that all t-tests for beta-weights describing the relationship of items to their hypothesized composites were highly significant (p<0.0001), ranging from 0.38 to 0.91.

2c
C☐
P☐
M☐
N☐

2d. Exclusions Justified

2d.1 **Summary of Evidence supporting exclusion(s):**

2d.2 **Citations for Evidence:**

2d.3 **Data/sample** *(description of data/sample and size)*:

2d.4 **Analytic Method** *(type analysis & rationale)*:

2d.5 **Testing Results** *(e.g., frequency, variability, sensitivity analyses)*:

2d
C☐
P☐
M☐
N☐
NA☐

2e. Risk Adjustment for Outcomes/ Resource Use Measures **2e.1 Data/sample** *(description of data/sample and size)*: No risk adjustment strategy was used. **2e.2 Analytic Method** *(type of risk adjustment, analysis, & rationale)*: **2e.3 Testing Results** *(risk model performance metrics)*: **2e.4 If outcome or resource use measure is not risk adjusted, provide rationale:**	**2e** C☐ P☐ M☐ N☐ NA☐
2f. Identification of Meaningful Differences in Performance **2f.1 Data/sample from Testing or Current Use** *(description of data/sample and size)*: The field test involved 96 surgeons in 33 different practices, representing a range of surgical specialties. A total of 5,627 adult patients were sent questionnaires, a total of 2,285 completed the questionnaire by mail. The major criteria for patient selection was having had a major surgery as defined by CPT codes with a 90 day global within 3 to 6 months prior to the start of the survey. **2f.2 Methods to identify statistically significant and practically/meaningfully differences in performance** *(type of analysis & rationale)*: The variability of assessments was evaluated by evaluating the percentage of consumers for whom the highest (i.e., the ceiling effect) and the lowest (i.e., the floor effect) possible scores were tabulated. **2f.3 Provide Measure Scores from Testing or Current Use** *(description of scores, e.g., distribution by quartile, mean, median, SD, etc.; identification of statistically significant and meaningfully differences in performance)*: The percent at the highest score in the mail mode group were as follows: pre-surgical: 70%; peri-operative: 56%; post-surgical: 64%; and office staff: 87%. The results on the office staff indicates that there is little information about differences in the quality of office staff across surgeons. The relatively high ceiling effects on composites is believed to be due to a restricted range of performance in the field test sample, since participating surgeons were volunteers and were not randomly selected. Thus, high performers are likely to have been over-represented in the sample. A random sample of surgeons would probably provide a more accurate picture of the distribution of the composite scores.	**2f** C☐ P☐ M☐ N☐
2g. Comparability of Multiple Data Sources/Methods **2g.1 Data/sample** *(description of data/sample and size)*: The survey was also administered in a web-based version. The web-based version was completed by 465 of the respondents, who were about 17% of the respondents. This was field tested in the summer of 2008. In terms of modality of questionnaire (mail vs. web-based), this was investigated as a potential case mix adjuster and was not found to have any significant impact. **2g.2 Analytic Method** *(type of analysis & rationale)*: Structural equation modeling as implemented by PROC CALIS to evaluate the fit of the data to the structure around which the questionnaire was designed. The maximum likelihood estimation method was used, taking into account that simulation studies suggest that the ML method is likely to result in conservative estimates of model fit. These data were also treated as continuous, consistent with the observed imputed values that comprised a portion of the data. The goodness of fit of the model to the data was evaluated using chi-square, the comparative fit index (CFI), the non-normed fit index (NNFI) and the average root mean square residual approximation (RMSEA). Current practice with regard to these indicators of model fit is to: 1) report chi-square and p-values but not to reject models where the p-value is <0.05 in data sets greater than 250 observations; 2) require RMSEA to be less than 0.10 and ideally less than 0.06 and 3) require the CFI and NNFI to be greater than 0.90. **2g.3 Testing Results** *(e.g., correlation statistics, comparison of rankings)*: The web-administered questionnaire is comparable to the mailed questionnaire in terms of reliability and	**2g** C☐ P☐ M☐ N☐ NA☐

validity estimates. These are the statistics for the internal consistency reliability for the web only version: pre-surgical 0.77; peri-operative = 0.70; post-surgical = 0.87; and office staff = 0.79. The correlation with rating of surgeon was as follows: pre-surgical = 0.69; peri-operative = 0.29; post-surgical = 0.78; and office staff = 0.46. The mean composite scores were also identical to the first decimal point of those in the mail mode: pre-surgical = 3.83; peri-operative = 2.27; post-surgical = 3.79 and office staff = 3.82.	
2h. Disparities in Care **2h.1 If measure is stratified, provide stratified results** *(scores by stratified categories/cohorts)*: The measure is not stratified **2h.2 If disparities have been reported/identified, but measure is not specified to detect disparities, provide follow-up plans:**	**2h** C☐ P☐ M☐ N☐ NA☐
TAP/Workgroup: What are the strengths and weaknesses in relation to the subcriteria for *Scientific Acceptability of Measure Properties?*	**2**
Steering Committee: Overall, to what extent was the criterion, *Scientific Acceptability of Measure Properties*, met? **Rationale:**	***2*** C☐ P☐ M☐ N☐
3. USABILITY	
Extent to which intended audiences (e.g., consumers, purchasers, providers, policy makers) can understand the results of the measure and are likely to find them useful for decision making. (evaluation criteria)	Eval Rating
3a. Meaningful, Understandable, and Useful Information **3a.1 Current Use:** Not in use but testing completed **3a.2 Use in a public reporting initiative (disclosure of performance results to the public at large)** (*If used in a public reporting initiative, provide name of initiative(s), locations, Web page URL(s). If not publicly reported, state the plans to achieve public reporting within 3 years*): The plan are to have this used in a public reporting initiative within the next 3 years: the Centers for Medicare and Medicaid Services´ Physician Quality Reporting System. **3a.3 If used in other programs/initiatives (***If used in quality improvement or other programs/initiatives, name of initiative(s), locations, Web page URL(s). If not used for QI, state the plans to achieve use for QI within 3 years***):** The plan is to use this with the American Academy of Ophthalmology´s Ophthalmic Patient Outcomes Database for quality improvement purposes within 3 years´ time. **Testing of Interpretability** (*Testing that demonstrates the results are understood by the potential users for public reporting and quality improvement*) **3a.4 Data/sample** *(description of data/sample and size)*: **3a.5 Methods** *(e.g., focus group, survey, QI project)*: **3a.6 Results** *(qualitative and/or quantitative results and conclusions)*:	**3a** C☐ P☐ M☐ N☐
3b/3c. Relation to other NQF-endorsed measures **3b.1 NQF # and Title of similar or related measures:**	
(for NQF staff use) **Notes on similar/related endorsed or submitted measures:**	
3b. Harmonization If this measure is related to measure(s) already endorsed by NQF (e.g., same topic, but different target	**3b** C☐

population/setting/data source or different topic but same target population): **3b.2 Are the measure specifications harmonized? If not, why?**	P☐ M☐ N☐ NA☐
3c. Distinctive or Additive Value **3c.1 Describe the distinctive, improved, or additive value this measure provides to existing NQF-endorsed measures:** **5.1 If this measure is similar to measure(s) already endorsed by NQF (i.e., on the same topic and the same target population), Describe why it is a more valid or efficient way to measure quality:** This measure is based on the S-CAHPS which specifically evaluates patient satisfaction with surgical care.	**3c** C☐ P☐ M☐ N☐ NA☐
TAP/Workgroup: What are the strengths and weaknesses in relation to the subcriteria for *Usability?*	**3**
Steering Committee: Overall, to what extent was the criterion, *Usability*, met? **Rationale:**	**3** C☐ P☐ M☐ N☐
4. FEASIBILITY	
Extent to which the required data are readily available, retrievable without undue burden, and can be implemented for performance measurement. (evaluation criteria)	Eval Rating
4a. Data Generated as a Byproduct of Care Processes **4a.1-2 How are the data elements that are needed to compute measure scores generated?** Survey	**4a** C☐ P☐ M☐ N☐
4b. Electronic Sources **4b.1 Are all the data elements available electronically?** (*elements that are needed to compute measure scores are in defined, computer-readable fields, e.g., electronic health record, electronic claims*) No **4b.2 If not, specify the near-term path to achieve electronic capture by most providers.** A web-based survey could be used and results uploaded into a data registry. Paper survey instruments could be scanned and incorporated into a data registry. The registry could calculate these results and provide these results as feedback to the physicians and as quality measures to the CMS PQRS.	**4b** C☐ P☐ M☐ N☐
4c. Exclusions **4c.1 Do the specified exclusions require additional data sources beyond what is required for the numerator and denominator specifications?** No **4c.2 If yes, provide justification.**	**4c** C☐ P☐ M☐ N☐ NA☐
4d. Susceptibility to Inaccuracies, Errors, or Unintended Consequences **4d.1 Identify susceptibility to inaccuracies, errors, or unintended consequences of the measure and describe how these potential problems could be audited. If audited, provide results.** There is the potential for biases and inaccuracies based on patient recall and reporting of information. There is the potential for biases introduced if the patient fills out the survey in the physician´s office or is contacted by the physician´s office to follow up on the survey. One strategy to minimize this bias is to have the survey administered through a third party, e.g., the Academy´s data registry which could provide a web portal for patients to fill out the survey form or other options (mail survey, phone administered survey).	**4d** C☐ P☐ M☐ N☐

4e. Data Collection Strategy/Implementation

4e.1 Describe what you have learned/modified as a result of testing and/or operational use of the measure regarding data collection, availability of data/missing data, timing/frequency of data collection, patient confidentiality, time/cost of data collection, other feasibility/ implementation issues:
There is a burden upon the office practice to survey patients post cataract surgery. The vast majority of patients are elderly and they may require assistance/prompting in responding to the surveys. This then will entail time taken out by the office staff. To ensure compliance with the follow-up service will also require attention. Therefore, we propose a minimal sampling size of 30 patients, which would reduce burden on the physicians´ practices and optimize response rates. The survey would be administered by a third party (a registry for reporting PQRS measures sponsored by the American Academy of Ophthalmology) to prevent or minimize bias which might be introduced if it is an in-office paper survey with questions asked by the office staff. Options would be provided to the patient, either online survey, mail survey or phone survey, depending on their preferences and abilities, because these patients are elderly and have visual impairment.

4e.2 Costs to implement the measure (*costs of data collection, fees associated with proprietary measures*)**:**
There are costs of data collection and follow up of patients who haven´t filled out the surveys. There are no fees associated with proprietary measures. Therefore, we have proposed a sample size of 30, which will reduce the burden of these costs.

4e.3 Evidence for costs:

4e.4 Business case documentation:

4e
C☐
P☐
M☐
N☐

TAP/Workgroup: What are the strengths and weaknesses in relation to the subcriteria for *Feasibility?*

4

Steering Committee: Overall, to what extent was the criterion, *Feasibility*, met?
Rationale:

4
C☐
P☐
M☐
N☐

RECOMMENDATION

(for NQF staff use) **Check if measure is untested and only eligible for time-limited endorsement.**

Time-limited ☐

Steering Committee: Do you recommend for endorsement?
Comments:

Y☐
N☐
A☐

CONTACT INFORMATION

Co.1 Measure Steward (Intellectual Property Owner)
Co.1 Organization
American Academy of Ophthalmology and the Hoskins Center for Quality Eye Care, 655 Beach Street, San Francisco, California, 94109-1336

Co.2 Point of Contact
Flora, Lum, MD, flum@aao.org, 415-561-8592-

Measure Developer If different from Measure Steward
Co.3 Organization
American Academy of Ophthalmology and the Hoskins Center for Quality Eye Care, 655 Beach Street, San Francisco, California, 94109-1336

Co.4 Point of Contact Flora, Lum, MD, flum@aao.org, 415-561-8592-
Co.5 Submitter If different from Measure Steward POC Flora, Lum, MD, flum@aao.org, 415-561-8592-, American Academy of Ophthalmology and the Hoskins Center for Quality Eye Care
Co.6 Additional organizations that sponsored/participated in measure development American Society of Cataract and Refractive Surgery
ADDITIONAL INFORMATION
Workgroup/Expert Panel involved in measure development **Ad.1 Provide a list of sponsoring organizations and workgroup/panel members' names and organizations. Describe the members' role in measure development.** Priscilla Arnold, MD; David Chang, MD; John Thompson, MD, Kevin Miller, MD, Leon Herndon, MD
Ad.2 If adapted, provide name of original measure: **Ad.3-5 If adapted, provide original specifications URL or attachment**
Measure Developer/Steward Updates and Ongoing Maintenance **Ad.6 Year the measure was first released:** 2010 **Ad.7 Month and Year of most recent revision:** 12, 2010 **Ad.8 What is your frequency for review/update of this measure?** Every 3 years **Ad.9 When is the next scheduled review/update for this measure?** 12, 2013
Ad.10 Copyright statement/disclaimers: Copyright by the American Academy of Ophthalmology 2010
Ad.11 -13 Additional Information web page URL or attachment: Attachment visual functionand patient satisfaction measure Nov 2010-634279328820242414.doc
Date of Submission (*MM/DD/YY*)**:** 06/10/2011

NATIONAL QUALITY FORUM

Measure Evaluation 4.1
December 2009

This form contains the measure information submitted by stewards. Blank fields indicate no information was provided. Attachments also may have been submitted and are provided to reviewers. The subcriteria and most of the footnotes from the evaluation criteria are provided in Word comments within the form and will appear if your cursor is over the highlighted area. Hyperlinks to the evaluation criteria and ratings are provided in each section.

TAP/Workgroup (if utilized)**:** Complete all yellow highlighted areas of the form. Evaluate the extent to which each subcriterion is met. Based on your evaluation, summarize the strengths and weaknesses in each section.

Note: *If there is no TAP or workgroup, the SC also evaluates the subcriteria (yellow highlighted areas).*

Steering Committee: Complete all pink highlighted areas of the form. Review the workgroup/TAP assessment of the subcriteria, noting any areas of disagreement; then evaluate the extent to which each major criterion is met; and finally, indicate your recommendation for the endorsement. Provide the rationale for your ratings.

Evaluation ratings of the extent to which the criteria are met
C = Completely (unquestionably demonstrated to meet the criterion)
P = Partially (demonstrated to partially meet the criterion)
M = Minimally (addressed BUT demonstrated to only minimally meet the criterion)
N = Not at all (NOT addressed; OR incorrectly addressed; OR demonstrated to NOT meet the criterion)
NA = Not applicable (only an option for a few subcriteria as indicated)

(for NQF staff use) **NQF Review #:** 0125 **NQF Project:** Surgery Endorsement Maintenance 2010
MEASURE DESCRIPTIVE INFORMATION
De.1 **Measure Title:** Timing of Antibiotic Prophylaxis for Cardiac Surgery Patients
De.2 **Brief description of measure:** Percent of patients aged 18 years and older undergoing cardiac surgery who received prophylactic antibiotics within one hour of surgical incision or start of procedure if no incision was required (two hours if receiving vancomycin or fluoroquinolone)
1.1-2 **Type of Measure:** Process De.3 **If included in a composite or paired with another measure, please identify composite or paired measure**
De.4 **National Priority Partners Priority Area:** Safety De.5 **IOM Quality Domain:** Safety De.6 **Consumer Care Need:** Getting better

CONDITIONS FOR CONSIDERATION BY NQF	
Four conditions must be met before proposed measures may be considered and evaluated for suitability as voluntary consensus standards:	**NQF Staff**
A. The measure is in the public domain or an intellectual property (measure steward agreement) is signed. *Public domain only applies to governmental organizations. All non-government organizations must sign a measure steward agreement even if measures are made publicly and freely available.* A.1 **Do you attest that the measure steward holds intellectual property rights to the measure and the right to use aspects of the measure owned by another entity (e.g., risk model, code set)?** Yes A.2 **Indicate if Proprietary Measure** (*as defined in measure steward agreement*)**:** A.3 **Measure Steward Agreement:** Agreement will be signed and submitted prior to or at the time of measure submission A.4 **Measure Steward Agreement attached:** STS Measure Steward Agreement. Fully Executed-634267323027557342.pdf	**A** Y☐ N☐

B. The measure owner/steward verifies there is an identified responsible entity and process to maintain and update the measure on a schedule that is commensurate with the rate of clinical innovation, but at least every 3 years. Yes, information provided in contact section	**B** Y☐ N☐
C. The intended use of the measure includes both public reporting and quality improvement. ►**Purpose:** Public Reporting, Quality Improvement (Internal to the specific organization), Quality Improvement with Benchmarking (external benchmarking to multiple organizations)	**C** Y☐ N☐
D. The requested measure submission information is complete. Generally, measures should be fully developed and tested so that all the evaluation criteria have been addressed and information needed to evaluate the measure is provided. Measures that have not been tested are only potentially eligible for a time-limited endorsement and in that case, measure owners must verify that testing will be completed within 12 months of endorsement. D.1**Testing:** Yes, fully developed and tested D.2 **Have NQF-endorsed measures been reviewed to identify if there are similar or related measures?** Yes	**D** Y☐ N☐
(for NQF staff use) **Have all conditions for consideration been met?** **Staff Notes to Steward** (*if submission returned*)**:**	**Met** Y☐ N☐
Staff Notes to Reviewers (*issues or questions regarding any criteria*)**:**	
Staff Reviewer Name(s):	

TAP/Workgroup Reviewer Name:	
Steering Committee Reviewer Name:	
1. IMPORTANCE TO MEASURE AND REPORT	
Extent to which the specific measure focus is important to making significant gains in health care quality (safety, timeliness, effectiveness, efficiency, equity, patient-centeredness) and improving health outcomes for a specific high impact aspect of healthcare where there is variation in or overall poor performance. ***Measures must be judged to be important to measure and report*** *in order to be evaluated against the remaining criteria.* (evaluation criteria) **1a. High Impact**	**Eval Rating**
(for NQF staff use) **Specific NPP goal**:	
1a.1 **Demonstrated High Impact Aspect of Healthcare:** Affects large numbers, Frequently performed procedure, Leading cause of morbidity/mortality, High resource use, Severity of illness, Patient/societal consequences of poor quality 1a.2 1a.3 **Summary of Evidence of High Impact:** Postoperative mediastinitis is an infection of the mediastinal space after cardiac surgery. The incidence of deep sternal infections (mediastinitis) associated with cardiac surgery ranges between 0.25% and 4% [1]. The incidence of postoperative mediastinitis can be decrease by assuring that "patients aged 18 years and older undergoing cardiac surgery receive prophylactic antibiotics within one hour of surgical incision or start of procedure if no incision was required (two hours if receiving vancomycin or fluoroquinolone)". Reference 1 below states: "Postoperative mediastinitis carries a very high hospital mortality [3–5] and is also associated with reduced long-term survival [3]. This complication invariably involves an additional operation, a prolonged hospitalization, a significant toll in clinical resources, and dramatically increased costs. Anyone who has provided care for a patient with mediastinitis also knows well the emotional cost not only for the patient but also for the family, the nursing staff, and the surgeons. Truly one of the most devastating infections in all of surgery, this dreaded complication influences the perioperative management strategy of virtually all cardiothoracic surgeons."	**1a** C☐ P☐ M☐ N☐

1a.4 Citations for Evidence of High Impact: 1. Edwards FH, Engelman RM, Houck P, Shahian DM, Bridges CR; Society of Thoracic Surgeons. The Society of Thoracic Surgeons Practice Guideline Series: Antibiotic Prophylaxis in Cardiac Surgery, Part I: Duration. Ann Thorac Surg. 2006 Jan;81(1):397-404. No abstract available. PMID: 16368422
2. Engelman R, Shahian D, Shemin R, Guy TS, Bratzler D, Edwards F, Jacobs M, Fernando H, Bridges C; Workforce on Evidence-Based Medicine, Society of Thoracic Surgeons. The Society of Thoracic Surgeons practice guideline series: Antibiotic prophylaxis in cardiac surgery, part II: Antibiotic choice. Ann Thorac Surg. 2007 Apr;83(4):1569-76. Review. No abstract available. PMID: 17383396
3. Braxton JH, Marrin CAS, McGrath PD, et al. 10-year follow-up of patients with and without mediastinitis. Sem Thorac Cardiovasc Surg 2004;16:70–6.
4. Demmy TL, Park SB, Liebler GA, et al. Recent experience with major sternal wound complications. Ann Thorac Surg 1990;49:458–62.
5. Tang GHL, Maganti M, Weisel RD, Borger MA. Prevention and management of deep sternal wound infection. Sem Thorac Cardiovasc Surg 2004;16:62–9.
6. American Society of Health-System Pharmacists. ASHP Therapeutic Guidelines on Antimicrobial Prophylaxis in Surgery; March 23, 2004. Available at www.ashp.org. Last accessed April 20, 2004.
7. Centers for Disease Control and Prevention (CDC) National Nosocomial Infections Surveillance (NNIS) System. National nosocomial infections surveillance (NNIS) system report, data summary from January 1992 to June 2003, issued August 2003. Am J Infect Control. 2003;31:481-498.
8. Classen DC, Evans RS, Pestotnik SL, Horn SD, Menlove RL, Burke JP. The timing of prophylactic administration of antibiotics and the risk of surgical-wound infection. N Engl J Med. 1992;326(5):281-286.

1b. Opportunity for Improvement

1b.1 Benefits (improvements in quality) envisioned by use of this measure: The incidence of deep sternal infections (mediastinitis) associated with cardiac surgery ranges between 0.25% and 4% [1]. The incidence of postoperative mediastinitis can be decrease by assuring that "patients aged 18 years and older undergoing cardiac surgery who received prophylactic antibiotics within one hour of surgical incision or start of procedure if no incision was required (two hours if receiving vancomycin or fluoroquinolone)".

1b.2 Summary of data demonstrating performance gap (variation or overall poor performance) across providers:
Please see attachment and below

Measurement	Timing of Antibiotic Administration for Cardiac Surgery Patients
N	786
Mean	98.0%
1st	83.2%
5th	93.2%
10th	95.2%
25th	97.7%
Median	99.2%
75th	99.9%
90th	100.0%
95th	100.0%
99th	100.0%
Outlier	347 (44.1%)
High	259
Low	88

1b.3 Citations for data on performance gap:
Dates: January 1, 2009-December 31, 2009

Analysis includes 786 STS Adult Cardiac Surgery Database Participants who had at least 100 eligible cases for the measure and reported data to STS for all 12 months.

1b.4 Summary of Data on disparities by population group:

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N☐

please see attachment

1b.5 Citations for data on Disparities:
Analysis includes STS Adult Cardiac Surgery Database Participants that had more than 50 eligible cases in 2008 and 2009, and reported data for at least 15 months.

375888 Patients from 887 Participants were included in the Gender = Male sub-group.
175058 Patients from 819 Participants were included in the Gender = Female sub-group.
29844 Patients from 231 Participants were included in the Race = Black sub-group.
477888 Patients from 881 Participants were included in the Race = White sub-group.
25994 Patients from 192 Participants were included in the Race = Other sub-group.
19142 Patients from 151 Participants were included in the Ethnicity = Hispanic sub-group.
526816 Patients from 887 Participants were included in the Ethnicity = Non-Hispanic sub-group.

1c. Outcome or Evidence to Support Measure Focus

1c.1 Relationship to Outcomes (*For non-outcome measures, briefly describe the relationship to desired outcome. For outcomes, describe why it is relevant to the target population*)**:** "Postoperative mediastinitis carries a very high hospital mortality and is also associated with reduced long-term survival [3]. This complication invariably involves an additional operation, a prolonged hospitalization, a significant toll in clinical resources, and dramatically increased costs. Anyone who has provided care for a patient with mediastinitis also knows well the emotional cost not only for the patient but also for the family, the nursing staff, and the surgeons. Truly one of the most devastating infections in all of surgery, this dreaded complication influences the perioperative management strategy of virtually all cardiothoracic surgeons."

Reference:
Edwards FH, Engelman RM, Houck P, Shahian DM, Bridges CR; Society of Thoracic Surgeons. The Society of Thoracic Surgeons Practice Guideline Series: Antibiotic Prophylaxis in Cardiac Surgery, Part I: Duration. Ann Thorac Surg. 2006 Jan;81(1):397-404. No abstract available. PMID: 16368422

The incidence of deep sternal infections (mediastinitis) associated with cardiac surgery ranges between 0.25% and 4% [1]. The incidence of postoperative mediastinitis can be decrease by assuring that "patients aged 18 years and older undergoing cardiac surgery receive prophylactic antibiotics within one hour of surgical incision or start of procedure if no incision was required (two hours if receiving vancomycin or fluoroquinolone)".

1c.2-3. Type of Evidence: Observational study, Expert opinion, Systematic synthesis of research, Other
Clinical results from approximately 90% of cardiac surgery centers in the US

1c.4 Summary of Evidence (*as described in the criteria; for outcomes, summarize any evidence that healthcare services/care processes influence the outcome*)**:**
"Postoperative mediastinitis carries a very high hospital mortality and is also associated with reduced long-term survival [3]. This complication invariably involves an additional operation, a prolonged hospitalization, a significant toll in clinical resources, and dramatically increased costs. Anyone who has provided care for a patient with mediastinitis also knows well the emotional cost not only for the patient but also for the family, the nursing staff, and the surgeons. Truly one of the most devastating infections in all of surgery, this dreaded complication influences the perioperative management strategy of virtually all cardiothoracic surgeons."

Reference:
Edwards FH, Engelman RM, Houck P, Shahian DM, Bridges CR; Society of Thoracic Surgeons. The Society of Thoracic Surgeons Practice Guideline Series: Antibiotic Prophylaxis in Cardiac Surgery, Part I: Duration. Ann Thorac Surg. 2006 Jan;81(1):397-404. No abstract available. PMID: 16368422

The incidence of deep sternal infections (mediastinitis) associated with cardiac surgery ranges between 0.25% and 4% [1]. The incidence of postoperative mediastinitis can be decreased by assuring that "patients aged 18 years and older undergoing cardiac surgery receive prophylactic antibiotics within one hour of

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surgical incision or start of procedure if no incision was required (two hours if receiving vancomycin or fluoroquinolone)".

"In patients for whom cefazolin is the appropriate prophylactic antibiotic for cardiac surgery, administration within 60 minutes of the skin incision is indicated (Class I, Level of Evidence A)."

Reference:
Engelman R, Shahian D, Shemin R, Guy TS, Bratzler D, Edwards F, Jacobs M, Fernando H, Bridges C; Workforce on Evidence-Based Medicine, Society of Thoracic Surgeons. The Society of Thoracic Surgeons practice guideline series: Antibiotic prophylaxis in cardiac surgery, part II: Antibiotic choice. Ann Thorac Surg. 2007 Apr;83(4):1569-76. Review. No abstract available. PMID: 17383396

"In patients for whom vancomycin is an appropriate prophylactic antibiotic for cardiac surgery, a dose of 1 to 1.5 g or a weight-adjusted dose of 15 mg/kg administered intravenously slowly over 1 hour, with completion within 1 hour of the skin incision, is recommended (Class I, Level of Evidence A)."

Reference:
Engelman R, Shahian D, Shemin R, Guy TS, Bratzler D, Edwards F, Jacobs M, Fernando H, Bridges C; Workforce on Evidence-Based Medicine, Society of Thoracic Surgeons. The Society of Thoracic Surgeons practice guideline series: Antibiotic prophylaxis in cardiac surgery, part II: Antibiotic choice. Ann Thorac Surg. 2007 Apr;83(4):1569-76. Review. No abstract available. PMID: 17383396

1c.5 Rating of strength/quality of evidence (*also provide narrative description of the rating and by whom***):**
Class I, Level of Evidence A – "In patients for whom cefazolin is the appropriate prophylactic antibiotic for cardiac surgery, administration within 60 minutes of the skin incision is indicated." Class I, Level of Evidence A – "In patients for whom vancomycin is an appropriate prophylactic antibiotic for cardiac surgery, a dose of 1 to 1.5 g or a weight-adjusted dose of 15 mg/kg administered intravenously slowly over 1 hour, with completion within 1 hour of the skin incision, is recommended." -- Reference: Engelman R, Shahian D, Shemin R, Guy TS, Bratzler D, Edwards F, Jacobs M, Fernando H, Bridges C; Workforce on Evidence-Based Medicine, Society of Thoracic Surgeons. The Society of Thoracic Surgeons practice guideline series: Antibiotic prophylaxis in cardiac surgery, part II: Antibiotic choice. Ann Thorac Surg. 2007 Apr;83(4):1569-76. Review. No abstract available. PMID: 17383396

1c.6 Method for rating evidence: n/a

1c.7 Summary of Controversy/Contradictory Evidence: n/a

1c.8 Citations for Evidence (*other than guidelines***):** 1.Edwards FH, Engelman RM, Houck P, Shahian DM, Bridges CR; Society of Thoracic Surgeons. The Society of Thoracic Surgeons Practice Guideline Series: Antibiotic Prophylaxis in Cardiac Surgery, Part I: Duration. Ann Thorac Surg. 2006 Jan;81(1):397-404. No abstract available. PMID: 16368422
2. Engelman R, Shahian D, Shemin R, Guy TS, Bratzler D, Edwards F, Jacobs M, Fernando H, Bridges C; Workforce on Evidence-Based Medicine, Society of Thoracic Surgeons. The Society of Thoracic Surgeons practice guideline series: Antibiotic prophylaxis in cardiac surgery, part II: Antibiotic choice. Ann Thorac Surg. 2007 Apr;83(4):1569-76. Review. No abstract available. PMID: 17383396
3. Braxton JH, Marrin CAS, McGrath PD, et al. 10-year follow-up of patients with and without mediastinitis. Sem Thorac Cardiovasc Surg 2004;16:70–6.
4. Demmy TL, Park SB, Liebler GA, et al. Recent experience with major sternal wound complications. Ann Thorac Surg 1990;49:458–62.
5. Tang GHL, Maganti M, Weisel RD, Borger MA. Prevention and management of deep sternal wound infection. Sem Thorac Cardiovasc Surg 2004;16:62–9.
6. American Society of Health-System Pharmacists. ASHP Therapeutic Guidelines on Antimicrobial Prophylaxis in Surgery; March 23, 2004. Available at www.ashp.org. Last accessed April 20, 2004.
7. Centers for Disease Control and Prevention (CDC) National Nosocomial Infections Surveillance (NNIS) System. National nosocomial infections surveillance (NNIS) system report, data summary from January 1992 to June 2003, issued August 2003. Am J Infect Control. 2003;31:481-498.

8. Classen DC, Evans RS, Pestotnik SL, Horn SD, Menlove RL, Burke JP. The timing of prophylactic administration of antibiotics and the risk of surgical-wound infection. N Engl J Med. 1992;326(5):281-286. **1c.9 Quote the Specific guideline recommendation (***including guideline number and/or page number***):** n/a **1c.10 Clinical Practice Guideline Citation:** n/a **1c.11 National Guideline Clearinghouse or other URL:** n/a **1c.12 Rating of strength of recommendation (***also provide narrative description of the rating and by whom***):** n/a **1c.13 Method for rating strength of recommendation** (*If different from USPSTF system, also describe rating and how it relates to USPSTF)*: n/a **1c.14 Rationale for using this guideline over others:** n/a	
TAP/Workgroup: What are the strengths and weaknesses in relation to the subcriteria for *Importance to Measure and Report?*	**1**
Steering Committee: Was the threshold criterion, *Importance to Measure and Report*, met? **Rationale:**	**1** **Y☐** **N☐**
2. SCIENTIFIC ACCEPTABILITY OF MEASURE PROPERTIES	
Extent to which the measure, as specified, produces consistent (reliable) and credible (valid) results about the quality of care when implemented. (evaluation criteria)	**Eval Rating**
2a. MEASURE SPECIFICATIONS	
S.1 Do you have a web page where current detailed measure specifications can be obtained? **S.2 If yes, provide web page URL:** **2a. Precisely Specified**	
2a.1 Numerator Statement (*Brief, text description of the numerator - what is being measured about the target population, e.g. target condition, event, or outcome***):** Number of patients undergoing cardiac surgery patients who received prophylactic antibiotics within one hour of surgical incision or start of procedure if no incision was required (two hours if vancomycin or fluoroquinolone) **2a.2 Numerator Time Window (***The time period in which cases are eligible for inclusion in the numerator***):** Within one hour of surgical incision or start of procedure if no incision was required (two hours if vancomycin or fluoroquinolone) Rationale: Due to the longer infusion time required for vancomycin or a fluoroquinolone, it is acceptable to start these antibiotics within two hours prior to incision time. **2a.3 Numerator Details (***All information required to collect/calculate the numerator, including all codes, logic, and definitions***):** Number of cardiac surgery procedures in which timing of appropriate antibiotic administration [AbxTiming (STS Adult Cardiac Surgery Database Version 2.73)] is marked "yes"	**2a-specs** **C☐** **P☐** **M☐** **N☐**
2a.4 Denominator Statement (*Brief, text description of the denominator - target population being measured***):** Number of patients undergoing cardiac surgery	

2a.5 Target population gender: Female, Male
2a.6 Target population age range: 18 and older

2a.7 Denominator Time Window (*The time period in which cases are eligible for inclusion in the denominator***):**
12 months

2a.8 Denominator Details (*All information required to collect/calculate the denominator - the target population being measured - including all codes, logic, and definitions***):**
Number of cardiac surgery procedures;

A cardiac procedure is determined as a procedure for which at least one of the following is not marked "no" or "missing" (note: full terms for STS field names are provided in brackets []):
OpCAB[Coronary Artery Bypass], OpValve[Valve Surgery], VADProc [VAD Implanted or Removed], VSAV [Aortic Valve Procedure], VSMV [Mitral Valve Procedure], OpTricus [Tricuspid Valve Procedure Performed], OpPulm[Pulmonic Valve Procedure Performed], OpOCard [Other Cardiac Procedure other than CABG or Valve], OCarLVA [Left Ventricular Aneurysm Repair], OCarVSD [Ventricular Septal Defect Repair], OCarSVR [Surgical Ventricular Restoration], OCarCong [Congenital Defect Repair], OCarTrma [surgical procedure for an injury due to Cardiac Trauma], OCarCrTx [Cardiac Transplant], OCarACD [Arrhythmia Correction Surgery], OCAoProcType[Aortic Procedure Type], EndoProc [Endovascular Procedure (TEVAR)], OCTumor [resection of an intracardiac tumor], OCPulThromDis [Pulmonary Thromboembolectomy,, OCarOthr [Other Cardiac Procedure other than those listed previously], ECMO [Extracorporeal Membrane Oxygenation], OCarLasr [-Transmyocardial Laser Revascularization], OCarASD [Atrial Septal Defect Repair], OCarAFibSur [Atrial Fibrillation Surgical Procedure]

2a.9 Denominator Exclusions (*Brief text description of exclusions from the target population***):** Cases are removed from the denominator if the patient had a documented contraindication or rationale for not administering antibiotic in medical record.

Other exclusions include:
- Patients who had a principal diagnosis suggestive of preoperative infectious diseases
- Patients whose ICD-9-CM principal procedure was performed entirely by Laparoscope
- Patients enrolled in clinical trials
- Patients with documented infection prior to surgical procedure of interest
- Patients who were receiving antibiotics more than 24 hours prior to surgery
- Patients who were receiving antibiotics within 24 hours prior to arrival

This list will be provided in the STS Adult Cardiac Surgery Database Data Manager's Training Manual as acceptable exclusions.

2a.10 Denominator Exclusion Details (*All information required to collect exclusions to the denominator, including all codes, logic, and definitions***):**
Timing of appropriate antibiotic administration (AbxTiming) is marked "Exclusion"

2a.11 Stratification Details/Variables (*All information required to stratify the measure including the stratification variables, all codes, logic, and definitions***):**
N/A

2a.12-13 Risk Adjustment Type: No risk adjustment necessary

2a.14 Risk Adjustment Methodology/Variables (*List risk adjustment variables and describe conceptual models, statistical models, or other aspects of model or method***):**
N/A

2a.15-17 Detailed risk model available Web page URL or attachment:

2a.18-19 Type of Score: Rate/proportion
2a.20 Interpretation of Score: Better quality = Higher score
2a.21 Calculation Algorithm (*Describe the calculation of the measure as a flowchart or series of steps***):**

N/A

2a.22 Describe the method for discriminating performance *(e.g., significance testing)*:
Two-sided 95% binomial confidence intervals; a confidence interval is calculated for each database participant. If the overall STS database result falls within the participant's 95% binomial confidence interval, the participant's performance is considered not significantly different from the overall database result. If the overall STS database result falls to the right of the participant's 95% binomial confidence interval, then the participant's performance is considered significantly lower than the overall database results. If the overall STS database result falls to the left of the participant's 95% binomial confidence interval, then the participant's performance is considered significantly higher than the overall database results.

2a.23 Sampling (Survey) Methodology *If measure is based on a sample (or survey), provide instructions for obtaining the sample, conducting the survey and guidance on minimum sample size (response rate)*:
N/A

2a.24 Data Source (*Check the source(s) for which the measure is specified and tested)*
Electronic Clinical Data : Registry

2a.25 Data source/data collection instrument (*Identify the specific data source/data collection instrument, e.g. name of database, clinical registry, collection instrument, etc.*)**:**
STS Adult Cardiac Surgery Database – Version 2.73

2a.26-28 Data source/data collection instrument reference web page URL or attachment: URL Data Collection Form
http://www.sts.org/sites/default/files/documents/STSAdultCVDataCollectionForm2_73_Annotated.pdf

2a.29-31 Data dictionary/code table web page URL or attachment: URL
http://www.sts.org/sites/default/files/documents/STSAdultCVDataSpecificationsV2_73.pdf

2a.32-35 Level of Measurement/Analysis (*Check the level(s) for which the measure is specified and tested)*
Clinician : Group/Practice, Facility, Population : County or City, Population : National, Population : Regional, Population : State

2a.36-37 Care Settings (*Check the setting(s) for which the measure is specified and tested)*
Hospital/Acute Care Facility

2a.38-41 Clinical Services (*Healthcare services being measured, check all that apply*)
Clinicians: Physicians (MD/DO)

TESTING/ANALYSIS

2b. Reliability testing

2b.1 Data/sample *(description of data/sample and size)*: STS Adult Cardiac Surgery Database - Compared results between two proximate time periods: January 2008-December 2008 and January 2009-December 2009.

2b.2 Analytic Method *(type of reliability & rationale, method for testing)*:
Compared results between two proximate time periods: January 2008-December 2008 and January 2009-December 2009. Excluded from analysis are participants that did not submit results for both time periods. As database participants can change their underlying care processes at any time, we would not expect perfect correlation between two sets of results from even proximate time periods.

2b.3 Testing Results *(reliability statistics, assessment of adequacy in the context of norms for the test conducted)*:
Please see attachment

2b
C☐ P☐ M☐ N☐

2c. Validity testing

2c
C☐

2c.1 Data/sample *(description of data/sample and size)*: STS Adult Cardiac Surgery Database

Audits conducted in 2010, all cases performed in 2009; N = 40 randomly selected sites participating in the STS Adult Cardiac Surgery Database

2c.2 Analytic Method *(type of validity & rationale, method for testing)*:
Participating sites are randomly selected for participation in STS Adult Cardiac Surgery Database Audit, which is designed to evaluate the accuracy, consistency, and comprehensiveness of data collection and ultimately validate the integrity of the data contained in the database. The Iowa Foundation for Medical Care (IFMC), the quality improvement organization for Iowa and Illinois, has conducted audits on behalf of STS since 2006.

Each year, the IFMC conducts audits at randomly selected sites throughout the country and tracks the individual agreement rates by variable and by year. More specifically, for each site, agreement rates are calculated for 73 individual elements. In addition, aggregate agreement rates for each element, variable category (e.g., pre-operative risk factors, previous interventions, etc), and overall for all categories are calculated for all sites. While this is not region specific, it is data point specific and comparison agreement rates confirm the improvement over time as well as the consistency.

2c.3 Testing Results *(statistical results, assessment of adequacy in the context of norms for the test conducted)*:

P☐
M☐
N☐

2d. Exclusions Justified

2d.1 Summary of Evidence supporting exclusion(s):

2d.2 Citations for Evidence:

2d.3 Data/sample *(description of data/sample and size)*: Immediately prior to this NQF measure endorsement maintenance period, stewardship of this measure was transferred to STS. Exclusions could not be captured using the previous version of the STS Database (STS Adult Cardiac Surgery Database Version 2.61).

Released in December 2010, STS Adult Cardiac Surgery Database Version 2.73, which is designed to address changes in technology and practice, allow for easier identification of devices, and permit improved capture of preoperative risk factors, operative information and postoperative evaluation, has the capability of capturing exclusions data for this measure. Therefore, during the next NQF endorsement maintenance period, scheduled to take place in the year 2013, STS will be able to provide data on exclusions. STS Adult Cardiac Surgery Database Version 2.73 will be implemented for all cases with a surgery date of 7/1/2011 or later.

2d.4 Analytic Method *(type analysis & rationale)*:

2d.5 Testing Results *(e.g., frequency, variability, sensitivity analyses)*:

2d
C☐
P☐
M☐
N☐
NA☐

2e. Risk Adjustment for Outcomes/ Resource Use Measures

2e.1 Data/sample *(description of data/sample and size)*: n/a

2e.2 Analytic Method *(type of risk adjustment, analysis, & rationale)*:

2e.3 Testing Results *(risk model performance metrics)*:

2e
C☐
P☐
M☐
N☐
NA☐

2e.4 If outcome or resource use measure is not risk adjusted, provide rationale:	
2f. Identification of Meaningful Differences in Performance **2f.1 Data/sample from Testing or Current Use** *(description of data/sample and size)*: 786 STS Adult Cardiac Surgery Database Participants who had at least 100 eligible cases for the measure and reported data to STS for all 12 months; January 1, 2009-December 31, 2009 **2f.2 Methods to identify statistically significant and practically/meaningfully differences in performance** *(type of analysis & rationale)*: Two-sided 95% binomial confidence intervals; a confidence interval is calculated for each database participant. If the overall STS database result falls within the participant's 95% binomial confidence interval, the participant's performance is considered not significantly different from the overall database result. If the overall STS database result falls to the right of the participant's 95% binomial confidence interval, then the participant's performance is considered significantly lower than the overall database results. If the overall STS database result falls to the left of the participant's 95% binomial confidence interval, then the participant's performance is considered significantly higher than the overall database results. **2f.3 Provide Measure Scores from Testing or Current Use** *(description of scores, e.g., distribution by quartile, mean, median, SD, etc.; identification of statistically significant and meaningfully differences in performance)*: Please see attachment	**2f** C☐ P☐ M☐ N☐
2g. Comparability of Multiple Data Sources/Methods **2g.1 Data/sample** *(description of data/sample and size)*: n/a **2g.2 Analytic Method** *(type of analysis & rationale)*: **2g.3 Testing Results** *(e.g., correlation statistics, comparison of rankings)*:	**2g** C☐ P☐ M☐ N☐ NA☐
2h. Disparities in Care **2h.1 If measure is stratified, provide stratified results** *(scores by stratified categories/cohorts)*: n/a **2h.2 If disparities have been reported/identified, but measure is not specified to detect disparities, provide follow-up plans:**	**2h** C☐ P☐ M☐ N☐ NA☐
TAP/Workgroup: What are the strengths and weaknesses in relation to the subcriteria for *Scientific Acceptability of Measure Properties?*	**2**
Steering Committee: Overall, to what extent was the criterion, *Scientific Acceptability of Measure Properties*, met? **Rationale:**	***2*** C☐ P☐ M☐ N☐
3. USABILITY	
Extent to which intended audiences (e.g., consumers, purchasers, providers, policy makers) can understand the results of the measure and are likely to find them useful for decision making. (evaluation criteria)	**Eval Rating**
3a. Meaningful, Understandable, and Useful Information **3a.1 Current Use:** In use **3a.2 Use in a public reporting initiative (disclosure of performance results to the public at large)** (*If used in a public reporting initiative, provide name of initiative(s), locations, Web page URL(s). If not publicly*	**3a** C☐ P☐ M☐ N☐

reported, state the plans to achieve public reporting within 3 years):
Currently being considered for NQF endorsement, the STS CABG Composite Score is a multidimensional performance measure comprised of four domains consisting of 11 individual NQF-endorsed cardiac surgery metrics: (1) Operative Care--use of the internal mammary artery; (2) Perioperative Medical Care (use of preoperative beta blockade; discharge beta blockade, antiplatelet agents, and lipid-lowering agents—an "all-or-none" measure); (3) Risk-adjusted Operative Mortality; and (4) Risk-Adjusted Postoperative Morbidity (occurrence of postoperative stroke, renal failure, prolonged ventilation, re-exploration, or deep sternal wound infection--an "any-or-none" measure). Composite star ratings are presented on the STS website, www.sts.org/publicreporting and in the health section of the Consumers Union website, www.ConsumerReportsHealth.org. There are approximately 330 STS Adult Cardiac Surgery Database Participants who voluntarily participate in the Consumer's Union public reporting initiative. In addition, approximately 352 STS Adult Cardiac Surgery Database Participants voluntarily take part in STS Public Reporting Online.

STS plans to publicly report more measures in the future. There is no definite date yet assigned to this measure; however, STS staff and surgeon leadership have engaged in initial internal STS discussions regarding this matter.

3a.3 **If used in other programs/initiatives (***If used in quality improvement or other programs/initiatives, name of initiative(s), locations, Web page URL(s). If not used for QI, state the plans to achieve use for QI within 3 years***):**
CMS Physician Quality Reporting Initiative (PQRI), www.cms.hhs.gov/pqri

Testing of Interpretability (*Testing that demonstrates the results are understood by the potential users for public reporting and quality improvement*)
3a.4 **Data/sample** *(description of data/sample and size)*: See 3a.6 below

3a.5 **Methods** *(e.g., focus group, survey, QI project)*:

3a.6 **Results** *(qualitative and/or quantitative results and conclusions)*:
Please see attached

3b/3c. Relation to other NQF-endorsed measures

3b.1 **NQF # and Title of similar or related measures:**
...

(for NQF staff use) **Notes on similar/related endorsed or submitted measures:**

3b. Harmonization
If this measure is related to measure(s) already endorsed by NQF (e.g., same topic, but different target population/setting/data source or different topic but same target population):
3b.2 **Are the measure specifications harmonized? If not, why?**
N/A; however, data definitions and key elements have been established by a multi-societal writing committee called the "ACCF/AHA Writing Committee to Develop Acute Coronary Syndromes and Coronary Artery Disease Clinical Data Standards" with representatives from each of the following organizations:

Agency for Healthcare Research and Quality
American College of Cardiology
American College of Chest Physicians
American College of Emergency Physicians
American College of Physicians
American College of Preventative Medicine
American Heart Association
American Medical Association
Centers for Disease Control and Prevention
Emergency Nurses Association
Food and Drug Administration
Joint Commission on Accreditation of Healthcare Organizations

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NA ☐

National Association of Emergency Medical Technicians National Association of EMS Physicians National Heart, Lung, and Blood Institute Preventive Cardiovascular Nurses Association Society for Academic Emergency Medicine Society of Chest Pain Centers and Providers Society of General Internal Medicine Society of Thoracic Surgeons	
3c. Distinctive or Additive Value **3c.1 Describe the distinctive, improved, or additive value this measure provides to existing NQF-endorsed measures:** n/a **5.1 If this measure is similar to measure(s) already endorsed by NQF (i.e., on the same topic and the same target population), Describe why it is a more valid or efficient way to measure quality:** n/a	**3c** C☐ P☐ M☐ N☐ NA☐
TAP/Workgroup: What are the strengths and weaknesses in relation to the subcriteria for *Usability?*	**3**
Steering Committee: Overall, to what extent was the criterion, *Usability*, met? **Rationale:**	**3** C☐ P☐ M☐ N☐
4. FEASIBILITY	
Extent to which the required data are readily available, retrievable without undue burden, and can be implemented for performance measurement. (evaluation criteria)	**Eval Rating**
4a. Data Generated as a Byproduct of Care Processes **4a.1-2 How are the data elements that are needed to compute measure scores generated?** Data generated as byproduct of care processes during care delivery (Data are generated and used by healthcare personnel during the provision of care, e.g., blood pressure, lab value, medical condition), Coding/abstraction performed by someone other than person obtaining original information (E.g., DRG, ICD-9 codes on claims, chart abstraction for quality measure or registry)	**4a** C☐ P☐ M☐ N☐
4b. Electronic Sources **4b.1 Are all the data elements available electronically?** (*elements that are needed to compute measure scores are in defined, computer-readable fields, e.g., electronic health record, electronic claims*) Yes **4b.2 If not, specify the near-term path to achieve electronic capture by most providers.**	**4b** C☐ P☐ M☐ N☐
4c. Exclusions **4c.1 Do the specified exclusions require additional data sources beyond what is required for the numerator and denominator specifications?** No **4c.2 If yes, provide justification.**	**4c** C☐ P☐ M☐ N☐ NA☐
4d. Susceptibility to Inaccuracies, Errors, or Unintended Consequences **4d.1 Identify susceptibility to inaccuracies, errors, or unintended consequences of the measure and describe how these potential problems could be audited. If audited, provide results.** This measure may be susceptible to human error (i.e., recording the measure inaccurately or not at all).	**4d** C☐ P☐ M☐ N☐

When data collection on this measure is done through participation in the STS Adult Cardiac Surgery Database, an auditing strategy is in place. Both STS and the Duke Clinical Research Institute have a list of database participants making participation in the STS Adult Cardiac Surgery Database easy to track. Each participant is responsible for the quality and accuracy of the data they submit to the database. The participant agrees to the following quality control measures in the participation agreement: i) Participant hereby warrants that all data submitted for inclusion in the STS National Database will be accurate and complete, and acknowledges that such data may be subject to independent audit. Participant will use its best efforts to address any data or related deficiencies identified by the independent data warehouse service provider and agrees to cooperate with and assist STS and its designees in connection with the performance of any independent audit. ii) Participant warrants that it will take all reasonable steps to avoid the submission of duplicative data for inclusion in the STS National Database, including but not limited to apprising the Director of the STS National Database and the independent data warehouse service provider about any other Participation Agreements in which an individual cardiothoracic surgeon named above or on Schedule A attached hereto (as amended from time to time) is also named. STS audited for these potential problems during testing.	
4e. Data Collection Strategy/Implementation **4e.1 Describe what you have learned/modified as a result of testing and/or operational use of the measure regarding data collection, availability of data/missing data, timing/frequency of data collection, patient confidentiality, time/cost of data collection, other feasibility/ implementation issues:** **4e.2 Costs to implement the measure** (*costs of data collection, fees associated with proprietary measures*)**:** Data Collection: There are no direct costs to collect the data for this measure. Costs to develop the measure included volunteer cardiothoracic surgeon time, STS staff time, and DCRI statistician and project management time. Other fees: STS Adult Cardiac Surgery Database participants (single cardiothoracic surgeons or a group of surgeons) pay annual participant fees of $2,950 or $3,700, depending on whether participants are STS members (or whether the majority of surgeons in a group are STS members). As a benefit of STS membership, STS members are charged the lesser of the two fees. **4e.3 Evidence for costs:** **4e.4 Business case documentation:**	**4e** **C☐** **P☐** **M☐** **N☐**
TAP/Workgroup: What are the strengths and weaknesses in relation to the subcriteria for *Feasibility?*	**4**
Steering Committee: Overall, to what extent was the criterion, *Feasibility*, met? **Rationale:**	**4** **C☐** **P☐** **M☐** **N☐**
RECOMMENDATION	
(for NQF staff use) **Check if measure is untested and only eligible for time-limited endorsement.**	**Time-limited**

	☐
Steering Committee: Do you recommend for endorsement? **Comments:**	**Y**☐ **N**☐ **A**☐

CONTACT INFORMATION

Co.1 Measure Steward (Intellectual Property Owner)
Co.1 Organization
Society of Thoracic Surgeons, 633 North Saint Clair Street, Suite 2320, Chicago, Illinois, 60611

Co.2 Point of Contact
Jane, Han, MSW, jhan@sts.org, 312-202-5856-

Measure Developer If different from Measure Steward
Co.3 Organization
Society of Thoracic Surgeons, 633 North Saint Clair Street, Suite 2320, Chicago, Illinois, 60611

Co.4 Point of Contact
Jane, Han, MSW, jhan@sts.org, 312-202-5856-

Co.5 Submitter If different from Measure Steward POC
Jane, Han, MSW, jhan@sts.org, 312-202-5856-, Society of Thoracic Surgeons

Co.6 Additional organizations that sponsored/participated in measure development

ADDITIONAL INFORMATION

Workgroup/Expert Panel involved in measure development
Ad.1 Provide a list of sponsoring organizations and workgroup/panel members' names and organizations. Describe the members' role in measure development.
Members of the STS Task Force on Quality Initiatives provide clinical expertise as needed. The STS Workforce on National Databases meets at the STS Annual Meeting and reviews the measures on a yearly basis. Changes or updates to the measure will be at the recommendation of the Workforce.

Ad.2 If adapted, provide name of original measure:
Ad.3-5 If adapted, provide original specifications URL or attachment

Measure Developer/Steward Updates and Ongoing Maintenance
Ad.6 Year the measure was first released: 2004
Ad.7 Month and Year of most recent revision: 12, 2010
Ad.8 What is your frequency for review/update of this measure? annually
Ad.9 When is the next scheduled review/update for this measure? 2011

Ad.10 Copyright statement/disclaimers:

Ad.11 -13 Additional Information web page URL or attachment: Attachment 0125 Sections 1b.2, 1b.4, 2b.3, 2f.3, 3a.6.pdf

Date of Submission (*MM/DD/YY*)**:** 06/13/2011

NATIONAL QUALITY FORUM

Measure Evaluation 4.1
December 2009

This form contains the measure information submitted by stewards. Blank fields indicate no information was provided. Attachments also may have been submitted and are provided to reviewers. The subcriteria and most of the footnotes from the evaluation criteria are provided in Word comments within the form and will appear if your cursor is over the highlighted area. Hyperlinks to the evaluation criteria and ratings are provided in each section.

TAP/Workgroup (if utilized)**:** Complete all yellow highlighted areas of the form. Evaluate the extent to which each subcriterion is met. Based on your evaluation, summarize the strengths and weaknesses in each section.

Note: *If there is no TAP or workgroup, the SC also evaluates the subcriteria (yellow highlighted areas).*

Steering Committee: Complete all pink highlighted areas of the form. Review the workgroup/TAP assessment of the subcriteria, noting any areas of disagreement; then evaluate the extent to which each major criterion is met; and finally, indicate your recommendation for the endorsement. Provide the rationale for your ratings.

Evaluation ratings of the extent to which the criteria are met
C = Completely (unquestionably demonstrated to meet the criterion)
P = Partially (demonstrated to partially meet the criterion)
M = Minimally (addressed BUT demonstrated to only minimally meet the criterion)
N = Not at all (NOT addressed; OR incorrectly addressed; OR demonstrated to NOT meet the criterion)
NA = Not applicable (only an option for a few subcriteria as indicated)

(for NQF staff use) **NQF Review #:** 0264 **NQF Project:** Surgery Endorsement Maintenance 2010
MEASURE DESCRIPTIVE INFORMATION
De.1 **Measure Title:** Prophylactic Intravenous (IV) Antibiotic Timing
De.2 **Brief description of measure:** Rate of ASC patients who received IV antibiotics ordered for surgical site infection prophylaxis on time
1.1-2 **Type of Measure:** Process De.3 **If included in a composite or paired with another measure, please identify composite or paired measure** Not included in a composite or paired with another measure
De.4 **National Priority Partners Priority Area:** Safety De.5 **IOM Quality Domain:** Effectiveness De.6 **Consumer Care Need:** Staying healthy

CONDITIONS FOR CONSIDERATION BY NQF	
Four conditions must be met before proposed measures may be considered and evaluated for suitability as voluntary consensus standards:	**NQF Staff**
A. The measure is in the public domain or an intellectual property (measure steward agreement) is signed. *Public domain only applies to governmental organizations. All non-government organizations must sign a measure steward agreement even if measures are made publicly and freely available.* A.1 **Do you attest that the measure steward holds intellectual property rights to the measure and the right to use aspects of the measure owned by another entity (e.g., risk model, code set)?** Yes A.2 **Indicate if Proprietary Measure** (*as defined in measure steward agreement*)**:** Proprietary measure A.3 **Measure Steward Agreement:** Agreement will be signed and submitted prior to or at the time of measure submission A.4 **Measure Steward Agreement attached:** NQF Measure Steward Agreement with ASC QC.pdf	**A** Y☐ N☐
B. The measure owner/steward verifies there is an identified responsible entity and process to maintain and	**B**

update the measure on a schedule that is commensurate with the rate of clinical innovation, but at least every 3 years. Yes, information provided in contact section	Y☐ N☐
C. The intended use of the measure includes both public reporting and quality improvement. ►**Purpose:** Public Reporting, Quality Improvement (Internal to the specific organization), Quality Improvement with Benchmarking (external benchmarking to multiple organizations)	**C** Y☐ N☐
D. The requested measure submission information is complete. Generally, measures should be fully developed and tested so that all the evaluation criteria have been addressed and information needed to evaluate the measure is provided. Measures that have not been tested are only potentially eligible for a time-limited endorsement and in that case, measure owners must verify that testing will be completed within 12 months of endorsement. D.1**Testing:** Yes, fully developed and tested D.2 **Have NQF-endorsed measures been reviewed to identify if there are similar or related measures?** Yes	**D** Y☐ N☐
(for NQF staff use) **Have all conditions for consideration been met?** **Staff Notes to Steward** (*if submission returned*)**:**	**Met** Y☐ N☐
Staff Notes to Reviewers (*issues or questions regarding any criteria*)**:**	
Staff Reviewer Name(s):	

TAP/Workgroup Reviewer Name:	
Steering Committee Reviewer Name:	
1. IMPORTANCE TO MEASURE AND REPORT	
Extent to which the specific measure focus is important to making significant gains in health care quality (safety, timeliness, effectiveness, efficiency, equity, patient-centeredness) and improving health outcomes for a specific high impact aspect of healthcare where there is variation in or overall poor performance. ***Measures must be judged to be important to measure and report*** *in order to be evaluated against the remaining criteria.* (evaluation criteria) **1a. High Impact**	**Eval Rating**
(for NQF staff use) **Specific NPP goal**:	
1a.1 **Demonstrated High Impact Aspect of Healthcare:** Affects large numbers, Frequently performed procedure, Leading cause of morbidity/mortality, High resource use, Severity of illness, Patient/societal consequences of poor quality 1a.2 1a.3 **Summary of Evidence of High Impact:** As a result of advances in surgery and anesthesia, approximately 80 percent of surgeries in the United States are now performed on an outpatient basis. Ambulatory surgical centers perform approximately 40%, or more than 22 million, of those outpatient surgeries. The timeliness of prophylactic IV antibiotic administration is measured for surgical patients in both the hospital inpatient and outpatient settings, and given the high volume of surgical procedures performed, should also be measured in the ambulatory surgical center setting. 1 Accumulated evidence indicates that timely administration of prophylactic intravenous antibiotics reduces the incidence of surgical site infections. The evidence suggests that administration of antibiotics within one hour of incision is associated with maximal efficacy. Further prolonging the interval between administration and incision/inflation of the tourniquet is associated with progressively higher risk of surgical wound infection. 2-11 Surgical site infection rates in ambulatory surgery are not well understood. However, in other settings, surgical site infections occur in 2 to 5 percent of clean extra-abdominal surgeries. Evidence suggests each infection increases a hospital stay by 7 to 10 days and adds from $3,000 to $29,000 in charges. Patients who	**1a** C☐ P☐ M☐ N☐

develop surgical site infections are thought to have at least twice the incidence of mortality when compared to surgical patients without a surgical site infection. 12-20

1a.4 Citations for Evidence of High Impact:

1 U.S. Department of Health and Human Services. Centers for Medicare & Medicaid Services. http://www.cms.gov/.

2 Steinberg JP, Barun BI, Hellinger WC, Kusek L, Bozikis MR, Bush AJ, Dellinger EP, Burke JP, Simmons B, Kritchevsky SB, Trial to reduce antimicrobial prophylaxis errors (TRAPE) study group. Timing of antimicrobial prophylaxis and the risk of surgical site infections: results from the trial to reduce antimicrobial prophylaxis errors. Ann Surg 2009;250(1):10-6.

3 Forbes SS, Stephen WJ, Harper WL, Loeb M, Smith R, Christoffersen EP, McLean RF. Implementation of evidence-based practices for surgical site infection prophylaxis: results of a pre- and postintervention study. J Am Coll Surg. 2008 Sep;207(3):336-41.

4 Koopman E, Nix DE, Erstad BL, Demeure MJ, Hayes MM, Ruth JT, Mattias KR. End-of-procedure cefazolin concentrations after administration for prevention of surgical-site infection. Am J Health Syst Pharm. 2007 Sep;64(18):1927-34.

5 Manniën J, van Kasteren ME, Nagelkerke NJ, Gyssens IC, Kullberg BJ, Wille JC, de Boer AS. Effect of optimized antibiotic prophylaxis on the incidence of surgical site infection. Infect Control Hosp Epidemiol. 2006;27(12):1340-6.

6 Burke J. Maximizing appropriate antibiotic prophylaxis for surgical patients: an update from LDS Hospital, Salt Lake City. Clin Infect Dis. 2001;33(Suppl 2):S78-83.

7 Classen D et al. The timing of prophylactic administration of antibiotics and the risk of surgical wound infection. NEJM. 1992;326(5):281-286.

8 Silver A et al. Timeliness and use of antibiotic prophylaxis in selected inpatient surgical procedures. The Antibiotic Prophylaxis Study Group. Am J Surg. 1996;171(6):548-552.

9 Papaioannou N, Kalivas L, Kalavritinos J, and Tsourvakas S. Tissue concentrations of third-generation cephalosporins (ceftazidime and ceftriaxone) in lower extremity tissues using a tourniquet. Arch Orthop Trauma Surg. 1994;113(3):167-9.

10 Dounis E, Tsourvakas S, Kalivas L, and Giamacellou H. Effect of time interval on tissue concentrations of cephalosporins after tourniquet inflation. Highest levels achieved by administration 20 minutes before inflation. Acta Orthop Scand. 1995;66(2):158-60.

11 Friedrich L, White R, Brundage D, Kays M, Friedman R. The effect of tourniquet inflation on cefazolin tissue penetration during total knee arthroplasty. Pharmacotherapy. 1990; 10(6):373-7.

12 Cruse P. Wound infection surveillance. Rev Infect Dis 1981; 3:734-737.

13 Cruse PJ, Foord R. The epidemiology of wound infection: a 10-year prospective study of 62,939 wounds. Surg Clin North Am 1980; 60:27-40.

14 Engemann JJ, Carmeli Y, Cosgrove SE, et al. Adverse clinical and economic outcomes attributable to methicillin resistance among patients with Staphylococcus aureus surgical site infection. Clin Infect Dis 2003; 36:592-598.

15 Kirkland K, Briggs J, Trivette S, Wilkinson W, and Sexton D. The impact of surgical-site infections in the 1990s: attributable mortality, excess length of hospitalization, and extra costs. Infect Control Hosp Epidemiol. 1999;20(11):725-30.

16 Coello R, Glenister H, Fereres J, et al. The cost of infection in surgical patients: a case-control study. J Hosp Infect 1993; 25:239-250.

17 Vegas AA, Jodra VM, Garcia ML. Nosocomial infection in surgery wards: a controlled study of increased duration of hospital stays and direct cost of hospitalization. Eur J Epidemiol 1993; 9:504-510.

18 Whitehouse JD, Friedman ND, Kirkland KB, Richardson WJ, Sexton DJ. The impact of surgical-site infections following orthopedic surgery at a community hospital and a university hospital: adverse quality of life, excess length of stay, and extra cost. Infect Control Hosp Epidemiol 2002; 23:183-189.

19 Apisarnthanarak A, Jones M, Waterman BM, Carroll CM, Bernardi R, Fraser VJ. Risk factors for spinal surgical-site infections in a community hospital: a case-control study. Infect Control Hosp Epidemiol 2003; 24:31-36.

20 Encinosa WE, Hellinger FJ. The impact of medical errors on ninety-day costs and outcomes: An examination of surgical patients. Health Serv Res. 2008 Dec;43(6):2067-85.

1b. Opportunity for Improvement

1b.1 **Benefits (improvements in quality) envisioned by use of this measure:** Improving the rate of timely administration of intravenous prophylactic antibiotics is expected to reduce the risk of surgical site infection

1b.2 **Summary of data demonstrating performance gap (variation or overall poor performance) across providers:**
Although data for 671 ASCs are included in the ASC Quality Collaboration (ASC QC) database for this measure, many report at the corporate level and do not report data for individual ASCs. The ASC QC database includes center-level rates for this measure for 349 ASCs throughout the US. The rates for this measure are based on the 349 individually-reporting ambulatory surgery centers, located throughout the US. The rate for timely administration of a pre-operative antibiotic ranged from a minimum of 0.2% to a maximum of 100%. The mean rate was 96% (SD: 14.6%), while the median rate was 100%. The minimum compliance rate of 0.2% demonstrates that there is a significant opportunity for improvement in this measure.

1b.3 **Citations for data on performance gap:**
Although data for 671 ASCs are included in the ASC QC database, many report at the corporate level and do not report data for individual ASCs. The ASC QC database includes center-level rates for this measure for 349 ASCs throughout the US. The 349 individually-reporting ambulatory surgery centers represent a convenience sample that may be used to assess the opportunity for improvement for this measure. The centers were located throughout the US. Data collected for second calendar quarter of 2010 were included in this portion of the study.

1b.4 **Summary of Data on disparities by population group:**
This measure is currently collected at the ASC-level or at the level of the corporate parent of the ASC. Disparity measures by population group require the collection of patient-level data or collection of the data for individual populations of patients. The ASC QC is investigating a number of strategies that will make this type of data available and hopes to add this component in the near future.

1b.5 **Citations for data on Disparities:**
No data available for disparities by population group. Please see 1b.4. above.

1b
C☐
P☐
M☐
N☐

1c. Outcome or Evidence to Support Measure Focus

1c.1 **Relationship to Outcomes** (*For non-outcome measures, briefly describe the relationship to desired outcome. For outcomes, describe why it is relevant to the target population*)**:** Evidence suggests improving the rate of timely administration of intravenous prophylactic antibiotics can be expected to reduce the risk of surgical site infection.

1c.2-3. **Type of Evidence:** Evidence-based guideline, Randomized controlled trial, Expert opinion, Systematic synthesis of research, Meta-analysis

1c.4 **Summary of Evidence** (*as described in the criteria; for outcomes, summarize any evidence that healthcare services/care processes influence the outcome*)**:**

1c
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M☐
N☐

Evidence suggests improving the rate of timely administration of intravenous prophylactic antibiotics can be expected to reduce the risk of surgical site infection.

1c.5 **Rating of strength/quality of evidence (***also provide narrative description of the rating and by whom***):** A-I rating. A=Good evidence to support a recommendation for use; I = Evidence from > or = 1 properly randomized, controlled trial. Rating given by SHEA/IDSA.

1c.6 **Method for rating evidence:** Adapted from the Canadian Task Force on the Periodic Health Examination.
Strength of recommendation:
A Good evidence to support a recommendation for use
B Moderate evidence to support a recommendation for use
C Poor evidence to support a recommendation
Quality of evidence:
I Evidence from > or = 1 properly randomized, controlled trial
II Evidence from > or = 1 well-designed clinical trial, without randomization; from cohort or case-control analytic studies (preferably from >1 center); from multiple time series; or from dramatic results from uncontrolled experiments
III Evidence from opinions of respected authorities, based on clinical experience, descriptive studies, or reports of expert committees

1c.7 **Summary of Controversy/Contradictory Evidence:** We are not aware of any evidence contradicting current recommendations regarding the appropriate timing of prophylactic antibiotic administration.

1c.8 **Citations for Evidence (***other than guidelines***):** Steinberg JP, Barun BI, Hellinger WC, Kusek L, Bozikis MR, Bush AJ, Dellinger EP, Burke JP, Simmons B, Kritchevsky SB, Trial to reduce antimicrobial prophylaxis errors (TRAPE) study group. Timing of antimicrobial prophylaxis and the risk of surgical site infections: results from the trial to reduce antimicrobial prophylaxis errors. Ann Surg 2009;250(1):10-6.

Bratzler DW, Hunt DR. The surgical infection prevention and surgical care improvement projects: national initiatives to improve outcomes for patients having surgery. Clin Infect dis 2006;43(3):322-30.

Dellinger EP. Prophylactic antibiotics: administration and timing before operation are more important than administration after operation. Clin Infect Dis 2007;44:928-930.

Burke J. Maximizing appropriate antibiotic prophylaxis for surgical patients: an update from LDS Hospital, Salt Lake City. Clin Infect Dis. 2001;33(Suppl 2):S78-83.

1c.9 **Quote the Specific guideline recommendation (***including guideline number and/or page number***):**
See pages S55-S56 of guideline referenced below.
1. Administer antimicrobial prophylaxis in accordance with evidence-based standards and guidelines.
a. Administer prophylaxis within 1 hour before incision to maximize tissue concentration.
i. Two hours are allowed for the administration of vancomycin and fluoroquinolones.

1c.10 **Clinical Practice Guideline Citation:** Anderson DJ, Kaye KS, Classen D, Arias KM, Podgorny K, Burstin H, Calfee DP, Coffin SE, Dubberke ER, Fraser V, Gerding DN, Griffin FA, Gross P, Klompas M, Lo E, Marschall J, Mermel LA, Nicolle L, Pegues DA, Perl TM, Saint S, Salgado CD, Weinstein RA, Wise R, Yokoe DS. Strategies to prevent surgical site infections in acute care hospitals. Infect Control Hosp Epidemiol 2008 Oct;29 Suppl 1:S51-61.
1c.11 **National Guideline Clearinghouse or other URL:**
http://www.guideline.gov/content.aspx?id=13399&search=%22surgical+site+infection%22

1c.12 **Rating of strength of recommendation (***also provide narrative description of the rating and by whom***):**
A-I

1c.13 **Method for rating strength of recommendation** (*If different from USPSTF system, also describe rating and how it relates to USPSTF*)**:**

Adapted from the Canadian Task Force on the Periodic Health Examination. Strength of recommendation: A Good evidence to support a recommendation for use B Moderate evidence to support a recommendation for use C Poor evidence to support a recommendation Quality of evidence: I Evidence from > or = 1 properly randomized, controlled trial II Evidence from > or = 1 well-designed clinical trial, without randomization; from cohort or case-control analytic studies (preferably from >1 center); from multiple time series; or from dramatic results from uncontrolled experiments III Evidence from opinions of respected authorities, based on clinical experience, descriptive studies, or reports of expert committees 1c.14 **Rationale for using this guideline over others:** Most recent guideline for the prevention of surgical site infection.	
TAP/Workgroup: What are the strengths and weaknesses in relation to the subcriteria for *Importance to Measure and Report?*	**1**
Steering Committee: Was the threshold criterion, *Importance to Measure and Report*, met? **Rationale:**	**1** **Y☐** **N☐**
2. SCIENTIFIC ACCEPTABILITY OF MEASURE PROPERTIES	
Extent to which the measure, as specified, produces consistent (reliable) and credible (valid) results about the quality of care when implemented. (evaluation criteria)	**Eval Rating**
2a. MEASURE SPECIFICATIONS	
S.1 **Do you have a web page where current detailed measure specifications can be obtained?** S.2 **If yes, provide web page URL:** **2a. Precisely Specified**	
2a.1 **Numerator Statement (***Brief, text description of the numerator - what is being measured about the target population, e.g. target condition, event, or outcome***):** Number of ambulatory surgical center (ASC) admissions with a preoperative order for a prophylactic IV antibiotic for prevention of surgical site infection who received the prophylactic antibiotic on time 2a.2 **Numerator Time Window (***The time period in which cases are eligible for inclusion in the numerator***):** In-facility, prior to discharge 2a.3 **Numerator Details (***All information required to collect/calculate the numerator, including all codes, logic, and definitions***):** DEFINITIONS: Admission: completion of registration upon entry into the facility Prophylactic IV antibiotic for prevention of surgical site infection: an antibiotic prescribed with the intent of reducing the probability of an infection related to an invasive procedure; for purposes of this measures, the following are considered prophylactic for surgical site infection: ampicillin/sulbactam, aztreonam, cefazolin, cefmetazole, cefotetan, cefoxitin, cefuroxime, ciprofloxacin, clindamycin, ertapenem, erythromycin, gatifloxacin, gentamicin, levofloxacin, metronidazole, moxifloxacin, neomycin and vancomycin On time: antibiotic infusion is initiated within one hour prior to the time of the initial surgical incision or the beginning of the procedure (e.g., introduction of endoscope, insertion of needle, inflation of tourniquet) or two hours prior if vancomycin or a fluoroquinolone is administered	**2a-specs** **C☐** **P☐** **M☐** **N☐**
2a.4 **Denominator Statement (***Brief, text description of the denominator - target population being*	

measured):
All ASC admissions with a preoperative order for a prophylactic IV antibiotic for prevention of surgical site infection

2a.5 **Target population gender:** Female, Male
2a.6 **Target population age range:** All ages

2a.7 **Denominator Time Window (***The time period in which cases are eligible for inclusion in the denominator***):**
In-facility, prior to discharge

2a.8 **Denominator Details (***All information required to collect/calculate the denominator - the target population being measured - including all codes, logic, and definitions***):**
DEFINITIONS:

Admission: completion of registration upon entry into the facility

Prophylactic IV antibiotic for prevention of surgical site infection: an antibiotic prescribed with the intent of reducing the probability of an infection related to an invasive procedure; for purposes of this measures, the following are considered prophylactic for surgical site infection: ampicillin/sulbactam, aztreonam, cefazolin, cefmetazole, cefotetan, cefoxitin, cefuroxime, ciprofloxacin, clindamycin, ertapenem, erythromycin, gatifloxacin, gentamicin, levofloxacin, metronidazole, moxifloxacin, neomycin and vancomycin

2a.9 **Denominator Exclusions (***Brief text description of exclusions from the target population***):** ASC admissions with a preoperative order for a prophylactic IV antibiotic for prevention of infections other than surgical site infections (e.g., bacterial endocarditis).

ASC admissions with a preoperative order for a prophylactic antibiotic not administered by the intravenous route.

2a.10 **Denominator Exclusion Details (***All information required to collect exclusions to the denominator, including all codes, logic, and definitions***):**
The denominator exclusions do not require additional data collection. They are included to offer additional clarification to the measure user to help ensure only the specified admissions are included for measurement.

2a.11 **Stratification Details/Variables (***All information required to stratify the measure including the stratification variables, all codes, logic, and definitions***):**
The measure is not stratified

2a.12-13 **Risk Adjustment Type:** No risk adjustment necessary

2a.14 **Risk Adjustment Methodology/Variables (***List risk adjustment variables and describe conceptual models, statistical models, or other aspects of model or method***):**
Not applicable

2a.15-17 **Detailed risk model available Web page URL or attachment:**

2a.18-19 **Type of Score:** Rate/proportion
2a.20 **Interpretation of Score:** Better quality = Higher score
2a.21 **Calculation Algorithm (***Describe the calculation of the measure as a flowchart or series of steps***):**
The number of admissions with a preoperative order for a prophylactic IV antibiotic for prevention of surgical site infection who received the prophylactic antibiotic on time is divided by the number of ASC admissions with a preoperative order for a prophylactic IV antibiotic during the reporting period, yielding the rate of on time prophylactic IV antibiotic administration for the reporting period.

2a.22 **Describe the method for discriminating performance** *(e.g., significance testing)***:**
Facilities reporting data may compare their performance to the average performance. Alternatively, facilities may compare their performance to a percentile ranking (such as the 50th percentile (median)) to determine their relative performance.

2a.23 **Sampling (Survey) Methodology** *If measure is based on a sample (or survey), provide instructions for*

obtaining the sample, conducting the survey and guidance on minimum sample size (response rate):
The measure is not based on a sample

2a.24 **Data Source (***Check the source(s) for which the measure is specified and tested)*
Paper Records

2a.25 **Data source/data collection instrument (***Identify the specific data source/data collection instrument, e.g. name of database, clinical registry, collection instrument, etc.***):**
ASC medical records, as well as medication administration records, and variance reports may serve as data sources. No specific collection instrument is required although the ASC Quality Collaboration has developed a sample data collection instrument that may be used as desired. Facilities may use any collection instrument that allows tracking of the timing of prophylactic IV antibiotic administration for all admissions with a preoperative order for prophylaxis.

2a.26-28 **Data source/data collection instrument reference web page URL or attachment:** URL Not required http://ascquality.org/documents/ASCQualityCollaborationImplementationGuide.pdf

2a.29-31 **Data dictionary/code table web page URL or attachment:** URL Not required
http://ascquality.org/documents/ASCQualityCollaborationImplementationGuide.pdf

2a.32-35 **Level of Measurement/Analysis** (*Check the level(s) for which the measure is specified and tested)*
Facility

2a.36-37 **Care Settings (***Check the setting(s) for which the measure is specified and tested)*
Ambulatory Care : Ambulatory Surgery Center (ASC)

2a.38-41 **Clinical Services** (*Healthcare services being measured, check all that apply*)
Other ambulatory surgical center

TESTING/ANALYSIS

2b. Reliability testing

2b.1 **Data/sample** *(description of data/sample and size)***:** A convenience sample of 16 ambulatory surgery centers was selected for a retrospective chart audit comparing the reported values for the measure versus the values identified from the medical record. The centers were located in eight different states throughout the US. Services from April 1, 2010 to June 30, 2010 were reviewed in the course of the reliability testing.

2b.2 **Analytic Method** *(type of reliability & rationale, method for testing)***:**
The numerator (number of ASC admissions during the period who received the ordered prophylactic IV antibiotic for prevention of surgical site infection on time) and denominator (number of ASC admissions with a preoperative order for a prophylactic IV antibiotic for prevention of surgical site infection during the period) values were compared for all 16 centers in the sample.

2b.3 **Testing Results** *(reliability statistics, assessment of adequacy in the context of norms for the test conducted)***:**
The error rates at 11 of the 16 (69%) of the ASCs are zero for both the numerator and denominator. The mean error rate for the numerator and denominator were 2.3% and 2.1% respectively. The median error rates were zero for both the numerator and denominator. One outlier ASC recorded an error rate of 61.1%. This was a very small ASC (32 orders for preoperative antibiotics). The errors were attributed to data entry/transcription errors. The results show an excellent level of reliability with an overall 97.7% accuracy rate.

2b
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P☐
M☐
N☐

2c. Validity testing

2c.1 **Data/sample** *(description of data/sample and size)***:** Validity was measured via a formal consensus process. A questionnaire that included ratings of the various characteristics of the measure was distributed to 8 clinicians (RNs) who currently work in ambulatory surgery centers or have responsibility for multiple surgery centers. Two have credentials in quality and the others are involved in quality in their current positions. Responses were received from 7 of the panel members.

2c
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2c.2 Analytic Method *(type of validity & rationale, method for testing)*:
Validity was measured via a formal consensus process. Six of the seven respondents responded with a 5/5 rating for the question most related to content validity for this measure. Due to the high level of consensus on the primary validity question, multiple rounds of Delphi-type evaluations were not necessary. These results demonstrate a high level of agreement around the validity of the measure.

2c.3 Testing Results *(statistical results, assessment of adequacy in the context of norms for the test conducted)*:
Each attribute was measured on a 5 point Likert Scale. The attributes related to validity and average scores are listed below:
1. The measure appears to measure what it is intended to. (Median: 5/5; Mean: 4.9/5.0)
2. The measure is defined in a way that will allow for consistent interpretation of the inclusion and exclusion criteria from center to center. (Median: 5/5; Mean: 4.7/5.0)
3. The data required for the measure are likely to be obtained with reasonable effort. (Median: 5/5; Mean: 4.4/5.0)
4. The data required for the measure are likely to be obtained with reasonable cost. (Median: 5/5; Mean: 4.6/5.0)
5. The data required for the measure can be generated during care delivery. (Median: 5/5; Mean: 4.6/5.0)

2d. Exclusions Justified

2d.1 Summary of Evidence supporting exclusion(s):
Measure exclusions do not limit the denominator cohort, but rather are designed to improve the accuracy of data collection by providing additional clarifying statements to the measure user.

2d.2 Citations for Evidence:
Not applicable

2d.3 Data/sample *(description of data/sample and size)*: Not applicable

2d.4 Analytic Method *(type analysis & rationale)*:
Not applicable

2d.5 Testing Results *(e.g., frequency, variability, sensitivity analyses)*:
Not applicable

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NA ☐

2e. Risk Adjustment for Outcomes/ Resource Use Measures

2e.1 Data/sample *(description of data/sample and size)*: This measure is not risk adjusted

2e.2 Analytic Method *(type of risk adjustment, analysis, & rationale)*:
Not applicable

2e.3 Testing Results *(risk model performance metrics)*:
Not applicable

2e.4 If outcome or resource use measure is not risk adjusted, provide rationale: This process measure does not require risk adjustment.

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N☐
NA ☐

2f. Identification of Meaningful Differences in Performance

2f.1 Data/sample from Testing or Current Use *(description of data/sample and size)*: Although data for 671 ASCs are included in the ASC QC database, many report at the corporate level and do not report data for individual ASCs. The ASC QC database includes center-level rates for this measure for 349 ASCs throughout the US. The rates for this measure were collected for the 349 individually-reporting ambulatory surgery centers throughout the US for services provided during April to June 2010.

2f.2 Methods to identify statistically significant and practically/meaningfully differences in performance *(type of analysis & rationale)*:

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An individual ASC's rate for timely administration of antibiotic may be compared to the standard rate from the ASC Quality website (http://www.ascquality.org/qualityreport.cfm#Antibiotic). A statistically significant difference in performance may be detected by using a standard test of proportions as outlined in most standard statistical texts. Since each delay in administration of the preoperative antibiotic may represent increased surgical site infection risk for the patient, a rate lower than the 94.4% is also of practical significance. The null hypothesis for this test is that the sample proportion from the ASC is not different from the industry standard taken from the ASC Quality website. The alternative is that there is a statistically significant difference. We recommend that this test be performed in its two-sided form so that the ASC may determine if they are either statistically higher or lower than the standard. The recommended p-value for this test is the 0.05 level, but ASCs may have justification for different value. Using this statistical method for detecting significant variances from the industry standard will allow users to determine if differences may be due to sampling error or may indicate a true difference in performance. 2f.3 **Provide Measure Scores from Testing or Current Use** *(description of scores, e.g., distribution by quartile, mean, median, SD, etc.; identification of statistically significant and meaningfully differences in performance)*: The rate for timely administration of antibiotic ranged from a minimum of 0.2% to a maximum of 100%. The mean rate was 96.0% (SD: 14.6%), while the median rate was 100%. The maximum rates of 100% and a third quartile value of 100% demonstrate that there is an opportunity for improvement in this measure and that full compliance (100%) is achievable for all centers.	
2g. Comparability of Multiple Data Sources/Methods 2g.1 **Data/sample** *(description of data/sample and size)*: This measure is specified for a single data source (paper medical record/flow-sheet) as noted in 2a.24. above 2g.2 **Analytic Method** *(type of analysis & rationale)*: Not applicable 2g.3 **Testing Results** *(e.g., correlation statistics, comparison of rankings)*: Not applicable	**2g** C☐ P☐ M☐ N☐ NA ☐
2h. Disparities in Care 2h.1 **If measure is stratified, provide stratified results** *(scores by stratified categories/cohorts)*: This measure is not stratified 2h.2 **If disparities have been reported/identified, but measure is not specified to detect disparities, provide follow-up plans:** At the present time, a federal quality reporting system has not yet been proposed or implemented for ambulatory surgical centers. We anticipate that CMS will issue its proposals for an ASC quality reporting system in the near future. The data the ASC Quality Collaboration currently receives for this measure is collected at the ASC-level or at the level of the corporate parent of the ASC. Corporate parent data submissions combine data from multiple ASCs. Disparity measures by population group require the collection of patient-level data or collection of the data for individual populations of patients. At this time, the ASC Quality Collaboration does not have access to any patient-level or individual population level data that would allow for analysis of subpopulation disparities based on race, sex and age. However, we understand the importance of subpopulation data and are taking steps that would allow us to collect the necessary data. We are actively pursuing the development of a registry that would allow us to develop subpopulation performance data for this measure and others. Potential registry development vendors have been identified and initial communications regarding the project have already taken place. We plan to select a vendor by third quarter of 2011, initiate the development of the registry database immediately upon contract acceptance, and have a functioning registry three months thereafter.	**2h** C☐ P☐ M☐ N☐ NA ☐
TAP/Workgroup: What are the strengths and weaknesses in relation to the subcriteria for *Scientific Acceptability of Measure Properties?*	**2**
Steering Committee: Overall, to what extent was the criterion, *Scientific Acceptability of Measure Properties*, met?	***2*** **C☐**

Rationale:	P☐ M☐ N☐
3. USABILITY	
Extent to which intended audiences (e.g., consumers, purchasers, providers, policy makers) can understand the results of the measure and are likely to find them useful for decision making. (evaluation criteria)	Eval Rating
3a. Meaningful, Understandable, and Useful Information 3a.1 **Current Use:** In use 3a.2 **Use in a public reporting initiative (disclosure of performance results to the public at large)** (*If used in a public reporting initiative, provide name of initiative(s), locations, Web page URL(s). If not publicly reported, state the plans to achieve public reporting within 3 years*)**:** The ASC Quality Collaboration posts a public report of quality data on six ASC quality measures endorsed by the NQF on a quarterly basis. This quarterly report included aggregated performance data on the Prophylactic Intravenous Antibiotic Timing measure. The report for the second quarter of 2010 is available at: http://www.ascquality.org/qualityreport.cfm. Six hundred seventy-one (671) ASCs submitted data on the timing of prophylactic intravenous antibiotic administration for the second quarter 2010 report. 3a.3 **If used in other programs/initiatives (***If used in quality improvement or other programs/initiatives, name of initiative(s), locations, Web page URL(s). If not used for QI, state the plans to achieve use for QI within 3 years***):** This measure is in use in several other initiatives. For example, the ASC Association includes this metric in its Outcomes Monitoring Project, which is described at http://www.ascassociation.org/outcomes/. It is also in use in various state association quality data collection and reporting projects, including the Texas Ambulatory Surgery Center Association, located at http://tascs.org/. In addition, the measure has been adopted by the Minnesota Department of Health (MDH) for state reporting by ASCs beginning July 2011. This is described at the MDH website at: http://www.health.state.mn.us/healthreform/measurement/adoptedrule/QualityMeasurementAppendices_101129.pdf **Testing of Interpretability** (*Testing that demonstrates the results are understood by the potential users for public reporting and quality improvement*) 3a.4 **Data/sample** *(description of data/sample and size)***:** Interpretability was measured via a formal consensus process. A questionnaire that included ratings of the various characteristics of the measure was distributed to 8 clinicians (RNs) who currently work in ambulatory surgery centers or have responsibility for multiple surgery centers. Two have credentials in quality and the others are involved in quality in their current positions. Responses were received from 7 of the panel members. 3a.5 **Methods** *(e.g., focus group, survey, QI project)***:** The survey was summarized to assess the panel's level of agreement with statements that measured the interpretability of the measure. 3a.6 **Results** *(qualitative and/or quantitative results and conclusions)***:** Each attribute was measured on a 5 point Likert Scale. The attributes related to usability and average scores are listed below: 1. A provider can understand the results of the measure. (Median: 5/5; Mean: 4.9/5.0) 2. If necessary, a provider can use the results of the measure to take action. (Median: 5/5; Mean: 4.9/5.0) 3. This measure has a direct link to improving the outcome and/or process of care. (Median: 5/5; Mean: 4.9/5.0)	3a C☐ P☐ M☐ N☐
3b/3c. Relation to other NQF-endorsed measures 3b.1 **NQF # and Title of similar or related measures:** NQF # 0269: Timing of Prophylactic Antibiotics - Administering Physician; NQF # 0270: Timing of Antibiotic	

Prophylaxis: Ordering Physician; NQF # 0472: Prophylactic Antibiotic Received Within One Hour Prior to Surgical Incision or at the Time of Delivery – Cesarean section; NQF # 0527: Prophylactic antibiotic received within 1 hour prior to surgical incision	
(for NQF staff use) **Notes on similar/related endorsed or submitted measures:**	
3b. Harmonization If this measure is related to measure(s) already endorsed by NQF (e.g., same topic, but different target population/setting/data source or different topic but same target population): **3b.2 Are the measure specifications harmonized? If not, why?** Certain, but not all, of the measure specifications have been harmonized with related measures. The most significant difference is that the ASC QC measure does not incorporate code sets to specify the denominator, as doing so means that data collection becomes retrospective (i.e., after the billing code has been assigned based on the supporting clincal documentation) and therefore inefficient and more expensive for the provider.	**3b** C☐ P☐ M☐ N☐ NA ☐
3c. Distinctive or Additive Value **3c.1 Describe the distinctive, improved, or additive value this measure provides to existing NQF-endorsed measures:** The measure allows concurrent data collection. **5.1 If this measure is similar to measure(s) already endorsed by NQF (i.e., on the same topic and the same target population), Describe why it is a more valid or efficient way to measure quality:** The measure specifications allow concurrent data collection, improving the efficiency of measure use.	**3c** C☐ P☐ M☐ N☐ NA ☐
TAP/Workgroup: What are the strengths and weaknesses in relation to the subcriteria for *Usability?*	**3**
Steering Committee: Overall, to what extent was the criterion, *Usability*, met? **Rationale:**	**3** C☐ P☐ M☐ N☐
4. FEASIBILITY	
Extent to which the required data are readily available, retrievable without undue burden, and can be implemented for performance measurement. (evaluation criteria)	**Eval Rating**
4a. Data Generated as a Byproduct of Care Processes **4a.1-2 How are the data elements that are needed to compute measure scores generated?** Data generated as byproduct of care processes during care delivery (Data are generated and used by healthcare personnel during the provision of care, e.g., blood pressure, lab value, medical condition)	**4a** C☐ P☐ M☐ N☐
4b. Electronic Sources **4b.1 Are all the data elements available electronically?** (*elements that are needed to compute measure scores are in defined, computer-readable fields, e.g., electronic health record, electronic claims*) No **4b.2 If not, specify the near-term path to achieve electronic capture by most providers.** Widespread adoption of electronic health records in ambulatory surgical centers would be needed to achieve electronic capture of data elements.	**4b** C☐ P☐ M☐ N☐
4c. Exclusions **4c.1 Do the specified exclusions require additional data sources beyond what is required for the numerator and denominator specifications?** No **4c.2 If yes, provide justification.**	**4c** C☐ P☐ M☐ N☐ NA ☐
4d. Susceptibility to Inaccuracies, Errors, or Unintended Consequences	**4d**

4d.1 Identify susceptibility to inaccuracies, errors, or unintended consequences of the measure and describe how these potential problems could be audited. If audited, provide results. Experience with this measure and feedback from users indicates that reliability is high. Most errors appear to be the result of human factors, such as data entry errors. The ASC Quality Collaboration is not aware of any unintended consequences as a result of the use of this measure.	C☐ P☐ M☐ N☐
4e. Data Collection Strategy/Implementation **4e.1 Describe what you have learned/modified as a result of testing and/or operational use of the measure regarding data collection, availability of data/missing data, timing/frequency of data collection, patient confidentiality, time/cost of data collection, other feasibility/ implementation issues:** The ASC Quality Collaboration has included "Frequently Asked Questions" in the Implementation Guide for the measure to assist users in their implementation of data collection. **4e.2 Costs to implement the measure** (*costs of data collection, fees associated with proprietary measures*)**:** The measure is designed to allow the possibility of concurrent data collection, which minimizes staff time, effort and cost. There are no fees associated with the use of this measure and benchmarking data is publicly available on the ASC Quality Collaboration´s website. **4e.3 Evidence for costs:** The survey used for validity and interpretability also asked respondents about the feasibility and cost of collecting data. The following two questions support the premise that the cost to collect this information is reasonable for the ASC: The data required for the measure are likely to be obtained with reasonable effort. (Median: 5/5; Mean: 4.4/5.0) The data required for the measure are likely to be obtained with reasonable cost. (Median: 5/5; Mean: 4.6/5.0) **4e.4 Business case documentation:** Not applicable	**4e** C☐ P☐ M☐ N☐
TAP/Workgroup: What are the strengths and weaknesses in relation to the subcriteria for *Feasibility?*	**4**
Steering Committee: Overall, to what extent was the criterion, *Feasibility*, met? **Rationale:**	**4** C☐ P☐ M☐ N☐
RECOMMENDATION	
(for NQF staff use) **Check if measure is untested and only eligible for time-limited endorsement.**	**Time-limited** ☐
Steering Committee: Do you recommend for endorsement? **Comments:**	Y☐ N☐ A☐
CONTACT INFORMATION	
Co.1 Measure Steward (Intellectual Property Owner) **Co.1 Organization** ASC Quality Collaboration, 5686 Escondida Blvd S, St. Petersburg, Florida, 33715 **Co.2 Point of Contact**	

Donna, Slosburg, BSN, LHRM, CASC, donnaslosburg@ascquality.org, 727-867-0072-

Measure Developer If different from Measure Steward
Co.3 Organization
ASC Quality Collaboration, 5686 Escondida Blvd S, St. Petersburg, Florida, 33715

Co.4 Point of Contact
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Co.5 Submitter If different from Measure Steward POC
Donna, Slosburg, BSN, LHRM, CASC, donnaslosburg@ascquality.org, 727-867-0072-, ASC Quality Collaboration

Co.6 Additional organizations that sponsored/participated in measure development

ADDITIONAL INFORMATION

Workgroup/Expert Panel involved in measure development
Ad.1 Provide a list of sponsoring organizations and workgroup/panel members' names and organizations. Describe the members' role in measure development.
The ASC Quality Collaboration workgroup members meet via teleconference to develop, critique, and modify candidate measures; to maintain existing measures; and to offer sites willing to participate in testing. No contractors are used.

The following is a list of the individuals (and their affiliation at the time of their participation) serving on the workgroup and contributing to this measure:

AAAHC: Naomi Kuznets, PhD
Ambulatory Surgery Foundation: Debra Stinchcomb, BSN, CASC, David Shapiro, MD,
Sarah Martin, RN, BS, CASC and Marian Lowe
AMSURG: Deby Samuels, Lorri Smith RN, BSN and Linda Brooks-Belli
AOA/HFAP: Monda Shaver, RN, BSN, CPHIT and Susan Lautner, RN, BSN, MSHL
AORN: Bev Kirchner BSN, CNOR, CASC and Bonnie Denholm, RN, MS, CNOR
ASCOA: Ann Geier RN, MS, CNOR, CASC
ASC Quality Collaboration: Donna Slosburg, BSN, LHRM, CASC
HCA: Kathy Wilson
The Joint Commission: Michael Kulczycki and Kathleen Domzalski
NATIONAL: Rhonda Arnwine, MBA and Terry Hawes, RN, BHA
Novamed: Cassandra Speier
NUETERRA: Rachelle Babin RN, BSN
Surgical Care Affiliates: Kim Wood, MD
Symbion: Steve Whitmore and Gina Throneberry RN, MBA, CASC
USPI: David Zarin, MD, Julie Gunderson RN, MM, CPHQ and Clint Chain, RN, BSN

Ad.2 If adapted, provide name of original measure: Not adapted
Ad.3-5 If adapted, provide original specifications URL or attachment

Measure Developer/Steward Updates and Ongoing Maintenance
Ad.6 Year the measure was first released: 2007
Ad.7 Month and Year of most recent revision: 12, 2010
Ad.8 What is your frequency for review/update of this measure? Annually, or more frequently if indicated
Ad.9 When is the next scheduled review/update for this measure? 12, 2011

Ad.10 Copyright statement/disclaimers: None

Ad.11 -13 Additional Information web page URL or attachment:

Date of Submission (*MM/DD/YY*)**:** 06/13/2011