The purpose of this memo is 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.
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’s 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
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.
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## Competing Mortality Measures

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<th>Measure# PCS-021-09</th>
<th>Measure #0339</th>
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<tbody>
<tr>
<td><strong>Title</strong></td>
<td>Pre-Operative Mortality Stratified by the Five STS-EACTS Mortality Levels</td>
<td>Standardized Mortality Ratio for Congenital Heart Surgery, Risk Adjustment for Congenital Heart Surgery (RACHS-1) Adjusted.</td>
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<tr>
<td><strong>Status</strong></td>
<td>Recommended for Endorsement</td>
<td>Recommended for Endorsement</td>
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<tr>
<td><strong>Steward</strong></td>
<td>Society of Thoracic Surgeons</td>
<td>Program for Patient Safety and Quality, Children's Hospital Boston</td>
</tr>
<tr>
<td><strong>Description</strong></td>
<td>Operative mortality stratified by the five STS-EACTS Mortality Levels, a multi-institutional validated complexity stratification tool.</td>
<td>Ratio of observed to expected rate of in-hospital mortality following surgical repair of congenital heart defect among patients &lt;18 years of age, risk-adjusted using the Risk Adjustment for Congenital Heart Surgery (RACHS-1) method.</td>
</tr>
<tr>
<td><strong>Numerator</strong></td>
<td>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</td>
<td>Cases of congenital heart surgery among patients &lt;18 years of age resulting in in-hospital death.</td>
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<tr>
<td><strong>Numerator Details</strong></td>
<td>Number of cases of congenital heart surgery among patients &lt;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.</td>
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<tr>
<td><strong>Denominator</strong></td>
<td>Number of index cardiac operations in each level of complexity stratification using the five STS-EACTS Mortality Levels, a multi-</td>
<td>Total cases of congenital heart surgery among patients &lt;18 years of age.</td>
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*NQF MEMO: DO NOT CITE, QUOTE, OR CIRCULATE*
## 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

### Table: Denominator Details

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<tr>
<td>institutional validated complexity stratification tool</td>
<td>Pediatric cases &lt;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).</td>
<td>diagnosis of congenital heart disease (2D) in any field.</td>
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<td><strong>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.</strong></td>
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<td><strong>Congenital heart disease procedures (1P):</strong></td>
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<td>CLOSED AORTIC VALVOTOMY</td>
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<td>2130, 1720, 1730, 1740, 1760, 1780, 1790, 1802, 1804, 1830, 1860</td>
<td><strong>Please find data definitions in STS Attachment 2 (of 2) - STS Procedure Code Definitions.</strong> Pediatric heart surgery is heart surgery on patients &lt;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</td>
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<td>74617 CONG AORTA VALV INSUFFIC 74618</td>
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<td>74619 CONGEN MITRAL STENOSIS 74620</td>
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<td>74621 CONG MITRAL INSUFFICIENC 74622</td>
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<td>74623 HYPOPLAS LEFT HEART SYND 74624</td>
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<td>74625 CONG SUBAORTIC STENOSIS 74626</td>
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<td>74627 COR TRIATRIATUM 74628</td>
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<td>74629 INFUNDIB PULMON STENOSIS 74630</td>
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<td>74631 OBSTRUCT HEART ANOM NEC 74632</td>
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<tr>
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<th>Measure# PCS-021-09</th>
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<tr>
<td>Any operation that is not a pediatric or congenital Cardiac Operation.</td>
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<td>CORONARY ARTERY ANOMALY 74687</td>
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<td>MALPOSITION OF HEART 74689</td>
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<td>PATENT DUCTUS ARTERIOSUS 74710</td>
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<td>COARCTATION OF AORTA 74711</td>
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<td>INTERRUPT OF AORTIC ARCH 74720</td>
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<td>CONG ANOM OF AORTA NEC 7473</td>
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<td>PULMONARY ARTERY ANOM 74740</td>
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<td>GREAT VEIN ANOMALY NOS 74741</td>
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<td>TOT ANOM PULM VEN CONN 74741</td>
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<td>GREAT VEIN ANOMALY NEC 74749</td>
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<tr>
<td>Patients &gt;=18 years of age, those undergoing heart transplantation,</td>
<td></td>
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<td>Exclude cases:</td>
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<td></td>
<td></td>
<td>• MDC 14 (pregnancy, childbirth and</td>
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**NATIONAL QUALITY FORUM**

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</table>
| 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. | • 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**

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</tr>
</thead>
</table>
| 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 |
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| 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 model RACHS-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.
**Risk Model Performance Statistics**

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<th>Measure #0339</th>
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<tbody>
<tr>
<td>C-statistics: STS-EACTS Congenital Heart Surgery Mortality Categories (2009) Model without patient covariates: ( C = 0.778 ) Model with patient covariates: ( C = 0.812 )</td>
<td>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:</td>
<td>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.</td>
</tr>
</tbody>
</table>

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

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<tr>
<td>(7) Pediatric Health Information System (PHIS) 2002-2006; 45621 total cases.</td>
<td>(3) Area under the ROC curve 0.818; p value for Hosmer-Lemeshow test 0.83.</td>
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</tr>
<tr>
<td>Risk Model C-Statistics:</td>
<td>(4) Area under the ROC curve 0.854.</td>
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<tr>
<td>(1) Area under the ROC curve for the full RACHS-1 model 0.811; p value for Hosmer-Lemeshow test 0.34.</td>
<td>(5) Area under the ROC curve 0.828; p value for Hosmer-Lemeshow test 0.66.</td>
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<tr>
<td>(2) Area under the ROC curve 0.814; p value for Hosmer-Lemeshow test 0.21.</td>
<td>(6) Area under the ROC curve 0.809; p value for Hosmer-Lemeshow test 0.18.</td>
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<tr>
<td>(3) Area under the ROC curve 0.818; p value for Hosmer-Lemeshow test 0.83.</td>
<td>(7) Area under the ROC curve 0.822; p value for Hosmer-Lemeshow test 0.08.</td>
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<tr>
<td><strong>Data Source</strong></td>
<td>Paper Medical Record, Electronic Clinical Registry, Electronic Clinical Database, Electronic Health/Medical Record</td>
<td>Paper Medical Record, Electronic Clinical Database, Electronic Health/Medical Record, Other</td>
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<td><strong>Level</strong></td>
<td>Community/Population, Health Plan, Group of clinicians (facility, dept/unit, group), Facility (e.g., hospital, nursing home)</td>
<td>Facility (e.g., hospital, nursing home)</td>
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<td><strong>Setting</strong></td>
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# National Quality Forum

## Competing Volume Measures

<table>
<thead>
<tr>
<th>Measure # PCS-007-09</th>
<th>Measure # PCS-008-09</th>
<th>Measure # 0340</th>
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<tbody>
<tr>
<td><strong>Title</strong></td>
<td>Surgical Volume for Pediatric and Congenital Heart Surgery</td>
<td>Surgical Volume for Pediatric and Congenital Heart Surgery, Stratified by the Five STS-EACTS Mortality Levels</td>
</tr>
<tr>
<td><strong>Status</strong></td>
<td>Recommended for Time-Limited Endorsement</td>
<td>Recommended for Time-Limited Endorsement</td>
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<tr>
<td><strong>Steward</strong></td>
<td>Society of Thoracic Surgeons</td>
<td>Society of Thoracic Surgeons</td>
</tr>
<tr>
<td><strong>Description</strong></td>
<td>Surgical Volume for Pediatric and Congenital Heart Surgery</td>
<td>Surgical volume for pediatric and congenital heart surgery stratified by the five STS-EACTS Mortality Levels, a multi-institutional validated complexity stratification tool</td>
</tr>
<tr>
<td><strong>Numerator</strong></td>
<td>Number of pediatric and congenital heart surgery operations</td>
<td>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.</td>
</tr>
<tr>
<td><strong>Denominator</strong></td>
<td>N/A</td>
<td>N/A</td>
</tr>
<tr>
<td><strong>Exclusions</strong></td>
<td>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].</td>
<td>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].</td>
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<table>
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<th>Methods &amp; Risk Adjustment</th>
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#### 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, 2250, 470, 480, 490, 500, 510, 520, 530, 540, 550, 560, 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 congenital heart disease procedures (1P):

- CLOSED VALVOTOMY NOS 3500
- CLOSED AORTIC VALVOTOMY 3501
- CLOSED MITRAL VALVOTOMY 3502
- CLOSED PULMON VALVOTOMY 3503
- CLOSED TRICUSP VALVOTOMY 3504

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):

- CLOSED VALVOTOMY NOS 3500
- OPEN VALVULOPLASTY NOS 3510
- OPN AORTIC VALVULOPLASTY 3511
- OPN MITRAL VALVULOPLASTY 3512
- OPN PULMON VALVULOPLASTY 3513
- OPN TRICUS VALVULOPLASTY 3514

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<td>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.</td>
<td>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, 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</td>
<td>REPLACE HEART VALVE NOS 3521</td>
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**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.

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| 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 | 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 GRAFT REPAIR HRT SEPT NOS 3561 GRAFT REPAIR ATRIAL DEF 3562 GRAFT REPAIR VENTRIC DEF 3563 GRAFT 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 |

**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
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<td>CONDUIT RT VENT-PUL ART 3593</td>
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<td>OTHER OPERATIONS ON VESSEL OF HEART 3733</td>
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# NATIONAL QUALITY FORUM

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Exclude cases:
- MDC 14 (pregnancy, childbirth and puerperium)
- 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

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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-0; 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.
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#### Phase I

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<tr>
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<th>Originally Submitted Specifications</th>
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</thead>
</table>
| **0134 Use of internal mammary artery (IMA) in coronary artery bypass graft (CABG)** | **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 | **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 |
### Table of Committee’s Suggested Modifications and Responses from Developers

<table>
<thead>
<tr>
<th>Measure ID</th>
<th>Measure Title</th>
<th>Originally Submitted Specifications</th>
<th>Version Information</th>
</tr>
</thead>
<tbody>
<tr>
<td>0134</td>
<td>Use of internal mammary artery (IMA) in coronary artery bypass graft (CABG)</td>
<td><em>(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)</em></td>
<td>Rationale: The information can be derived from electronic sources.</td>
</tr>
</tbody>
</table>
| 0300 | Cardiac patients with controlled 6 am postoperative serum glucose | **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 who expired perioperatively  
- Patients with physician/advanced practice nurse/physician assistant (physician/APN/PA) documented infection prior to surgery  
- Patients whose ICD CM other procedure codes of selected surgeries  
- Patients whose ICD 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](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

<table>
<thead>
<tr>
<th>Measure</th>
<th>0300 Cardiac patients with controlled 6 am postoperative serum glucose</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>1. Importance to Measure and Report:</strong></td>
<td>Y-16; N-5</td>
</tr>
<tr>
<td>(1a. Impact; 1b. Performance gap; 1c. Outcome or Evidence)</td>
<td></td>
</tr>
<tr>
<td><strong>Rationale:</strong></td>
<td>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.</td>
</tr>
</tbody>
</table>

| **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 |
Table of Committee’s Suggested Modifications and Responses from Developers

<table>
<thead>
<tr>
<th>0300 Cardiac patients with controlled 6 am postoperative serum glucose</th>
</tr>
</thead>
<tbody>
<tr>
<td>(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)</td>
</tr>
<tr>
<td>Rationale: The measure cannot be easily implemented using the current timeframe.</td>
</tr>
</tbody>
</table>

Phase II

<table>
<thead>
<tr>
<th>0284 Surgery patients on beta blocker therapy prior to admission who received a beta blocker during the perioperative period</th>
</tr>
</thead>
<tbody>
<tr>
<td>Originally Submitted Specifications</td>
</tr>
<tr>
<td><strong>Description:</strong> Percentage of patients on beta blocker therapy prior to admission who received a beta blocker during the perioperative period</td>
</tr>
<tr>
<td><strong>Numerator Statement:</strong> Surgery patients on beta blocker therapy prior to admission who receive a beta blocker during the perioperative period</td>
</tr>
<tr>
<td><strong>Denominator Statement:</strong> All surgery patients on beta blocker therapy prior to arrival</td>
</tr>
<tr>
<td><strong>Exclusions:</strong></td>
</tr>
<tr>
<td>• Patients less than 18 years of age</td>
</tr>
<tr>
<td>• Patients who have a Length of Stay greater than 120 days</td>
</tr>
<tr>
<td>• Patients enrolled in clinical trials</td>
</tr>
<tr>
<td>• Patients whose ICD-9-CM principal procedure occurred prior to the date of admission</td>
</tr>
<tr>
<td>• Patients who expired during the perioperative period</td>
</tr>
<tr>
<td>• Pregnant patients taking a beta-blocker prior to arrival</td>
</tr>
<tr>
<td>• Patients with a documented Reason for Not Administering Beta-Blocker-Perioperative</td>
</tr>
<tr>
<td>Data Elements:</td>
</tr>
<tr>
<td>Admission Date</td>
</tr>
<tr>
<td>Anesthesia Start Date</td>
</tr>
<tr>
<td>Birthdate</td>
</tr>
<tr>
<td>Clinical Trial</td>
</tr>
<tr>
<td>Discharge Date</td>
</tr>
<tr>
<td>ICD-9-CM Principal Procedure Code</td>
</tr>
<tr>
<td>Laparoscope</td>
</tr>
<tr>
<td>Include patients with an ICD-9-CM Principal Procedure code or ICD-9-CM Other Procedure Codes of selected surgeries.</td>
</tr>
<tr>
<td><strong>Adjustment/Stratification:</strong> no risk adjustment necessary/No stratification is required for this measure.</td>
</tr>
<tr>
<td><strong>Level of Analysis:</strong> Facility/ Agency, Population : National, Program : QIO</td>
</tr>
<tr>
<td><strong>Type of Measure:</strong> Process</td>
</tr>
<tr>
<td><strong>Data Source:</strong> Electronic administrative data/ claims, Paper medical record/ flow-sheet</td>
</tr>
<tr>
<td>Vendor tools (electronic) or CART. CART is available for download free at <a href="http://www.qualitynet.org/dcs/ContentServer?c=Page&amp;pagemain=QnetPublic%2FPage%2FQnetTier2&amp;cid=1138900279093">http://www.qualitynet.org/dcs/ContentServer?c=Page&amp;pagemain=QnetPublic%2FPage%2FQnetTier2&amp;cid=1138900279093</a></td>
</tr>
<tr>
<td><strong>Updated Specifications</strong></td>
</tr>
<tr>
<td><strong>Denominator Statement:</strong> All surgery patients on beta blocker therapy prior to arrival</td>
</tr>
<tr>
<td>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.</td>
</tr>
<tr>
<td>Data Element Data Collection Question: Is there documentation that the patient was on a daily beta-blocker therapy prior to arrival?</td>
</tr>
<tr>
<td>Yes/No</td>
</tr>
<tr>
<td><strong>Notes for Abstraction:</strong></td>
</tr>
<tr>
<td>• If there is documentation that the beta-blocker was taken daily at &quot;home&quot; or is a &quot;current&quot; medication, select “Yes”.</td>
</tr>
<tr>
<td>• If a beta-blocker is listed as a home medication without designation of how often or when it is taken, select “Yes”.</td>
</tr>
<tr>
<td>• 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 states &quot;patient denies taking beta-blocker every day&quot;, select &quot;No&quot;.</td>
</tr>
<tr>
<td>• If there is documentation that the beta-blocker is on a schedule other than daily, select “No”.</td>
</tr>
<tr>
<td>• If there is documentation that the beta-blocker was given on a “prn” basis for cardiac or non-cardiac reasons, select &quot;No&quot;.</td>
</tr>
<tr>
<td><strong>Measure Steward:</strong> Centers for Medicare &amp; Medicaid Services</td>
</tr>
<tr>
<td><strong>Steering Committee Recommendation for Endorsement:</strong> Conditional; Criteria for Endorsement met: Y-19, N-2, A-0</td>
</tr>
<tr>
<td><strong>Rationale:</strong> The measure is meaningful for public reporting and quality improvement.</td>
</tr>
</tbody>
</table>
Table of Committee’s Suggested Modifications and Responses from Developers

<table>
<thead>
<tr>
<th>0284 Surgery patients on beta blocker therapy prior to admission who received a beta blocker during the perioperative period</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>If applicable, Conditions/Questions for Developer:</strong></td>
</tr>
<tr>
<td>1. <strong>2a.4 Denominator Statement:</strong> 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.</td>
</tr>
<tr>
<td>2. <strong>2a.9 Denominator Exclusions:</strong> Exclusion for laparoscopy verbally reported as removed effective January 1, 2012. Please confirm.</td>
</tr>
<tr>
<td>3. <strong>2a.9 Denominator Exclusions:</strong> Consider exclusions for patients on beta blockers for non-cardiac reasons.</td>
</tr>
<tr>
<td><strong>Developer Response:</strong></td>
</tr>
<tr>
<td>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.</td>
</tr>
<tr>
<td><strong>Suggested Data Collection Question:</strong> Is there documentation that the patient was on a daily beta-blocker therapy prior to arrival? Yes/No</td>
</tr>
<tr>
<td><strong>Notes for Abstraction:</strong></td>
</tr>
<tr>
<td>• If there is documentation that the beta-blocker was taken daily at “home” or is a “current” medication, select “Yes”.</td>
</tr>
<tr>
<td>• If a beta-blocker is listed as a home medication without designation of how often or when it is taken, select “Yes”.</td>
</tr>
<tr>
<td>• 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”.</td>
</tr>
<tr>
<td>• If there is documentation that the beta-blocker is on a schedule other than daily, select “No”.</td>
</tr>
<tr>
<td>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).</td>
</tr>
<tr>
<td>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.</td>
</tr>
<tr>
<td><strong>If applicable, Questions to the Steering Committee:</strong></td>
</tr>
<tr>
<td>1. <strong>Importance to Measure and Report:</strong> Y-21; N-0</td>
</tr>
<tr>
<td><strong>Rationale:</strong> 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.</td>
</tr>
<tr>
<td>2. <strong>Scientific Acceptability of Measure Properties:</strong> C-10; P-10; M-1; N-0</td>
</tr>
<tr>
<td><strong>Rationale:</strong> 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.</td>
</tr>
<tr>
<td>3. <strong>Usability:</strong> C-12; P-9; M-0; N-0</td>
</tr>
<tr>
<td><strong>Rationale:</strong> The measure is meaningful for public reporting and quality improvement.</td>
</tr>
<tr>
<td>4. <strong>Feasibility:</strong> C-12; P-9; M-0; N-0</td>
</tr>
<tr>
<td><strong>Rationale:</strong> 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.</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>0365 Pancreatic Resection Mortality Rate (IQI 9)</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Originally Submitted Specifications</strong></td>
</tr>
<tr>
<td><strong>Description:</strong> Percentage of discharges with procedure code of pancreatic resection with an in-hospital death.</td>
</tr>
</tbody>
</table>
### 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:**
- 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 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**

**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:**
- 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:**
- 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

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

**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>
<thead>
<tr>
<th>0365 Pancreatic Resection Mortality Rate (IQI 9)</th>
</tr>
</thead>
<tbody>
<tr>
<td>2. <strong>2a.8 Denominator Details</strong>: Do not limit to pancreatic resection for cancer - could stratify by malignant and benign. Also, consider providing volume as well as rate.</td>
</tr>
<tr>
<td>3. <strong>2a.9 Denominator Exclusions</strong>: Please remove ‘transferring to another short-term hospital (DISP=2)’ from the exclusions.</td>
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<tr>
<td>4. <strong>2a.9 Denominator Exclusions</strong>: 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.</td>
</tr>
</tbody>
</table>

**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.

<table>
<thead>
<tr>
<th>0366 Pancreatic Resection Volume (IQI 2)</th>
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</table>
| **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

<table>
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<th>Measure</th>
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</table>
| 0366 Pancreatic Resection Volume (IQI 2) | ICD-9-CM pancreatic resection procedure codes: 526 TOTAL Pancreatectomy 527 RAD Pancreaticoduodenectomy 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 Measure Steward: Agency for Healthcare Research and Quality | 540 Gaither Road | Rockville | Maryland | 20850 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. Rational: 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. Za.3 Numerator Details: Partial resections and partial operations should be included in 0366, 3. Za.6 Denominator Details: Do not limit to pancreatic resection for cancer. 4. Za.9 Denominator Exclusions: Please remove ‘transferring to another short-term hospital (DISP=2)’ from the exclusions. 5. Za.9 Denominator Exclusions: Add exclusion for pancreatitis. 6. Zb.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:
Rate of 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 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...
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<tr>
<td>0265 Hospital Transfer/Admission</td>
<td>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.</td>
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<tr>
<td><strong>If disparities have been reported/identified but measure is not specified to detect disparities, provide follow-up plans:</strong> 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.</td>
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<tr>
<td><strong>Measure Steward:</strong> ASC Quality Collaboration</td>
<td><strong>Steering Committee Recommendation for Endorsement:</strong> Conditional Criteria for Endorsement met: Y-13; N-7; A-0</td>
<td><strong>Rationale:</strong> This measure focus is important and will encourage reporting and provide the ability to analyze transfer rates among ASCs.</td>
</tr>
<tr>
<td><strong>If applicable, Conditions/Questions for Developer:</strong></td>
<td>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</td>
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<td></td>
<td>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.</td>
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<td>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.</td>
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<td>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.</td>
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<td>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.</td>
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<tr>
<td><strong>Developer Response:</strong></td>
<td>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.</td>
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</tr>
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<td>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.</td>
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<td>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:</td>
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<td>Numerator statement: Ambulatory surgery center (ASC) admissions experiencing a hospital admission in the 24 hour period</td>
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<th>Measure Code</th>
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<tr>
<td>0265</td>
<td>Hospital Transfer/Admission</td>
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</table>

**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”.

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**1519 Statin Therapy at Discharge after Lower Extremity Bypass (LEB)**
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<tr>
<td><strong>1519 Statin Therapy at Discharge after Lower Extremity Bypass (LEB)</strong></td>
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</tbody>
</table>

**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.
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

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
Table of Committee’s Suggested Modifications and Responses from Developers

<table>
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<tr>
<th>0359 Abdominal Aortic Artery (AAA) Repair Mortality Rate (IQI 11)</th>
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<tbody>
<tr>
<td><strong>Description:</strong> Percent of discharges with procedure code of AAA repair with an in-hospital death.</td>
</tr>
<tr>
<td><strong>Numerator Statement:</strong> Number of deaths (DISP=20) among cases meeting the inclusion and exclusion rules for the denominator.</td>
</tr>
<tr>
<td><strong>Denominator Statement:</strong> Discharges, age 18 years and older, with ICD-9-CM AAA repair code procedure and a diagnosis of AAA in any field.</td>
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<tr>
<td><strong>Exclusions:</strong> Exclude cases:</td>
</tr>
<tr>
<td>- missing discharge disposition (DISP=missing), gender (SEX=missing), age (AGE=missing), quarter (DQTR=missing), year (YEAR=missing) or principal diagnosis (DX1=missing)</td>
</tr>
<tr>
<td>- transferring to another short-term hospital (DISP=2)</td>
</tr>
<tr>
<td>- MDC 14 (pregnancy, childbirth, and puerperium)</td>
</tr>
<tr>
<td><strong>Adjustment/Stratification:</strong> 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</td>
</tr>
<tr>
<td>ADRG 1731 (other vascular procedures-minor)</td>
</tr>
<tr>
<td>ADRG 1732 (other vascular procedures-moderate)</td>
</tr>
<tr>
<td>ADRG 1733 (other vascular procedures-major)</td>
</tr>
<tr>
<td>ADRG 1734 (other vascular procedures-extreme)</td>
</tr>
<tr>
<td>ADRG 1691 (major thoracic and abdominal vascular procedures-minor)</td>
</tr>
<tr>
<td>ADRG 1692 (major thoracic and abdominal vascular procedures-moderate)</td>
</tr>
<tr>
<td>ADRG 1693 (major thoracic and abdominal vascular procedures-major)</td>
</tr>
<tr>
<td>ADRG 1694 (major thoracic and abdominal vascular procedures-extreme)</td>
</tr>
<tr>
<td>ADRG 9999 (other)/Gender, age (5-year age groups), race / ethnicity, primary payer, custom</td>
</tr>
<tr>
<td><strong>Level of Analysis:</strong> Facility/ Agency</td>
</tr>
<tr>
<td><strong>Type of Measure:</strong> Outcome</td>
</tr>
<tr>
<td><strong>Data Source:</strong> Electronic administrative data/ claims</td>
</tr>
<tr>
<td><strong>Updated Specifications</strong></td>
</tr>
<tr>
<td><strong>Stratification Details/Variables:</strong> Gender, age (5-year age groups), race / ethnicity, primary payer, custom</td>
</tr>
<tr>
<td>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</td>
</tr>
<tr>
<td><strong>Testing Results:</strong> 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</td>
</tr>
<tr>
<td>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).</td>
</tr>
<tr>
<td>Table 3. Risk Adjustment Coefficients for IQI #11— AAA Repair Mortality</td>
</tr>
<tr>
<td>Parameter</td>
</tr>
<tr>
<td>Intercept</td>
</tr>
<tr>
<td>Sex Female</td>
</tr>
<tr>
<td>Age 65 to 74</td>
</tr>
</tbody>
</table>
Table of Committee’s Suggested Modifications and Responses from Developers

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

<table>
<thead>
<tr>
<th>Parameter</th>
<th>Label</th>
<th>DF</th>
<th>Estimate</th>
<th>Standard Error</th>
<th>Wald Chi-Square</th>
<th>Pr &gt; Chi-Square</th>
</tr>
</thead>
<tbody>
<tr>
<td>Intercept</td>
<td></td>
<td>1</td>
<td>-6.6044</td>
<td>0.1713</td>
<td>1486.04</td>
<td>0.0000</td>
</tr>
<tr>
<td>Sex</td>
<td>Female</td>
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<td>0.0747</td>
<td>36.95</td>
<td>0.0000</td>
</tr>
<tr>
<td>Age</td>
<td>65 to 74</td>
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<td>0.1072</td>
<td>20.72</td>
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</tr>
<tr>
<td>Age</td>
<td>75 to 79</td>
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<td>0.1201</td>
<td>52.97</td>
<td>0.0000</td>
</tr>
<tr>
<td>Age</td>
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</tr>
<tr>
<td>Age</td>
<td>85+</td>
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<td>1.4440</td>
<td>0.1359</td>
<td>112.97</td>
<td>0.0000</td>
</tr>
<tr>
<td>APR-DRG</td>
<td>‘1691’ to ‘1692’</td>
<td>1</td>
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<td>0.1623</td>
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<tr>
<td>APR-DRG</td>
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<td>3.9127</td>
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</tr>
<tr>
<td>APR-DRG</td>
<td>‘1733’ to ‘1734’</td>
<td>1</td>
<td>3.1568</td>
<td>0.1676</td>
<td>354.55</td>
<td>0.0000</td>
</tr>
<tr>
<td>MDC</td>
<td>5</td>
<td>1</td>
<td>2.6400</td>
<td>0.1483</td>
<td>316.85</td>
<td>0.0000</td>
</tr>
<tr>
<td>MDC</td>
<td>Other</td>
<td>1</td>
<td>2.9536</td>
<td>0.2252</td>
<td>172.05</td>
<td>0.0000</td>
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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

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</table>
### Table of Committee’s Suggested Modifications and Responses from Developers

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

<table>
<thead>
<tr>
<th>RUPTURED</th>
<th>1</th>
<th>2.0565</th>
<th>0.0808</th>
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<tbody>
<tr>
<td>c-statistic</td>
<td>0.937</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

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 asymptomatic 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 (< 6 cm 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 (< 6 cm 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 cutoff in men and a 5.5 cm dia cutoff.
Table of Committee’s Suggested Modifications and Responses from Developers

<table>
<thead>
<tr>
<th>Measure</th>
<th>Description</th>
<th>Steward</th>
<th>Rationale</th>
<th>Questions to the Steering Committee</th>
<th>Developer Response</th>
</tr>
</thead>
<tbody>
<tr>
<td>1523 In-hospital mortality following elective open repair of small AAAs</td>
<td>in women, as described below.</td>
<td>Society for Vascular Surgery</td>
<td>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.</td>
<td>1. 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.</td>
<td>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 measure 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 if that is not available. However, data indicate that MANY small AAAs are being electively repaired, it 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.</td>
</tr>
</tbody>
</table>
## Table of Committee’s Suggested Modifications and Responses from Developers

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

**Description:** Percentage of patients undergoing elective open repair of small asymptomatic abdominal aortic aneurysms (AAA) who died 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:** 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 open repair are included if their aneurysm was asymptomatic and small (< 6 cm 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...
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<tr>
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<th>Description</th>
<th>Conditions/Questions for Developer</th>
<th>Developer Response</th>
</tr>
</thead>
<tbody>
<tr>
<td>1534 In-hospital mortality following elective EVAR of small AAAs</td>
<td>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.</td>
<td>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. <strong>De2. Brief Description and 2a.1 Numerator Statement:</strong> 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. <strong>2a Measure Specifications:</strong> Scope of the measure as specified will have limited impact. Please reevaluate. 3. <strong>2b Reliability Testing and 2c Validity Testing:</strong> Identify the testing that will need to be completed for the suggested modifications? 4. <strong>2d. Exclusions:</strong> 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. <strong>2h. Disparities in Care:</strong> Providing information about disparities or plans to be able to provide same. 6. <strong>3a.2 Use in a public reporting initiative:</strong> Please provide plans for public reporting (within 3 years).</td>
<td>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 who 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.</td>
</tr>
</tbody>
</table>
### 1534 In-hospital mortality following elective EVAR of small AAAs

<table>
<thead>
<tr>
<th>Importance to Measure and Report:</th>
<th>Y-21; N-0; A-0</th>
</tr>
</thead>
<tbody>
<tr>
<td>Rationale:</td>
<td>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.</td>
</tr>
</tbody>
</table>

#### Scientific Acceptability of Measure Properties:

<table>
<thead>
<tr>
<th>C-5; P-13; M-3; N-0</th>
</tr>
</thead>
<tbody>
<tr>
<td>(2a. Precise specifications; 2b. Reliability testing; 2c. Validity testing; 2d. Exclusions justified; 2e. Risk adjustment/stratification; 2f. Meaningful differences; 2g. Comparability; 2h. Disparities)</td>
</tr>
<tr>
<td>Rationale:</td>
</tr>
</tbody>
</table>

#### Usability:

<table>
<thead>
<tr>
<th>C-3; P-15; M-2; N-1</th>
</tr>
</thead>
<tbody>
<tr>
<td>(3a. Meaningful/useful for public reporting and quality improvement; 3b. Harmonized; 3c. Distinctive or additive value to existing measures)</td>
</tr>
<tr>
<td>Rationale:</td>
</tr>
</tbody>
</table>

#### Feasibility:

<table>
<thead>
<tr>
<th>C-5; P-10; M-5; N-1</th>
</tr>
</thead>
<tbody>
<tr>
<td>(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)</td>
</tr>
<tr>
<td>Rationale:</td>
</tr>
</tbody>
</table>

### 1540 Postoperative Stroke or Death in Asymptomatic Patients undergoing Carotid Endarterectomy

#### Originally Submitted Specifications

<table>
<thead>
<tr>
<th>Description:</th>
<th>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.</th>
</tr>
</thead>
<tbody>
<tr>
<td>Numerator Statement:</td>
<td>Patients age 18 or older without preoperative carotid territory neurologic or retinal symptoms within the one year immediately preceding CEA who experience stroke or death during their hospitalization following carotid endarterectomy</td>
</tr>
<tr>
<td>Denominator Statement:</td>
<td>Asymptomatic patients (based on NASCET criteria) on the within one year of CEA</td>
</tr>
<tr>
<td>Exclusions:</td>
<td>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.</td>
</tr>
</tbody>
</table>

#### 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

#### 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

**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 preceding 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 symptoms 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).

**Denominator Statement:** 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

<table>
<thead>
<tr>
<th>Measure Steward:</th>
<th>Society for Vascular Surgery</th>
<th>633 N. St. Clair, 22nd floor</th>
<th>Chicago</th>
<th>Illinois, 60611</th>
</tr>
</thead>
<tbody>
<tr>
<td>Measure Name</td>
<td>1543 Postoperative Stroke or Death in Asymptomatic Patients undergoing Carotid Artery Stenting (CAS)</td>
<td></td>
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<tr>
<td>Denominator Time Window:</td>
<td>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 &lt; 10 procedures (ie, reported as too low volume to report).</td>
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</tr>
<tr>
<td>Denominator Details:</td>
<td>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.</td>
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<tr>
<td>Steering Committee Recommendation for Endorsement:</td>
<td>Recommended Y-15; N-6; A-0</td>
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<tr>
<td>If applicable, Questions to the Steering Committee:</td>
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<td></td>
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<td></td>
</tr>
<tr>
<td>1. Importance to Measure and Report:</td>
<td>Y-21; N-0</td>
<td></td>
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<tr>
<td>(1a. Impact; 1b. Performance gap; 1c. Outcome or Evidence)</td>
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<tr>
<td>Rationale:</td>
<td>The Committee considered the asymptomatic patient undergoing carotid artery stenting reasonable to measure.</td>
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<tr>
<td>2. Scientific Acceptability of Measure Properties:</td>
<td>C-6; P-14; M-1; N-0</td>
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<tr>
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<tr>
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<td>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.</td>
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<tr>
<td>3. Usability:</td>
<td>C-6; P-13; M-1; N-1</td>
<td></td>
<td></td>
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<tr>
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<tr>
<td>Rationale:</td>
<td>The Committee was unclear about the public reporting plan.</td>
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<tr>
<td>4. Feasibility:</td>
<td>C-6; P-11; M-3; N-1</td>
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<td></td>
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<tr>
<td>(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)</td>
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<tr>
<td>Rationale:</td>
<td>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’</td>
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<tr>
<td>1531 Follow-up assessment of stroke or death after carotid revascularization</td>
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<tr>
<td>Originally Submitted Specifications</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Description:</td>
<td>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.</td>
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<tr>
<td>Numerator Statement:</td>
<td>Patients with documentation of a follow-up assessment between 21 and 60 days after the date of carotid revascularization for both:</td>
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<tr>
<td>1. Neurologic status with an assessment using the NIH Stroke Scale (by an examiner who is certified by the American Stroke Association), AND</td>
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</tbody>
</table>
Table of Committee’s Suggested Modifications and Responses from Developers

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 periods.
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.

![Combined Endpoint](image.png)

Pearson correlation = .78
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

### Days post-procedure for Assessment

![Bar chart showing days post-procedure for assessment]

If applicable, Questions to the Steering Committee:

1. **Importance to Measure and Report:** Y-7; N-13  
   **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:**  
   **Rationale:**

3. **Usability:**  
   **Rationale:**

4. **Feasibility:**  
   **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 puerperium)
- 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)
<table>
<thead>
<tr>
<th>Measure Number</th>
<th>Measure Name</th>
<th>Description</th>
</tr>
</thead>
</table>
| 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  
**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:**  
   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-13; 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.  

<table>
<thead>
<tr>
<th>Measure Number</th>
<th>Measure Name</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>0340</td>
<td>Pediatric Heart Surgery Volume (PDI 7)</td>
<td>Number of discharges with procedure for pediatric heart surgery</td>
</tr>
</tbody>
</table>
Table of Committee’s Suggested Modifications and Responses from Developers

<table>
<thead>
<tr>
<th>Measure</th>
<th>Description</th>
<th>Numerator Statement</th>
<th>Denominator Statement</th>
<th>Exclusions</th>
<th>Adjustment/Stratification</th>
<th>Level of Analysis</th>
<th>Type of Measure</th>
<th>Data Source</th>
<th>Measure Steward</th>
<th>Steering Committee Recommendation for Endorsement</th>
<th>Rationale</th>
</tr>
</thead>
<tbody>
<tr>
<td>0340 Pediatric Heart Surgery Volume (PDI 7)</td>
<td>Percentage of patients who died with a complications in the hospital.</td>
<td>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.</td>
<td>Denominator Statement: Patients over age 90, under age 18.</td>
<td>No applicable. This measure does not have a denominator due to the fact it is a volume measure.</td>
<td>No risk adjustment necessary/No stratification is required for this measure.</td>
<td>Facility/Agency</td>
<td>Structure/management</td>
<td>Electronic administrative data/claims</td>
<td>Agency for Healthcare Research and Quality</td>
<td>Conditional Y-15; N-4; A-0</td>
<td>The measure was considered important, valid and meets criteria.</td>
</tr>
<tr>
<td>0352 Failure to Rescue In-Hospital Mortality (risk adjusted)</td>
<td>Percentage of patients who died with a complications in the hospital.</td>
<td>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.</td>
<td>Denominator Statement: All patients in an FTR analysis have developed a complication (by definition).</td>
<td>All patients in an FTR analysis have developed a complication (by definition).</td>
<td>Risk adjustment devised specifically for this measure/condition.</td>
<td>Facility/Agency</td>
<td>Structure/management</td>
<td>Electronic administrative data/claims</td>
<td>Agency for Healthcare Research and Quality</td>
<td>Conditional Y-15; N-4; A-0</td>
<td>The measure was considered important, valid and meets criteria.</td>
</tr>
</tbody>
</table>

**Developer Response:**

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 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.
Table of Committee’s Suggested Modifications and Responses from Developers

<table>
<thead>
<tr>
<th>Measure</th>
<th>Committee’s Suggested Modifications and Responses from Developers</th>
</tr>
</thead>
<tbody>
<tr>
<td>0352 Failure to Rescue In-Hospital Mortality (risk adjusted)</td>
<td>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 (<a href="http://www.research.chop.edu/programs/cor/outcomes.php">http://www.research.chop.edu/programs/cor/outcomes.php</a>) 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.</td>
</tr>
<tr>
<td>Data Source: Electronic administrative data/ claims</td>
<td>Updated Specifications</td>
</tr>
<tr>
<td>If measure is stratified, provide stratified results:</td>
<td>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)</td>
</tr>
<tr>
<td>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.</td>
<td></td>
</tr>
<tr>
<td>Use in Public Reporting Initiative: FTR information is online for the public to access (<a href="http://stokes.chop.edu/programs/cor/outcomes.php">http://stokes.chop.edu/programs/cor/outcomes.php</a>). 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.</td>
<td>Measure Steward: The Children’s Hospital of Philadelphia</td>
</tr>
<tr>
<td>Steering Committee Recommendation for Endorsement: Conditional</td>
<td>Y-18; N-3; A-0</td>
</tr>
<tr>
<td>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.</td>
<td>If applicable, Conditions/Questions for Developer:</td>
</tr>
<tr>
<td>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.</td>
<td>2h.2 Failure to Rescue can be used to detect disparities in health outcomes across providers, shown in Silber et al. Arch Surg 2009.</td>
</tr>
<tr>
<td>2. 2h. Disparities in Care: Provide information about disparities or plans to be able to provide data.</td>
<td></td>
</tr>
<tr>
<td>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</td>
<td></td>
</tr>
<tr>
<td>Developer Response:</td>
<td></td>
</tr>
<tr>
<td>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.</td>
<td></td>
</tr>
<tr>
<td>2. 2h. Disparities in Care:</td>
<td></td>
</tr>
<tr>
<td>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)</td>
<td></td>
</tr>
<tr>
<td>Measure Name</td>
<td>Description</td>
</tr>
<tr>
<td>--------------</td>
<td>-------------</td>
</tr>
<tr>
<td>Failure to Rescue In-Hospital Mortality (risk adjusted)</td>
<td>Percentage of patients who died with a complication within 30 days from admission.</td>
</tr>
<tr>
<td>Failure to Rescue 30-Day Mortality (risk adjusted)</td>
<td>Percentage of patients who died with a complication within 30 days from admission.</td>
</tr>
</tbody>
</table>
Table of Committee’s Suggested Modifications and Responses from Developers

<table>
<thead>
<tr>
<th>0353 Failure to Rescue 30-Day Mortality (risk adjusted)</th>
</tr>
</thead>
<tbody>
<tr>
<td>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.</td>
</tr>
<tr>
<td><strong>Type of Measure:</strong> Outcome</td>
</tr>
<tr>
<td><strong>Data Source:</strong> Electronic administrative data/claims</td>
</tr>
<tr>
<td><strong>Updated Specifications:</strong></td>
</tr>
<tr>
<td>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)</td>
</tr>
<tr>
<td>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.</td>
</tr>
<tr>
<td><strong>Use in Public Reporting Initiative:</strong> FTR information is online for the public to access (<a href="http://stokes.chop.edu/programs/cor/outcomes.php">http://stokes.chop.edu/programs/cor/outcomes.php</a>). 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.</td>
</tr>
<tr>
<td><strong>Measure Steward:</strong> The Children’s Hospital of Philadelphia</td>
</tr>
<tr>
<td><strong>Steering Committee Recommendation for Endorsement:</strong> Conditional Y-13; N-8; A-0</td>
</tr>
<tr>
<td><strong>Rationale:</strong> 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.</td>
</tr>
</tbody>
</table>

**Developer Response:**

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

**If applicable, Conditions/Questions for Developer:**

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:**
   1. **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)**
   2. **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...**
### Table of Committee’s Suggested Modifications and Responses from Developers

<table>
<thead>
<tr>
<th>Measure ID</th>
<th>Measure Name</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>0353 Failure to Rescue 30-Day Mortality (risk adjusted)</td>
<td>This 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.</td>
<td></td>
</tr>
<tr>
<td>0351 Death among surgical inpatients with serious, treatable complications (PSI 4)</td>
<td>This measure has not yet been used in public reporting. There was question regarding feasibility of use of this measure for non-medicare patients.</td>
<td></td>
</tr>
</tbody>
</table>

**Originally Submitted Specifications**

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

**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 inpatients 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)

**Adjustment/Stratification:** 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.

**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

<table>
<thead>
<tr>
<th>Measure ID</th>
<th>Measure Title</th>
<th>Originally Submitted Specifications</th>
<th>Steering Committee Recommendation for Endorsement</th>
<th>Rationale</th>
<th>If applicable, Conditions/Questions for Developer</th>
</tr>
</thead>
</table>
| 0351       | Death among surgical inpatients with serious, treatable complications (PSI 4) | **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 postoperative 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 - 66.87  
Postop VF-8R - 84.18  
Mean Diff = 17.31 | 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.  
2. **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. **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. **2. Scientific Acceptability of Measure Properties:** C-13; P-7; M-0; N-0  
   **Rationale:** An advantage of this measure is that it focuses on a broad population, patients 18 and over.  
3. **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. **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

<table>
<thead>
<tr>
<th>Postop VF-8R</th>
<th>81.58</th>
</tr>
</thead>
<tbody>
<tr>
<td>Mean Diff</td>
<td>13.87</td>
</tr>
</tbody>
</table>

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
  - 364.01
  - 362.02
  - 364.03
  - 364.04
  - 364.05
- **Amblyopia**
  - 368.01
  - 368.02
  - 368.03
- **Burn confined to eye and adnexa**
  - 940.0
  - 940.1
  - 940.2
  - 940.3
  - 940.4
  - 940.5
  - 940.9
  - **Cataract secondary to ocular disorders**
    - 366.32
    - 366.33
- **Certain types of iridocyclitis**
  - 364.21
  - 364.22
  - 364.23
  - 364.24
  - 364.3
  - **Choroidal degenerations**
    - 363.43
  - **Chorioretinal detachment**
    - 363.72
  - **Choroidal hemorrhage and rupture**
    - 363.61
    - 363.62
    - 363.63
  - **Chorioretinal scars**
    - 363.30
    - 363.31
    - 363.32
    - 363.33
    - 363.35
  - **Chronic iridocyclitis**
    - 364.10
    - 364.11
  - **Cloudy cornea**
    - 371.01
    - 371.02
    - 371.03
    - 371.04
  - **Corneal edema**
    - 371.20
    - 371.21
    - 371.22
    - 371.23
    - 371.43
    - 371.44
  - **Corneal opacity and other disorders of cornea**
    - 371.00
    - 371.03
    - 371.04
  - **Degenerative disorders of globe**
    - 360.20
    - 360.21
    - 360.23
    - 360.24
### 1536 Cataracts: Improvement in Patient’s Visual Function within 90 Days Following Cataract Surgery

<table>
<thead>
<tr>
<th>Condition</th>
<th>Code</th>
</tr>
</thead>
<tbody>
<tr>
<td>Degenerative disorders of globe</td>
<td>360.29</td>
</tr>
<tr>
<td>Degeneration of macula and posterior pole</td>
<td>362.50</td>
</tr>
<tr>
<td>Degeneration of macula and posterior pole</td>
<td>362.51</td>
</tr>
<tr>
<td>Degeneration of macula and posterior pole</td>
<td>362.52</td>
</tr>
<tr>
<td>Degeneration of macula and posterior pole</td>
<td>362.53</td>
</tr>
<tr>
<td>Degeneration of macula and posterior pole</td>
<td>362.54</td>
</tr>
<tr>
<td>Degeneration of macula and posterior pole</td>
<td>362.55</td>
</tr>
<tr>
<td>Degeneration of macula and posterior pole</td>
<td>362.56</td>
</tr>
<tr>
<td>Degeneration of macula and posterior pole</td>
<td>362.57</td>
</tr>
<tr>
<td>Disseminated chorioretinitis and disseminated retinochoroiditis</td>
<td>363.10</td>
</tr>
<tr>
<td>Disseminated chorioretinitis and disseminated retinochoroiditis</td>
<td>363.11</td>
</tr>
<tr>
<td>Disseminated chorioretinitis and disseminated retinochoroiditis</td>
<td>363.12</td>
</tr>
<tr>
<td>Disseminated chorioretinitis and disseminated retinochoroiditis</td>
<td>363.13</td>
</tr>
<tr>
<td>Disseminated chorioretinitis and disseminated retinochoroiditis</td>
<td>363.14</td>
</tr>
<tr>
<td>Disseminated chorioretinitis and disseminated retinochoroiditis</td>
<td>363.15</td>
</tr>
<tr>
<td>Diabetic retinopathy</td>
<td>362.01</td>
</tr>
<tr>
<td>Diabetic retinopathy</td>
<td>362.02</td>
</tr>
<tr>
<td>Diabetic retinopathy</td>
<td>362.03</td>
</tr>
<tr>
<td>Diabetic retinopathy</td>
<td>362.04</td>
</tr>
<tr>
<td>Diabetic retinopathy</td>
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### Table of Committee’s Suggested Modifications and Responses from Developers

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

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**References:**
   • 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
Table of Committee’s Suggested Modifications and Responses from Developers

<table>
<thead>
<tr>
<th>1536 Cataracts: Improvement in Patient’s Visual Function within 90 Days Following Cataract Surgery</th>
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<tbody>
<tr>
<td><strong>Medicare and Medicaid Services Physician Quality Reporting System.</strong></td>
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<tr>
<td><strong>Use in QI or Other Programs/Initiatives:</strong> 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.</td>
</tr>
<tr>
<td><strong>Specify the near-term path to achieve electronic capture by most providers:</strong> 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.</td>
</tr>
<tr>
<td><strong>If applicable, Conditions/Questions for Developer:</strong> These are no fees associated with proprietary measures. Therefore, we have proposed a sample 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.</td>
</tr>
<tr>
<td><strong>Costs to Implement the Measure:</strong> 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.</td>
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<td><strong>Measure Steward:</strong> American Academy of Ophthalmology and Hoskins Center for Quality Eye Care</td>
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<td><strong>Steering Committee Recommendation for Endorsement:</strong> Conditional Y-9; N-10; A-0</td>
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<tr>
<td><strong>Rationale:</strong> The Committee verified the importance of patient centered measures but suggested that the measure should be better specified.</td>
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<tr>
<td><strong>If applicable, Conditions/Questions for Developer:</strong> 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.</td>
</tr>
<tr>
<td>1. <strong>2a.3 Numerator Details:</strong> a) Provide the method (e.g., scale or other method to demonstrate improvement quantitatively 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) Indicate 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?</td>
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<td>2. <strong>2a.9 Denominator Exclusions:</strong> Excluding patients who do not want to complete the survey inappropriately inflates the rate.</td>
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<td>3. <strong>2a.25 Data Source/Data Collection Instrument:</strong> 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.</td>
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<td>4. <strong>3a.2 Use in Public Reporting Initiative:</strong> Provide plans and expected date (within 3 years) for public reporting.</td>
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<td>5. <strong>4e Data Collection Strategy:</strong> Clarify more specifically the burden on providers of data collection.</td>
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<tr>
<td><strong>Developer Response:</strong></td>
</tr>
<tr>
<td>1. <strong>2a.3 Numerator Details:</strong> 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 weights 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).</td>
</tr>
<tr>
<td>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...</td>
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</tbody>
</table>
### Table of Committee’s Suggested Modifications and Responses from Developers

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<tr>
<th>1536 Cataracts: Improvement in Patient’s Visual Function within 90 Days Following Cataract Surgery</th>
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<tr>
<td>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.</td>
</tr>
<tr>
<td>2. 2a.9 Denominator Exclusions: We agree and will not exclude patients who do not want to complete the survey.</td>
</tr>
<tr>
<td>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.</td>
</tr>
<tr>
<td>4. 3a.2 Use in Public Reporting Initiative: This is planned for public reporting through the CMS PQRS within the next 3 years.</td>
</tr>
<tr>
<td>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.</td>
</tr>
</tbody>
</table>

**If applicable, Questions to the Steering Committee:**

1. **Importance to Measure and Report:** Y-18; N-1
   - **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
   - **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 multi-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
   - **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
   - **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.
Table of Committee’s Suggested Modifications and Responses from Developers

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<tr>
<th>1549 Cataracts: Patient Satisfaction within 90 Days Following Cataract Surgery</th>
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</table>
| **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.
### Table of Committee’s Suggested Modifications and Responses from Developers

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**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 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.

**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
Table of Committee’s Suggested Modifications and Responses from Developers

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<td>- Continuity of care</td>
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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.

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**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.


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 vancomycin is an 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).

**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 measure, the following are considered prophylactic for surgical site infection: ampicillin/sulbactam, aztreonam, cefazolin, cefmetazole, cefotetan, cefoxitin, cefuroxime, ciprofloxacin, clindamycin, eretapenem, 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 preoperative 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...
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 rationale 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).
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:

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

<table>
<thead>
<tr>
<th>0264 Prophylactic Intravenous (IV) Antibiotic Timing</th>
</tr>
</thead>
<tbody>
<tr>
<td>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.</td>
</tr>
</tbody>
</table>

**If applicable, Questions to the Steering Committee:**

1. **Importance to Measure and Report:** Y-17; N-2  
   **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  
   **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  
   **Rationale:** The Committee described the measure as usable.

4. **Feasibility:** C-13; P-6; M-0; N-0  
   **Rationale:** The measure uses procedure codes, which makes it less burdensome for ambulatory surgical centers to collect.
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**

<table>
<thead>
<tr>
<th>Determine if need to compare measures for superiority</th>
<th>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</th>
</tr>
</thead>
<tbody>
<tr>
<td>Assess competing measures for superiority on NQF evaluation criteria and subcriteria</td>
<td>The comparison will require expert judgment and may involve considerations of pros and cons related to all the criteria.</td>
</tr>
<tr>
<td>---</td>
<td>---</td>
</tr>
<tr>
<td>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.</td>
<td>• 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).</td>
</tr>
<tr>
<td>Reliability and Validity—Scientific Acceptability of Measure Properties:</td>
<td>• Compare evidence of reliability.</td>
</tr>
<tr>
<td>• Compare evidence of validity.</td>
<td>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.</td>
</tr>
<tr>
<td>All else being equal:</td>
<td>• Measures with the broadest application (target patient population, settings, level of analysis) are preferred.</td>
</tr>
<tr>
<td>Usability:</td>
<td>• Compare evidence of use and usefulness for public reporting.</td>
</tr>
<tr>
<td>• Compare evidence of use and usefulness for quality improvement.</td>
<td>All else being equal:</td>
</tr>
<tr>
<td>• Measures that are publicly reported are preferred.</td>
<td>• Measures that are in use are preferred over those without evidence of use.</td>
</tr>
<tr>
<td>• Measures with the widest use (e.g., settings, numbers of entities reporting performance results) are preferred.</td>
<td>Feasibility:</td>
</tr>
<tr>
<td>All else being equal:</td>
<td>• Compare the ease of data collection.</td>
</tr>
<tr>
<td>• Compare the potential for inaccuracies, errors, and unintended consequences.</td>
<td>All else being equal:</td>
</tr>
<tr>
<td>• Measures based on data from electronic sources are preferred.</td>
<td>• Measures that are freely available are preferred.</td>
</tr>
<tr>
<td>If a competing measure does not have clear superiority, Assess justification for multiple measures</td>
<td>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?</td>
</tr>
<tr>
<td>Measures based on different data types may provide added value if:</td>
<td>• the additional measure allows transition to an EHR-based measure OR</td>
</tr>
<tr>
<td>• 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.</td>
<td>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</td>
</tr>
</tbody>
</table>
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**

<table>
<thead>
<tr>
<th>Related Measures</th>
<th>Lack of Harmonization</th>
<th>Assess Justification for Conceptual Differences</th>
<th>Assess Justification for Technical Differences</th>
</tr>
</thead>
<tbody>
<tr>
<td>Same measure focus (numerator); different target population</td>
<td>Inconsistent measure focus (numerator)</td>
<td>The evidence for the measure focus is different for the different target population so that one measure cannot</td>
<td>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</td>
</tr>
<tr>
<td>Related Measures</td>
<td>Lack of Harmonization</td>
<td>Assess Justification for Conceptual Differences</td>
<td>Assess Justification for Technical Differences</td>
</tr>
<tr>
<td>------------------</td>
<td>-----------------------</td>
<td>----------------------------------------------</td>
<td>-----------------------------------------------</td>
</tr>
<tr>
<td>(denominator)</td>
<td></td>
<td>accommodate both target populations. Evidence should always guide measure specifications.</td>
<td>important differences remain.</td>
</tr>
</tbody>
</table>
| 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*

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NQF DOCUMENT – DO NOT CITE, QUOTE, REPRODUCE, OR CIRCULATE
Cataracts

New Candidate Measure #1536: Cataracts: Improvement in patient’s visual function within 90 days following cataract surgery

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## NATIONAL QUALITY FORUM

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

*Phase 1*

### Cardiac Surgery: IMA

<table>
<thead>
<tr>
<th>Maintenance Measure #0134: Use of internal mammary artery (IMA) in coronary artery bypass graft (CABG)</th>
<th>Endorsed Measure #0516: Use of IMA in isolated CABG (surgeon level)</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Status</strong></td>
<td>Currently undergoing maintenance review</td>
</tr>
<tr>
<td><strong>Steward</strong></td>
<td>Society of Thoracic Surgeons</td>
</tr>
<tr>
<td><strong>Description</strong></td>
<td>Percentage of patients aged 18 years and older undergoing isolated coronary artery bypass graft (CABG) who received an internal mammary artery (IMA) graft.</td>
</tr>
<tr>
<td><strong>Type of Measure</strong></td>
<td>Process</td>
</tr>
<tr>
<td><strong>Numerator</strong></td>
<td>Number of patients undergoing isolated coronary artery bypass graft (CABG) who received an internal mammary artery (IMA) graft.</td>
</tr>
<tr>
<td><strong>Time window:</strong></td>
<td></td>
</tr>
<tr>
<td><strong>Numerator Details</strong></td>
<td>Number of isolated CABG procedures in which IMA Artery Used [IMAArtUs (STS Adult Cardiac Surgery Database Version 2.73)] is marked &quot;Left IMA,&quot; &quot;Right IMA,&quot; or &quot;Both IMAs&quot;</td>
</tr>
<tr>
<td><strong>Time window:</strong></td>
<td></td>
</tr>
<tr>
<td><strong>Denominator</strong></td>
<td>All patients undergoing isolated CABG.</td>
</tr>
<tr>
<td><strong>Time window:</strong></td>
<td>12 months</td>
</tr>
<tr>
<td><strong>Denominator Categories</strong></td>
<td>Female, Male; 18 and older</td>
</tr>
<tr>
<td><strong>Denominator Details</strong></td>
<td>Number of isolated CABG procedures excluding repeat CABG.</td>
</tr>
<tr>
<td><strong>Isolated CABG is determined as a procedure for which all of the following apply:</strong></td>
<td>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’.</td>
</tr>
<tr>
<td>- OpCAB is marked “Yes”</td>
<td>- OpValve, VSAV, VSAVPr, ResectSubA, VSMV, VSMVPrr, OpTricus, OpPulm, OpONCard, OCarLVA, OCarVSD,</td>
</tr>
<tr>
<td>- (VADProc is marked “No” or “Missing”)</td>
<td>- 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’.</td>
</tr>
<tr>
<td>or (VADProc is marked “Yes, Implanted” and UnpIVAD is marked “yes”)</td>
<td>- 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’.</td>
</tr>
<tr>
<td>- OCarASDty is marked “PFO” or “missing”</td>
<td>- 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’.</td>
</tr>
<tr>
<td>- OCarAFibAProc is marked “primarily epicardial” or “missing” and</td>
<td>- 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’.</td>
</tr>
<tr>
<td>- OpValve, VSAV, VSAVPr, ResectSubA, VSMV, VSMVPrr, OpTricus, OpPulm, OpONCard, OCarLVA, OCarVSD,</td>
<td>- 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’.</td>
</tr>
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<td></td>
<td>- 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’.</td>
</tr>
<tr>
<td>Maintenance Measure #0134: Use of internal mammary artery (IMA) in coronary artery bypass graft (CABG)</td>
<td>Endorsed Measure #0516: Use of IMA in isolated CABG (surgeon level)</td>
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<tr>
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</tr>
<tr>
<td>OCarSVR, OCarCong, OCarTrma, OCarCrTx, OCAoProcType, EndoProc, OCTumor, OCPulThromDis, OCarOth are all marked “no” or “missing”</td>
<td>CF_Annotated.pdf</td>
</tr>
<tr>
<td><strong>Exclusions</strong></td>
<td>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</td>
</tr>
<tr>
<td><strong>Exclusions Details</strong></td>
<td>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</td>
</tr>
<tr>
<td><strong>Risk Adjustment</strong></td>
<td>No risk adjustment necessary</td>
</tr>
<tr>
<td><strong>Stratification</strong></td>
<td>N/A</td>
</tr>
<tr>
<td><strong>Type Score</strong></td>
<td>Rate/proportion</td>
</tr>
<tr>
<td><strong>Algorithm</strong></td>
<td>N/A</td>
</tr>
<tr>
<td><strong>Data Source</strong></td>
<td>Registry data</td>
</tr>
<tr>
<td><strong>Level of Measurement/Analysis</strong></td>
<td>Clinicians: Group; Facility/agency; Population: National, regional/network, states, counties or cities</td>
</tr>
<tr>
<td><strong>Care Settings</strong></td>
<td>Hospital</td>
</tr>
</tbody>
</table>
## Table of Similar, or Competing Measures and those with potential for Harmonization

### Phase II

#### AAA Repair

<table>
<thead>
<tr>
<th>Maintenance Measure</th>
<th>Maintenance Measure</th>
<th>Endorsed Measure</th>
<th>New Candidate Standard</th>
<th>New Candidate Standard</th>
</tr>
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<tbody>
<tr>
<td>0357: Abdominal aortic aneurysm (AAA) repair volume (IQI 4)</td>
<td>#0359: Abdominal aortic artery (AAA) repair mortality rate (IQI 11)</td>
<td>0736: Survival predictor for abdominal aortic aneurysm (AAA)</td>
<td>1523: In-hospital mortality following elective open repair of small AAAs</td>
<td></td>
</tr>
</tbody>
</table>

#### 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 asymptomatic 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.
- Number of deaths (DISP=20) among cases meeting the inclusion and exclusion rules for the denominator.
- Survival rate for patients age 18 and over without AAA rupture who undergo an AAA repair.
- Mortality following elective open repair of asymptomatic AAAs in men with < 6 cm dia and women with < 5.5 cm dia AAAs.
- 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: Time window can be determined by user, but is generally a calendar year.
- Time window: Time window can be determined by user, but is generally a calendar year.
- Time Window: During the hospital admission.
- Time window: Lifetime for provider reporting, annual for hospital reporting.
- Time window: Lifetime for provider reporting, annual for hospital reporting.
<table>
<thead>
<tr>
<th><strong>NATIONAL QUALITY FORUM</strong></th>
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</thead>
<tbody>
<tr>
<td><strong>Maintenance Measure 0357:</strong> Abdominal aortic aneurysm (AAA) repair volume (IQI 4)</td>
</tr>
</tbody>
</table>

is generally a calendar year.

| **Numerator Details** | 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)). |

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
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<td></td>
<td></td>
</tr>
<tr>
<td><strong>ANEURYSM</strong> Exclude cases: • MDC 14 (pregnancy, childbirth, and puerperium)</td>
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<tr>
<td><strong>Denominator</strong> N/A</td>
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</tr>
<tr>
<td><strong>Denominator Categories</strong> Female, Male; 18 and older</td>
<td>Female, Male; 18 and older</td>
<td>Female, Male; 18 years or older</td>
<td>Female, Male; 18 years or older</td>
<td></td>
</tr>
<tr>
<td><strong>Denominator Details</strong> N/A</td>
<td>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.</td>
<td>All hospital patients age 18 and over without rupture who had an AAA repair. Time Window: 12 months</td>
<td>All elective open repairs of asymptomatic AAAs in men with &lt; 6 cm dia and women with &lt; 5.5 cm dia AAAs. Time window: Lifetime for provider reporting, annual for hospital reporting</td>
<td>All elective endovascular repairs of asymptomatic AAAs in men with &lt; 6 cm dia and women with &lt; 5.5 cm dia AAAs. Time window: Lifetime for provider reporting, annual for hospital reporting</td>
</tr>
<tr>
<td><strong>ICD-9-CM AAA repair procedure codes:</strong> 3834 AORTA RESECTION &amp; ANAST 3844 RESECT ABDM AORTA W REPL 3864 EXCISION OF AORTA 3971</td>
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<tr>
<td></td>
<td>For the volume predicted mortality, hospitals count the number of all AAA repair cases using the following procedure codes.</td>
<td>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 are included</td>
<td>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</td>
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**Denominator Details**

<p>| Denominator Details | 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 &amp; 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 &amp; 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 are included | 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 |</p>
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<td>1534: In-hospital mortality following elective EVAR of small AAAs</td>
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</table>

**Exclusions**

Numerator exclusions

- MDC 14 (pregnancy, childbirth, and puerperium)

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)

Patients with ruptured aneurysm or thoracoabdominal aneurysms.

- > 6 cm minor diameter - men
- > 5.5 cm minor diameter - women

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

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)

For the observed mortality hospitals count the number of AAA repair cases that also have a diagnosis of unruptured AAA using the following 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).
<table>
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<tr>
<th>Maintenance Measure</th>
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<th>Endorsed Measure 0736: Survival predictor for abdominal aortic aneurysm (AAA)</th>
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<th>New Candidate Standard 1534: In-hospital mortality following elective EVAR of small AAAs</th>
</tr>
</thead>
</table>
| 0357: Abdominal aortic aneurysm (AAA) repair volume (IQI 4) | #0359: Abdominal aortic artery (AAA) repair mortality rate (IQI 11) | (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** | **Exclusion Details** | 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. |

This volume measure does not have a denominator.
<table>
<thead>
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<td></td>
<td></td>
<td></td>
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</tr>
<tr>
<td>Risk Adjustment</td>
<td>No risk adjustment necessary</td>
<td>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.</td>
<td>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</td>
<td>No risk adjustment necessary</td>
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Risk Adjustment

No risk adjustment necessary
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<tbody>
<tr>
<td>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</td>
<td>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</td>
<td></td>
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</tbody>
</table>
## Maintenance Measure 0357: Abdominal aortic aneurysm (AAA) repair volume (IQI 4)

- Abdominal aortic aneurysm (AAA) repair volume (IQI 4)

## Maintenance Measure #0359: Abdominal aortic artery (AAA) repair mortality rate (IQI 11)

- 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)
- Moderate: ADRG 1693 (major thoracic and abdominal vascular procedures - major)
- Major: ADRG 1694 (major thoracic and abdominal vascular procedures - extreme)
- Other: ADRG 9999

### cohort 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:

\[
predicted \text{ Survival} = 1 - predicted \text{ Mortality} \\
predicted \text{ Mortality} = (weight) \times \text{mortality} + (1 - weight) \times \text{volume predicted mortality}
\]
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<tbody>
<tr>
<td>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”</td>
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<tr>
<td>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).</td>
<td></td>
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<tr>
<td>Method: We used an empirical Bayes approach to combine mortality rates with information on hospital volume at each hospital. In traditional</td>
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NATIONAL QUALITY FORUM

NQF DOCUMENT – DO NOT CITE, QUOTE, REPRODUCE, OR CIRCULATE
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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
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<td>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.</td>
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NATIONAL QUALITY FORUM

NQF DOCUMENT – DO NOT CITE, QUOTE, REPRODUCE, OR CIRCULATE 19
|---|---|---|---|---|
| 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 |
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</tbody>
</table>

<table>
<thead>
<tr>
<th>Stratification</th>
<th>N/A</th>
<th>Gender, age (5-year age groups), race / ethnicity, primary payer, custom</th>
<th>N/A</th>
<th>N/A</th>
</tr>
</thead>
<tbody>
<tr>
<td>Type Score</td>
<td>Count</td>
<td>Rate/proportion</td>
<td>Rate/proportion</td>
<td>Rate/proportion</td>
</tr>
<tr>
<td>Algorithm</td>
<td>The volume is the number of discharges with a diagnosis of, and a procedure for AAA.</td>
<td>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</td>
<td>Identify denominator, exclude non-elective repair of symptomatic or ruptured patients and men with AAA &gt;6 cm, and women with AAA &gt;5.5, find number of deaths Outcome = deaths/ # cases</td>
<td>Identify denominator, exclude non-elective repair of symptomatic or ruptured patients and men with AAA &gt;6 cm, and women with AAA &gt;5.5, find number of deaths Outcome = deaths/ # cases</td>
</tr>
</tbody>
</table>

*Any negative values are reset to "0"
<table>
<thead>
<tr>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>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</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>---------------------------------------------------------------</td>
<td>---------------------------------------------------------------</td>
<td>---------------------------------------------------------------</td>
<td>---------------------------------------------------------------</td>
<td>---------------------------------------------------------------</td>
</tr>
<tr>
<td><strong>Data Source</strong></td>
<td><strong>Data Source</strong></td>
<td><strong>Data Source</strong></td>
<td><strong>Data Source</strong></td>
<td><strong>Data Source</strong></td>
</tr>
<tr>
<td>Electronic administrative data/claims</td>
<td>Electronic administrative data/claims</td>
<td>Electronic administrative data/claims</td>
<td>Registry data</td>
<td>Registry data</td>
</tr>
<tr>
<td><strong>Level of Measurement /Analysis</strong></td>
<td><strong>Level of Measurement /Analysis</strong></td>
<td><strong>Level of Measurement /Analysis</strong></td>
<td><strong>Level of Measurement /Analysis</strong></td>
<td><strong>Level of Measurement /Analysis</strong></td>
</tr>
<tr>
<td>Facility/agency</td>
<td>Facility/agency</td>
<td>Facility/agency</td>
<td>Clinicians: Individual, group; Facility/agency; Can be measured at all levels</td>
<td>Clinicians: Individual, group; Facility/agency; Can be measured at all levels</td>
</tr>
<tr>
<td><strong>Care Settings</strong></td>
<td><strong>Care Settings</strong></td>
<td><strong>Care Settings</strong></td>
<td><strong>Care Settings</strong></td>
<td><strong>Care Settings</strong></td>
</tr>
<tr>
<td>Hospital</td>
<td>Hospital</td>
<td>Hospital</td>
<td>Hospital</td>
<td>Hospital</td>
</tr>
</tbody>
</table>
## Beta Blocker

<table>
<thead>
<tr>
<th>Endorsed Measure 0235: Pre-op beta blocker in patient with isolated CABG (1)</th>
<th>Maintenance Measure #0127: Pre-operative beta blockade</th>
<th>Endorsed Measure 0236: Pre-op beta-blocker in patient with isolated CABG (2)</th>
<th>Maintenance Measure 0284: Surgery patients on beta blocker therapy prior to admission who received a beta blocker during the perioperative period</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Status</strong></td>
<td>Endorsed 5/2007</td>
<td>Currently undergoing maintenance review</td>
<td>Endorsed 5/2007</td>
</tr>
<tr>
<td><strong>Steward</strong></td>
<td>Society of Thoracic Surgeons</td>
<td>Society of Thoracic Surgeons</td>
<td>Centers for Medicare &amp; Medicaid Services</td>
</tr>
<tr>
<td><strong>Description</strong></td>
<td>Percentage of procedures for which the patient received Beta Blockers within 24 hours preceding surgery/ Total number of isolated CABG procedures.</td>
<td>Percent of patients undergoing isolated CABG who received beta blockers within 24 hours preceding surgery.</td>
<td>Percentage of patients undergoing CABG with documented pre-operative beta blockade who had a coronary artery bypass graft</td>
</tr>
<tr>
<td><strong>Type of Measure</strong></td>
<td>Process</td>
<td>Process</td>
<td>Process</td>
</tr>
<tr>
<td><strong>Numerator</strong></td>
<td>Number of procedures for which the patient received Beta Blockers within 24 hours preceding surgery.</td>
<td>Number of procedures for which the patient received Beta Blockers within 24 hours preceding surgery.</td>
<td>Patients undergoing CABG with documented pre-operative beta blockade. 4115F Beta blocker administered within 24 hours prior to surgical incision</td>
</tr>
<tr>
<td><strong>Numerator Details</strong></td>
<td></td>
<td>Number of isolated CABG procedures in which preoperative beta blockers [MedBeta (STS Adult Cardiac Surgery Database Version 2.73, Sequence number 1710)] is marked &quot;yes&quot;.</td>
<td></td>
</tr>
<tr>
<td><strong>Denominator</strong></td>
<td>Total number of isolated CABG procedures.</td>
<td>Total number of isolated CABG procedures.</td>
<td>Patients with coronary artery bypass graft. CPT codes: 33510, 33511, 33512, 33513, 33514, 33516, 33533, 33534, 33535, 33536</td>
</tr>
</tbody>
</table>
## NATIONAL QUALITY FORUM

<table>
<thead>
<tr>
<th>Denominator Categories</th>
<th>Denominator Details</th>
<th>Endorsed Measure 0235: Pre-op beta blocker in patient with isolated CABG (1)</th>
<th>Maintenance Measure #0127: Pre-operative beta blockade</th>
<th>Endorsed Measure 0236: Pre-op beta-blocker in patient with isolated CABG (2)</th>
<th>Maintenance Measure 0284: Surgery patients on beta blocker therapy prior to admission who received a beta blocker during the perioperative period</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Female, Male; 18 and older</strong></td>
<td>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 []):</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>
- 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 |
| **Female, Male; Patients >/= 18 years of age** | 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

NQF DOCUMENT – DO NOT CITE, QUOTE, REPRODUCE, OR CIRCULATE
### National Quality Forum

<table>
<thead>
<tr>
<th>Endorsed Measure 0235: Pre-op beta blocker in patient with isolated CABG (1)</th>
<th>Maintenance Measure #0127: Pre-operative beta blockade</th>
<th>Endorsed Measure 0236: Pre-op beta-blocker in patient with isolated CABG (2)</th>
<th>Maintenance Measure 0284: Surgery patients on beta blocker therapy prior to admission who received a beta blocker during the perioperative period</th>
</tr>
</thead>
<tbody>
<tr>
<td>[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], OPCuThromDis [Pulmonary Thromboembolectomy], OCarOthr [other cardiac procedure] are all marked “no” or “missing”</td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

### 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,
<table>
<thead>
<tr>
<th><strong>Endorsed Measure 0235</strong>: Pre-op beta blocker in patient with isolated CABG (1)</th>
<th><strong>Maintenance Measure #0127</strong>: Pre-operative beta blockade</th>
<th><strong>Endorsed Measure 0236</strong>: Pre-op beta-blocker in patient with isolated CABG (2)</th>
<th><strong>Maintenance Measure 0284</strong>: Surgery patients on beta blocker therapy prior to admission who received a beta blocker during the perioperative period</th>
</tr>
</thead>
<tbody>
<tr>
<td>Procedures with preoperative beta blockers [MedBeta (STS Adult Cardiac Surgery Database Version 2.73, Sequence number 1710)] marked as “Contraindicated”</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Data Elements: Beta-Blocker During Pregnancy Clinical Trial Perioperative Death Reason for Not Administering Beta-Blocker-Perioperative</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>Exclusion Details</strong></td>
<td><strong>Risk Adjustment</strong></td>
<td>No risk adjustment necessary</td>
<td>No risk adjustment necessary</td>
</tr>
<tr>
<td></td>
<td><strong>Stratification</strong></td>
<td>N/A</td>
<td>N/A</td>
</tr>
<tr>
<td></td>
<td><strong>Type Score</strong></td>
<td>Rate/proportion</td>
<td>Rate/proportion</td>
</tr>
<tr>
<td></td>
<td><strong>Algorithm</strong></td>
<td>N/A</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Algorithm:</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>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.</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>2. Calculate Patient Age. The Patient Age, in years, is equal to the Admission Date minus</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

**NATIONAL QUALITY FORUM**
<table>
<thead>
<tr>
<th>Endorsed Measure 0235: Pre-op beta blocker in patient with isolated CABG (1)</th>
<th>Maintenance Measure #0127: Pre-operative beta blockade</th>
<th>Endorsed Measure 0236: Pre-op beta-blocker in patient with isolated CABG (2)</th>
<th>Maintenance Measure 0284: Surgery patients on beta blocker therapy prior to admission who received a beta blocker during the perioperative period</th>
</tr>
</thead>
</table>

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...
<table>
<thead>
<tr>
<th>Endorsed Measure 0235: Pre-op beta blocker in patient with isolated CABG (1)</th>
<th>Maintenance Measure #0127: Pre-operative beta blockade</th>
<th>Endorsed Measure 0236: Pre-op beta-blocker in patient with isolated CABG (2)</th>
<th>Maintenance Measure 0284: Surgery patients on beta blocker therapy prior to admission who received a beta blocker during the perioperative period</th>
</tr>
</thead>
</table>
| 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 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. |
Surgery Days, in days, is equal to the Anesthesia Start Date minus the Admission Date. |
| 8. Check Surgery Days  
Surgery Days, in days, is equal to the Anesthesia Start Date minus the Admission Date. |
<table>
<thead>
<tr>
<th>Endorsed Measure 0235: Pre-op beta blocker in patient with isolated CABG (1)</th>
<th>Maintenance Measure #0127: Pre-operative beta blockade</th>
<th>Endorsed Measure 0236: Pre-op beta-blocker in patient with isolated CABG (2)</th>
<th>Maintenance Measure 0284: Surgery patients on beta blocker therapy prior to admission who received a beta blocker during the perioperative period</th>
</tr>
</thead>
<tbody>
<tr>
<td>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.</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>b. If the Surgery Days is greater than or equal to zero, continue processing and proceed to Perioperative Death.</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>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.</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>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.</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>c. If Perioperative Death equals No, continue processing and proceed to Beta-Blocker Current Medication.</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>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.</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Endorsed Measure 0235: Pre-op beta blocker in patient with isolated CABG (1)</td>
<td>Maintenance Measure #0127: Pre-operative beta blockade</td>
<td>Endorsed Measure 0236: Pre-op beta-blocker in patient with isolated CABG (2)</td>
<td>Maintenance Measure 0284: Surgery patients on beta blocker therapy prior to admission who received a beta blocker during the perioperative period</td>
</tr>
<tr>
<td>---</td>
<td>---</td>
<td>---</td>
<td>---</td>
</tr>
</tbody>
</table>
| **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-
<table>
<thead>
<tr>
<th>Endorsed Measure 0235: Pre-op beta blocker in patient with isolated CABG (1)</th>
<th>Maintenance Measure #0127: Pre-operative beta blockade</th>
<th>Endorsed Measure 0236: Pre-op beta-blocker in patient with isolated CABG (2)</th>
<th>Maintenance Measure 0284: Surgery patients on beta blocker therapy prior to admission who received a beta blocker during the perioperative period</th>
</tr>
</thead>
</table>
| | | | 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 is missing, the case will proceed to a Measure Category Assignment of X and will be rejected. Stop processing.  
c.If Reason for Not Administering Beta-Blocker Perioperative equals No, continue processing and check Reason for Not Administering Beta-Blocker Perioperative.  
14.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 is missing, the case will proceed to a Measure Category Assignment of X and will be rejected. Stop processing.  
c.If Reason for Not Administering Beta-Blocker Perioperative equals No, continue processing and check Reason for Not Administering Beta-Blocker Perioperative.  
15.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 is missing, the case will proceed to a Measure Category Assignment of X and will be rejected. Stop processing.  
c.If Reason for Not Administering Beta-Blocker Perioperative equals No, continue processing and check Reason for Not Administering Beta-Blocker Perioperative.  
16.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 is missing, the case will proceed to a Measure Category Assignment of X and will be rejected. Stop processing.  
c.If Reason for Not Administering Beta-Blocker Perioperative equals No, continue processing and check Reason for Not Administering Beta-Blocker Perioperative.  
17.Check Reason for Not Administering Beta-Blocker Perioperative  
...
<table>
<thead>
<tr>
<th>Measure</th>
<th>Description</th>
<th>Data Source</th>
<th>Level of Measurement/Analysis</th>
<th>Care Settings</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Endorsed Measure 0235</strong>: Pre-op beta blocker in patient with isolated CABG (1)</td>
<td></td>
<td>Electronic administrative data/claims</td>
<td>Clinicians: Individual</td>
<td>Hospital</td>
</tr>
<tr>
<td><strong>Maintenance Measure #0127</strong>: Pre-operative beta blockade</td>
<td></td>
<td>Electronic clinical data</td>
<td>Facility/agency</td>
<td>Hospital</td>
</tr>
<tr>
<td><strong>Endorsed Measure 0236</strong>: Pre-op beta-blocker in patient with isolated CABG (2)</td>
<td></td>
<td>Electronic administrative data/claims</td>
<td>Clinicians: Individual</td>
<td>Hospital</td>
</tr>
<tr>
<td><strong>Maintenace Measure 0284</strong>: Surgery patients on beta blocker therapy prior to admission who received a beta blocker during the perioperative period</td>
<td>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.</td>
<td>Electronic administrative data/claims; Paper medical record/flow sheet</td>
<td>Facility/agency</td>
<td>Hospital</td>
</tr>
</tbody>
</table>

**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,
## NATIONAL QUALITY FORUM

### Cataracts

<table>
<thead>
<tr>
<th>New Candidate Measure #1536: Cataracts: Improvement in patient’s visual function within 90 days following cataract surgery</th>
<th>Endorsed Measure #0565: Cataracts: 20/40 or better visual acuity within 90 days following cataract surgery</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Status</strong></td>
<td>Currently undergoing review</td>
</tr>
<tr>
<td><strong>Steward</strong></td>
<td>American Academy of Ophthalmology and Hoskins Center for Quality Eye Care</td>
</tr>
<tr>
<td><strong>Description</strong></td>
<td>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.</td>
</tr>
<tr>
<td><strong>Type of Measure</strong></td>
<td>Outcome</td>
</tr>
<tr>
<td><strong>Numerator</strong></td>
<td>Patients who had improvement in visual function achieved within 90 days following cataract surgery.</td>
</tr>
</tbody>
</table>

**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
B. 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
C. 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
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
<table>
<thead>
<tr>
<th><strong>New Candidate Measure #1536</strong>: Cataracts: Improvement in patient’s visual function within 90 days following cataract surgery</th>
<th><strong>Endorsed Measure #0565</strong>: Cataracts: 20/40 or better visual acuity within 90 days following cataract surgery</th>
</tr>
</thead>
<tbody>
<tr>
<td>Denominator: All patients aged 18 years and older who had cataract surgery.</td>
<td>Denominator: All patients aged 18 years and older who had cataract surgery and no significant pre-operative ocular conditions impacting the visual outcome of surgery.</td>
</tr>
<tr>
<td>Denominator Categories: Female, Male; 18 years and older</td>
<td></td>
</tr>
<tr>
<td>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</td>
<td>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</td>
</tr>
<tr>
<td>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</td>
<td>Patients with comorbid conditions that impact the visual outcome of surgery (See Denominator Exclusions Spreadsheet).</td>
</tr>
<tr>
<td>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</td>
<td>Patients with any of the following comorbid conditions that impact the visual outcome of surgery (See Denominator Exclusions Spreadsheet)</td>
</tr>
<tr>
<td>Risk Adjustment: No risk adjustment necessary</td>
<td>No risk adjustment necessary</td>
</tr>
<tr>
<td>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</td>
<td></td>
</tr>
</tbody>
</table>
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 postoperative VF-14 scores across groups of patients with and without ocular co-morbidities, as seen in the table below.

<table>
<thead>
<tr>
<th>Type Score</th>
<th>Rate/proportion</th>
</tr>
</thead>
<tbody>
<tr>
<td>Algorithm</td>
<td>Calculation for Reporting:</td>
</tr>
<tr>
<td></td>
<td>For reporting purposes, this measure is calculated by creating a fraction with the following components: Reporting Numerator and Reporting Denominator.</td>
</tr>
<tr>
<td></td>
<td>Reporting Numerator includes each of the following instances:</td>
</tr>
<tr>
<td></td>
<td>A. Patients who had an improvement in their visual function achieved within 90 days following cataract surgery</td>
</tr>
<tr>
<td></td>
<td>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</td>
</tr>
<tr>
<td></td>
<td>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</td>
</tr>
<tr>
<td></td>
<td>Reporting Denominator (RD) includes:</td>
</tr>
<tr>
<td></td>
<td>• Patients aged 18 years and older AND</td>
</tr>
<tr>
<td></td>
<td>• Had cataract surgery</td>
</tr>
<tr>
<td></td>
<td>Reporting Calculation</td>
</tr>
<tr>
<td></td>
<td>A (# of patients meeting measure criteria) + C (# of patients with valid exclusions) + D (# of patients NOT meeting numerator criteria)</td>
</tr>
</tbody>
</table>
## NATIONAL QUALITY FORUM

<table>
<thead>
<tr>
<th>New Candidate Measure #1536: Cataracts: Improvement in patient’s visual function within 90 days following cataract surgery</th>
<th>Endorsed Measure #0565: Cataracts: 20/40 or better visual acuity within 90 days following cataract surgery</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Components for this measure are defined as:</strong>&lt;br&gt;RD (# of patients in denominator)&lt;br&gt;A (# of patients meeting measure criteria)&lt;br&gt;A&lt;br&gt;PD (# of patients in denominator)&lt;br&gt;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&lt;br&gt;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&lt;br&gt;RD # of patients aged 18 years and older who had cataract surgery</td>
<td><strong>Data Source</strong>&lt;br&gt;Survey: Patient&lt;br&gt;Electronic administrative data/claims, electronic health/medical record, paper medical record/flow-sheet&lt;br&gt;<strong>Level of Measurement/Analysis</strong>&lt;br&gt;Clinicians: Individual&lt;br&gt;Clinicians: Individual, group&lt;br&gt;<strong>Care Settings</strong>&lt;br&gt;Ambulatory care: Ambulatory surgery center, clinic, hospital outpatient&lt;br&gt;Ambulatory care: Clinic</td>
</tr>
</tbody>
</table>

### Failure to Rescue

<table>
<thead>
<tr>
<th>Maintenance Measure 0352: Failure to rescue in-hospital mortality (risk adjusted)</th>
<th>Maintenance Measure #0351: Death among surgical inpatients with serious, treatable complications (PSI 4)</th>
<th>Maintenance Measure 0353: Failure to rescue 30-day mortality (risk adjusted)</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Status</strong>&lt;br&gt;Currently undergoing maintenance review</td>
<td>Currently undergoing maintenance review</td>
<td>Currently undergoing maintenance review</td>
</tr>
<tr>
<td><strong>Steward</strong>&lt;br&gt;Children’s Hospital of Philadelphia</td>
<td>Agency for Healthcare Research and Quality</td>
<td>Children’s Hospital of Philadelphia</td>
</tr>
<tr>
<td><strong>Description</strong>&lt;br&gt;Percentage of patients who died with a complications in the hospital.</td>
<td>Percentage of cases having developed specified complications of care with an in-hospital death.</td>
<td>Percentage of patients who died with a complication within 30 days from admission.</td>
</tr>
<tr>
<td><strong>Type of Measure</strong>&lt;br&gt;Outcome</td>
<td>Outcome</td>
<td>Outcome</td>
</tr>
</tbody>
</table>
## Maintenance Measure 0352: Failure to rescue in-hospital 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](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](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.*

**Details**
Patients who died with a complication and patients who died without documented complications. Death is defined as death in the hospital.

## Maintenance Measure #0351: Death among surgical inpatients with serious, treatable complications (PSI 4)

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

**Details**
All discharges with a disposition of “deceased” (DISP=20) among cases meeting the inclusion and exclusion rules for the denominator.

## 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 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](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](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**
General Surgery, Orthopedic and Vascular patients in specific DRGs with complications plus patients who died in the hospital without complications.

**Details**
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).
<table>
<thead>
<tr>
<th>Maintenance Measure 0352: Failure to rescue in-hospital mortality (risk adjusted)</th>
<th>Maintenance Measure #0351: Death among surgical inpatients with serious, treatable complications (PSI 4)</th>
<th>Maintenance Measure 0353: Failure to rescue 30-day mortality (risk adjusted)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Surgery, Orthopedic or Vascular DRGs (see appendix A [<a href="http://www.research.chop.edu/programs/cor/outcomes.php">http://www.research.chop.edu/programs/cor/outcomes.php</a>])</td>
<td>complications of care listed in Death among Surgical definition (e.g., pneumonia, DVT/PE, sepsis, shock/cardiac arrest, or GI hemorrhage/acute ulcer).</td>
<td>[<a href="http://www.research.chop.edu/programs/cor/outcomes.php">http://www.research.chop.edu/programs/cor/outcomes.php</a>] Inclusions: adult patients admitted for one of the procedures in the General Surgery, Orthopedic or Vascular DRGs (see appendix A)</td>
</tr>
</tbody>
</table>

**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). | 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. |

See Patient Safety Indicators Appendices:

- Appendix A – Operating Room Procedure Codes
- Appendix D – Surgical Discharge DRGs
- Appendix E – Surgical Discharge MS-DRGs


**Exclusions**

<table>
<thead>
<tr>
<th>Patients over age 90, under age 18.</th>
<th>Exclude cases:</th>
</tr>
</thead>
<tbody>
<tr>
<td>• age 90 years and older</td>
<td></td>
</tr>
<tr>
<td>• transferred to an acute care facility (DISP = 2)</td>
<td></td>
</tr>
<tr>
<td>• missing discharge disposition (DISP=missing), gender (SEX=missing), age (AGE=missing), quarter (DQTR=missing), year (YEAR=missing) or principal diagnosis (DX1 =missing)</td>
<td></td>
</tr>
</tbody>
</table>

NOTE: Additional exclusion
<table>
<thead>
<tr>
<th>Maintenance Measure 0352: Failure to rescue in-hospital mortality (risk adjusted)</th>
<th>Maintenance Measure #0351: Death among surgical inpatients with serious, treatable complications (PSI 4)</th>
<th>Maintenance Measure 0353: Failure to rescue 30-day mortality (risk adjusted)</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>criteria is specific to each diagnosis (pneumonia, DVT/PE, sepsis, shock/cardiac arrest, or GI hemorrhage/acute ulcer).</td>
<td></td>
</tr>
</tbody>
</table>
| 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). | |
<p>| 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. |</p>
<table>
<thead>
<tr>
<th>Maintenance Measure 0352: Failure to rescue in-hospital mortality (risk adjusted)</th>
<th>Maintenance Measure #0351: Death among surgical inpatients with serious, treatable complications (PSI 4)</th>
<th>Maintenance Measure 0353: Failure to rescue 30-day mortality (risk adjusted)</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Stratification</strong></td>
<td>Complicated patient has at least one of the complications defined in Appendix B (<a href="http://www.research.chop.edu/programs/cor/outcomes.php">http://www.research.chop.edu/programs/cor/outcomes.php</a>) 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.</td>
<td>Complicated patient has at least one of the complications defined in Appendix B (<a href="http://www.research.chop.edu/programs/cor/outcomes.php">http://www.research.chop.edu/programs/cor/outcomes.php</a>) 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.</td>
</tr>
<tr>
<td><strong>Type Score</strong></td>
<td>Rate/proportion</td>
<td>Rate/proportion</td>
</tr>
<tr>
<td><strong>Algorithm</strong></td>
<td>Refer to website (<a href="http://www.research.chop.edu/programs/cor/outcomes.php">http://www.research.chop.edu/programs/cor/outcomes.php</a>)</td>
<td>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.</td>
</tr>
<tr>
<td>Maintenance Measure 0352: Failure to rescue in-hospital mortality (risk adjusted)</td>
<td>Maintenance Measure #0351: Death among surgical inpatients with serious, treatable complications (PSI 4)</td>
<td>Maintenance Measure 0353: Failure to rescue 30-day mortality (risk adjusted)</td>
</tr>
<tr>
<td>---</td>
<td>---</td>
<td>---</td>
</tr>
<tr>
<td>shrinkage estimate reflects a reliability adjustment unique to each indicator. Full information on calculation algorithms and specifications can be found at <a href="http://qualityindicators.ahrq.gov/PSI_download.htm">http://qualityindicators.ahrq.gov/PSI_download.htm</a></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Data Source</td>
<td>Electronic administrative data/claims</td>
<td>Electronic administrative data/claims</td>
</tr>
<tr>
<td>Level of Measurement/Analysis</td>
<td>Facility/agency; Health plan; Integrate delivery system; Population: National, regional/network, states, counties or cities</td>
<td>Facility/agency</td>
</tr>
<tr>
<td>Care Settings</td>
<td>Hospital</td>
<td>Hospital</td>
</tr>
</tbody>
</table>

### Pancreatic Resection

<table>
<thead>
<tr>
<th>Maintenance Measure 0365: Pancreatic resection mortality rate (IQI 9)</th>
<th>Maintenance Measure #0366: Pancreatic resection volume (IQI 2)</th>
<th>Endorsed Measure 0738: Survival predictor for pancreatic resection surgery</th>
</tr>
</thead>
<tbody>
<tr>
<td>Status</td>
<td>Currently undergoing maintenance review</td>
<td>Currently undergoing maintenance review</td>
</tr>
<tr>
<td>Steward</td>
<td>Agency for Healthcare Research and Quality</td>
<td>Agency for Healthcare Research and Quality</td>
</tr>
<tr>
<td>Description</td>
<td>Percentage of discharges with procedure code of pancreatic resection with an in-hospital death.</td>
<td>Number of discharges with procedure for pancreatic resection.</td>
</tr>
<tr>
<td>Type of Measure</td>
<td>Outcome</td>
<td>Structure/management</td>
</tr>
<tr>
<td>National Quality Forum</td>
<td></td>
<td></td>
</tr>
<tr>
<td>------------------------</td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>Maintenance Measure 0365:</strong> Pancreatic resection mortality rate (IQI 9)</td>
<td><strong>Maintenance Measure #0366:</strong> Pancreatic resection volume (IQI 2)</td>
<td><strong>Endorsed Measure 0738:</strong> Survival predictor for pancreatic resection surgery</td>
</tr>
<tr>
<td><strong>Numerator</strong></td>
<td><strong>Numerator Details</strong></td>
<td><strong>Denominator</strong></td>
</tr>
<tr>
<td>Number of deaths (DISP=20) among cases meeting the inclusion and exclusion rules for the denominator.</td>
<td>Number of deaths (DISP=20) among cases meeting the inclusion and exclusion rules for the denominator.</td>
<td>Discharges, age 18 years and older, with ICD-9-CM codes for pancreatic resection procedure.</td>
</tr>
<tr>
<td>Time window: Time window can be determined by user, but is generally a calendar year.</td>
<td>Time window: Time window can be determined by user, but is generally a calendar year.</td>
<td>ICD-9-CM pancreatic resection procedure codes: 526 TOTAL PANCREATECTOMY 527 RAD PANCREATICODUODENECT</td>
</tr>
<tr>
<td><strong>Endorsed Measure 0738:</strong> Survival predictor for pancreatic resection surgery</td>
<td>Survival of pancreatic cancer patients age 18 and over who undergo a pancreatic resection.</td>
<td>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.</td>
</tr>
<tr>
<td>N/A</td>
<td>Time window: During the hospital admission</td>
<td>Time Window: 12 months</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Maintenance Measure 0365: Pancreatic resection mortality rate (IQI 9)</td>
<td>Maintenance Measure #0366: Pancreatic resection volume (IQI 2)</td>
<td>Endorsed Measure 0738: Survival predictor for pancreatic resection surgery</td>
</tr>
<tr>
<td>---</td>
<td>---</td>
<td>---</td>
</tr>
<tr>
<td>526 TOTAL PANCREATECTOMY 527 RAD PANCREATICODUODENECT</td>
<td></td>
<td>5251 Proximal Pancreatectomy 5253 Radical Subtot Pancreatectomy 526 Total Pancreatectomy 527 Radical Pancreatectomy</td>
</tr>
<tr>
<td>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</td>
<td>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</td>
<td></td>
</tr>
<tr>
<td>Exclusions</td>
<td>Exclude cases: • missing discharge</td>
<td>N/A</td>
</tr>
<tr>
<td>Maintenance Measure 0365: Pancreatic resection mortality rate (IQI 9)</td>
<td>Maintenance Measure #0366: Pancreatic resection volume (IQI 2)</td>
<td>Endorsed Measure 0738: Survival predictor for pancreatic resection surgery</td>
</tr>
<tr>
<td>---------------------------------------------------------------</td>
<td>---------------------------------------------------------------</td>
<td>-------------------------------------------------------------------</td>
</tr>
<tr>
<td>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)</td>
<td>N/A</td>
<td>Pancreatectomy cases without a pancreatic cancer diagnosis code.</td>
</tr>
</tbody>
</table>

**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)

**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
<table>
<thead>
<tr>
<th>NATIONAL QUALITY FORUM</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Maintenance Measure 0365:</strong> Pancreatic resection mortality rate (IQI 9)</td>
</tr>
<tr>
<td>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.</td>
</tr>
</tbody>
</table>

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)
<table>
<thead>
<tr>
<th>Maintenance Measure 0365: Pancreatic resection mortality rate (IQI 9)</th>
<th>Maintenance Measure #0366: Pancreatic resection volume (IQI 2)</th>
<th>Endorsed Measure 0738: Survival predictor for pancreatic resection surgery</th>
</tr>
</thead>
</table>

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].
<table>
<thead>
<tr>
<th><strong>Maintenance Measure 0365:</strong> Pancreatic resection mortality rate (IQI 9)</th>
<th><strong>Maintenance Measure #0366:</strong> Pancreatic resection volume (IQI 2)</th>
<th><strong>Endorsed Measure 0738:</strong> Survival predictor for pancreatic resection surgery</th>
</tr>
</thead>
<tbody>
<tr>
<td>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.</td>
<td>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.</td>
<td></td>
</tr>
<tr>
<td>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.</td>
<td>The general composite measure calculation is as follows: Predicted Survival = 1-Predicted Mortality Predicted Mortality = (weight)*(mortality) + (1-</td>
<td></td>
</tr>
<tr>
<td>Maintenance Measure 0365: Pancreatic resection mortality rate (IQI 9)</td>
<td>Maintenance Measure #0366: Pancreatic resection volume (IQI 2)</td>
<td>Endorsed Measure 0738: Survival predictor for pancreatic resection surgery</td>
</tr>
<tr>
<td>---</td>
<td>---</td>
<td>---</td>
</tr>
<tr>
<td></td>
<td></td>
<td>weight)*(volume predicted mortality)</td>
</tr>
<tr>
<td></td>
<td>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).</td>
<td></td>
</tr>
<tr>
<td>*Any negative values are reset to &quot;0&quot;</td>
<td></td>
<td></td>
</tr>
<tr>
<td>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).</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

**Stratification**
- User has the option 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.
<table>
<thead>
<tr>
<th>Maintenance Measure 0365: Pancreatic resection mortality rate (IQI 9)</th>
<th>Maintenance Measure #0366: Pancreatic resection volume (IQI 2)</th>
<th>Endorsed Measure 0738: Survival predictor for pancreatic resection surgery</th>
</tr>
</thead>
<tbody>
<tr>
<td>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 <a href="http://qualityindicators.ahrq.gov/IQI_download.htm">http://qualityindicators.ahrq.gov/IQI_download.htm</a></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Data Source</th>
<th>Electronic administrative data/claims</th>
<th>Electronic administrative data/claims</th>
<th>Electronic administrative data/claims</th>
</tr>
</thead>
<tbody>
<tr>
<td>Level of Measurement /Analysis</td>
<td>Facility/agency</td>
<td>Facility/agency</td>
<td>Facility/agency</td>
</tr>
<tr>
<td>Care Settings</td>
<td>Hospital</td>
<td>Hospital</td>
<td>Hospital</td>
</tr>
</tbody>
</table>

**Prophylactic Antibiotics: Discontinued**

<table>
<thead>
<tr>
<th>Maintenance Measure #0529: Prophylactic antibiotics discontinued within 24 hours after surgery end time</th>
<th>Endorsed Measure #0637: Discontinuation of prophylactic antibiotics (cardiac procedures)</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Status</strong></td>
<td>Currently undergoing maintenance review</td>
</tr>
<tr>
<td><strong>Steward</strong></td>
<td>Centers for Medicare &amp; Medicaid Services</td>
</tr>
<tr>
<td><strong>Description</strong></td>
<td>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.</td>
</tr>
<tr>
<td>Maintenance Measure #0529:</td>
<td>Endorsed Measure #0637: Discontinuation of prophylactic antibiotics (cardiac procedures)</td>
</tr>
<tr>
<td>----------------------------</td>
<td>-----------------------------------------------------------------------------------</td>
</tr>
<tr>
<td>Prophylactic antibiotics discontinued within 24 hours after surgery end time</td>
<td>Cardiac surgical patients who have an order for discontinuation of prophylactic antibiotics within 48 hours of surgical end time.</td>
</tr>
</tbody>
</table>

**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**

<table>
<thead>
<tr>
<th>Data Elements:</th>
<th>CPT II 4043F: Documentation that an order was given to discontinue prophylactic antibiotics within 48 hours of surgical end time, cardiac procedure.</th>
</tr>
</thead>
<tbody>
<tr>
<td>Anesthesia End Date</td>
<td>*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.</td>
</tr>
<tr>
<td>Anesthesia End Time</td>
<td></td>
</tr>
<tr>
<td>Antibiotic Administration Date</td>
<td></td>
</tr>
<tr>
<td>Antibiotic Administration Time</td>
<td></td>
</tr>
</tbody>
</table>

**Denominator**

<table>
<thead>
<tr>
<th>Data Elements:</th>
<th>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</th>
</tr>
</thead>
<tbody>
<tr>
<td>Admission Date</td>
<td></td>
</tr>
<tr>
<td>Anesthesia Start Date</td>
<td></td>
</tr>
<tr>
<td>Antibiotic Administration Route</td>
<td></td>
</tr>
<tr>
<td>Antibiotic Name</td>
<td></td>
</tr>
<tr>
<td>Antibiotic Received</td>
<td></td>
</tr>
<tr>
<td>Birthdate</td>
<td></td>
</tr>
<tr>
<td>Clinical Trial</td>
<td></td>
</tr>
<tr>
<td>Discharge Date</td>
<td></td>
</tr>
<tr>
<td>ICD-9-CM Principal Diagnosis Code</td>
<td></td>
</tr>
<tr>
<td>ICD-9-CM Principal Procedure Code</td>
<td></td>
</tr>
<tr>
<td>Infection Prior to Anesthesia</td>
<td></td>
</tr>
<tr>
<td>Laparoscope</td>
<td></td>
</tr>
<tr>
<td>Oral Antibiotics</td>
<td></td>
</tr>
<tr>
<td>Other Surgeries</td>
<td></td>
</tr>
<tr>
<td>Perioperative Death</td>
<td></td>
</tr>
<tr>
<td>Reasons to Extend Antibiotics</td>
<td></td>
</tr>
<tr>
<td>Surgical Incision Date</td>
<td></td>
</tr>
</tbody>
</table>

**Denominator Categories**
- Female, Male; Patients aged 18 and older

**Denominator Details**

- 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.
<table>
<thead>
<tr>
<th>Maintenance Measure #0529: Prophylactic antibiotics discontinued within 24 hours after surgery end time</th>
<th>Endorsed Measure #0637: Discontinuation of prophylactic antibiotics (cardiac procedures)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Surgical Incision Time</td>
<td>35216, 35241, 35246, 35271, 35276, 35311.</td>
</tr>
</tbody>
</table>

**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

**Exclusion Details**

- Clinical Trial
- Infection Prior to Anesthesia
- Laparoscope
- Other Surgeries
- Perioperative Death
- Reasons to Extend Antibiotics

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.

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.
<table>
<thead>
<tr>
<th>Risk Adjustment</th>
<th>No risk adjustment necessary</th>
<th>No risk adjustment necessary</th>
</tr>
</thead>
<tbody>
<tr>
<td>Stratification</td>
<td>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.</td>
<td></td>
</tr>
<tr>
<td>Type Score</td>
<td>Rate/proportion</td>
<td></td>
</tr>
</tbody>
</table>
| 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  
as. 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  
as. 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  
as. 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 |
<table>
<thead>
<tr>
<th>Maintenance Measure #0529: Prophylactic antibiotics discontinued within 24 hours after surgery end time</th>
<th>Endorsed Measure #0637: Discontinuation of prophylactic antibiotics (cardiac procedures)</th>
</tr>
</thead>
</table>
| 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. |
<table>
<thead>
<tr>
<th>Maintenance Measure #0529: Prophylactic antibiotics discontinued within 24 hours after surgery end time</th>
<th>Endorsed Measure #0637: Discontinuation of prophylactic antibiotics (cardiac procedures)</th>
</tr>
</thead>
</table>
| 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. |
<table>
<thead>
<tr>
<th>Maintenance Measure #0529: Prophylactic antibiotics discontinued within 24 hours after surgery end time</th>
<th>Endorsed Measure #0637: Discontinuation of prophylactic antibiotics (cardiac procedures)</th>
</tr>
</thead>
<tbody>
<tr>
<td>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.</td>
<td></td>
</tr>
<tr>
<td>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.</td>
<td></td>
</tr>
<tr>
<td>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.</td>
<td></td>
</tr>
<tr>
<td>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</td>
<td></td>
</tr>
</tbody>
</table>
### Maintenance Measure #0529: Prophylactic antibiotics discontinued within 24 hours after surgery end time

- **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.

- **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.

- **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.

### Endorsed Measure #0637: Discontinuation of prophylactic antibiotics (cardiac procedures)

- **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

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
<table>
<thead>
<tr>
<th>Maintenance Measure #0529: Prophylactic antibiotics discontinued within 24 hours after surgery end time</th>
<th>Endorsed Measure #0637: Discontinuation of prophylactic antibiotics (cardiac procedures)</th>
</tr>
</thead>
<tbody>
<tr>
<td>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.</td>
<td></td>
</tr>
<tr>
<td>b. If the ICD-9-CM Principal Procedure Code is on Table 5.03, continue processing and check Oral Antibiotics.</td>
<td></td>
</tr>
<tr>
<td>26. Check Oral Antibiotics</td>
<td></td>
</tr>
<tr>
<td>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.</td>
<td></td>
</tr>
<tr>
<td>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.</td>
<td></td>
</tr>
<tr>
<td>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 step 31 Antibiotic Timing I.</td>
<td></td>
</tr>
<tr>
<td>27. Recheck Antibiotic Days I only if Antibiotic Days I was less than or equal to 1 for all antibiotic doses</td>
<td></td>
</tr>
<tr>
<td>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.</td>
<td></td>
</tr>
<tr>
<td>b. If the Antibiotic Days I is equal to 1 for ANY antibiotic dose, continue processing and proceed to Surgical Incision Time.</td>
<td></td>
</tr>
<tr>
<td>28. Check Surgical Incision Time</td>
<td></td>
</tr>
<tr>
<td>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.</td>
<td></td>
</tr>
<tr>
<td>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 Joint Commission.</td>
<td></td>
</tr>
</tbody>
</table>
### Maintenance Measure #0529: Prophylactic antibiotics discontinued within 24 hours after surgery end time

Joint Commission.

- If the Surgical Incision Time is equal to a Non Unable to Determine Value, continue processing and check Antibiotic Administration Time.

### Endorsed Measure #0637: Discontinuation of prophylactic antibiotics (cardiac procedures)

- 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.

#### Check Antibiotic Administration Time

- If the Antibiotic Administration Time equals a Non 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.

- If the Antibiotic Administration Time equals a Non Unable to Determine for ALL antibiotic doses with Antibiotic Days I equal to 1, continue processing and proceed to the Antibiotic Timing I calculation.

#### 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.

#### Check Antibiotic Timing I

- 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.

- 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 Principal Procedure Code.
<table>
<thead>
<tr>
<th>Maintenance Measure #0529: Prophylactic antibiotics discontinued within 24 hours after surgery end time</th>
<th>Endorsed Measure #0637: Discontinuation of prophylactic antibiotics (cardiac procedures)</th>
</tr>
</thead>
</table>
| 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 |
<table>
<thead>
<tr>
<th>Maintenance Measure #0529: Prophylactic antibiotics discontinued within 24 hours after surgery end time</th>
<th>Endorsed Measure #0637: Discontinuation of prophylactic antibiotics (cardiac procedures)</th>
</tr>
</thead>
<tbody>
<tr>
<td>(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.</td>
<td></td>
</tr>
<tr>
<td>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.</td>
<td></td>
</tr>
<tr>
<td>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 End Time.</td>
<td></td>
</tr>
<tr>
<td>Maintenance Measure #0529: Prophylactic antibiotics discontinued within 24 hours after surgery end time</td>
<td>Endorsed Measure #0637: Discontinuation of prophylactic antibiotics (cardiac procedures)</td>
</tr>
<tr>
<td>---</td>
<td>---</td>
</tr>
<tr>
<td>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</td>
<td></td>
</tr>
<tr>
<td><strong>Maintenance Measure #0529</strong>: Prophylactic antibiotics discontinued within 24 hours after surgery end time</td>
<td><strong>Endorsed Measure #0637</strong>: Discontinuation of prophylactic antibiotics (cardiac procedures)</td>
</tr>
<tr>
<td>---</td>
<td>---</td>
</tr>
<tr>
<td>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.</td>
<td></td>
</tr>
<tr>
<td>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</td>
<td></td>
</tr>
<tr>
<td>Maintenance Measure #0529: Prophylactic antibiotics discontinued within 24 hours after surgery end time</td>
<td>Endorsed Measure #0637: Discontinuation of prophylactic antibiotics (cardiac procedures)</td>
</tr>
<tr>
<td>---</td>
<td>---</td>
</tr>
</tbody>
</table>
| 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
<table>
<thead>
<tr>
<th>Maintenance Measure #0529: Prophylactic antibiotics discontinued within 24 hours after surgery end time</th>
<th>Endorsed Measure #0637: Discontinuation of prophylactic antibiotics (cardiac procedures)</th>
</tr>
</thead>
</table>
| 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

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

### Level of Measurement/Analysis
- Facility/agency

### Care Settings
- Hospital

## Endorsed Measure #0637: Discontinuation of prophylactic antibiotics (cardiac procedures)

- Electronic health/medical record, paper medical record/flow-sheet
- Clinicians: Individual, group
- Hospital, Ambulatory care: Ambulatory surgery center

## Prophylactic Antibiotics: Duration

### Maintenance Measure #0128: Duration of antibiotic prophylaxis for cardiac surgery patients

<table>
<thead>
<tr>
<th>Status</th>
<th>Currently undergoing maintenance review</th>
</tr>
</thead>
<tbody>
<tr>
<td>Steward</td>
<td>Society of Thoracic Surgeons</td>
</tr>
<tr>
<td>Description</td>
<td>Percent of patients aged 18 years and older undergoing cardiac surgery whose prophylactic antibiotics were discontinued within 48 hours after surgery end time.</td>
</tr>
<tr>
<td>Type of Measure</td>
<td>Process</td>
</tr>
<tr>
<td>Numerator</td>
<td>Number of cardiac surgery patients whose prophylactic antibiotics were discontinued within 48 hours after surgery end time.</td>
</tr>
</tbody>
</table>

### Endorsed Measure #0271: Discontinuation of prophylactic antibiotics (non-cardiac procedures)

<table>
<thead>
<tr>
<th>Status</th>
<th>Endorsed 7/2008</th>
</tr>
</thead>
<tbody>
<tr>
<td>Steward</td>
<td>American Medical Association-Physician Consortium for Performance Improvement</td>
</tr>
<tr>
<td>Description</td>
<td>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.</td>
</tr>
<tr>
<td>Type of Measure</td>
<td>Process</td>
</tr>
<tr>
<td>Numerator</td>
<td>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...</td>
</tr>
</tbody>
</table>
**National Quality Forum**

<table>
<thead>
<tr>
<th>Maintenance Measure #0128: Duration of antibiotic prophylaxis for cardiac surgery patients</th>
<th>Endorsed Measure #0271: Discontinuation of prophylactic antibiotics (non-cardiac procedures)</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Time window:</strong> Within 48 hours after surgery end time.</td>
<td>surgical end time.</td>
</tr>
<tr>
<td><strong>Numerator Details</strong></td>
<td>CPT II 4049F: Documentation that order was given to discontinue prophylactic antibiotics within 24 hours of surgical end time, non-cardiac procedure.</td>
</tr>
<tr>
<td>Number of cardiac surgery procedures in which appropriate antibiotic discontinuation [AbxDisc (STS Adult Cardiac Surgery Database Version 2.73)] is marked “yes”</td>
<td>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</td>
</tr>
<tr>
<td><strong>Denominator</strong></td>
<td>All non-cardiac surgical patients undergoing procedures with the indications for prophylactic antibiotics and who received a prophylactic antibiotic.</td>
</tr>
<tr>
<td>Number of patients undergoing cardiac surgery.</td>
<td><strong>Denominator Categories</strong></td>
</tr>
<tr>
<td>Female, Male; 18 yrs and older</td>
<td><strong>Denominator Details</strong></td>
</tr>
<tr>
<td>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], OCarSRV [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 Thromboembolism], OCarOthr [Other Cardiac Procedure other than those listed previously], ECMO [Extracorporeal Membrane Oxygenation], OCarLaser [-Transmyocardial Laser Revascularization], OCarASD [Atrial Septal</td>
<td></td>
</tr>
<tr>
<td>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,</td>
<td></td>
</tr>
<tr>
<td>Maintenance Measure #0128: Duration of antibiotic prophylaxis for cardiac surgery patients</td>
<td>Endorsed Measure #0271: Discontinuation of prophylactic antibiotics (non-cardiac procedures)</td>
</tr>
<tr>
<td>---</td>
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</tr>
<tr>
<td>Defect Repair, OCarAFibSur [Atrial Fibrillation Surgical Procedure]</td>
<td>43324-43326, 43330, 43331, 43340, 43341, 43350, 43351, 43352, 43360, 43361, 43400, 43401, 43405, 43410, 43415, 43420, 43425, 43496</td>
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<td>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</td>
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<td></td>
<td>Small Intestine: 44005, 44010, 44020, 44021, 44050, 44055, 44100, 44120, 44125–44127, 44130, 44132, 44133, 44135, 44136</td>
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<td>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, 47766, 47780, 47785, 47800, 47802, 47900</td>
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<td>Pancreas: 48020, 48100, 48120, 48140, 48145, 48146, 48148, 48150, 48152-48155, 48160, 48500, 48510, 48511, 48520, 48540, 48545, 48547, 48548, 48550, 48554, 48556</td>
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<tr>
<td></td>
<td>Abdomen, Peritoneum, and Omentum: 49215, 49568</td>
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<td>Renal Transplant: 50300, 50320, 50340, 50360, 50365, 50370, 50380</td>
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<tr>
<td></td>
<td>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</td>
</tr>
<tr>
<td></td>
<td>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</td>
</tr>
<tr>
<td>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, 32940, 33020, 33025, 33030, 33031, 33050, 33300, 33310, 33320, 34051, 35216, 35246, 35276, 35311, 35481, 35526, 37616, 38381, 38746, 38747, 39000, 39010, 39200, 39220, 39545, 39561, 60521, 60522, 64746</td>
<td></td>
</tr>
<tr>
<td>Foot &amp; Ankle: 27702, 27703, 27704, 27870, 28192, 28193, 28293, 28296, 28299, 28300, 28306, 28307, 28320</td>
<td></td>
</tr>
</tbody>
</table>
### Maintenance Measure #0128: Duration of antibiotic prophylaxis for cardiac surgery patients

**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.**

### Endorsed Measure #0271: Discontinuation of prophylactic antibiotics (non-cardiac procedures)

**Exclusion Details**
- **AbxDisc** is marked "Exclusion"
- Append modifier to CPT Category II code: 4046F-1P

**Risk Adjustment**
- 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

<table>
<thead>
<tr>
<th>Maintenance Measure #0126: Selection of antibiotic prophylaxis for cardiac surgery patients</th>
<th>Endorsed Measure #0268: Selection of prophylactic antibiotic: First or second generation cephalosporin</th>
<th>Maintenance Measure #0528: Prophylactic antibiotic selection for surgical patients</th>
<th>Endorsed Measure #0473: Appropriate DVT prophylaxis in women undergoing cesarean delivery</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Status</strong></td>
<td>Currently undergoing maintenance review</td>
<td>Currently undergoing maintenance review</td>
<td>Endorsed 10/2008</td>
</tr>
<tr>
<td><strong>Steward</strong></td>
<td>Society of Thoracic Surgeons</td>
<td>American Medical Association-Physician Consortium for Performance Improvement</td>
<td>Centers for Medicare &amp; Medicaid Services</td>
</tr>
<tr>
<td><strong>Description</strong></td>
<td>Percent of patients aged 18 years and older undergoing cardiac surgery who received preoperative prophylactic antibiotics recommended for the operation.</td>
<td>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.</td>
<td>Surgical patients who received prophylactic antibiotics consistent with current guidelines (specific to each type of surgical procedure).</td>
</tr>
<tr>
<td><strong>Type of Measure</strong></td>
<td>Process</td>
<td>Process</td>
<td>Process</td>
</tr>
<tr>
<td><strong>Numerator</strong></td>
<td>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.</td>
<td>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</td>
<td>Surgical patients who received recommended prophylactic antibiotics for specific surgical procedures.</td>
</tr>
</tbody>
</table>

**Note:**
- Measure adherence to current ACOG, ACCP recommendations for use of DVT prophylaxis in women undergoing cesarean delivery.
## NATIONAL QUALITY FORUM

<table>
<thead>
<tr>
<th>Maintenance Measure #0126: Selection of antibiotic prophylaxis for cardiac surgery patients</th>
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<th>Endorsed Measure #0473: Appropriate DVT prophylaxis in women undergoing cesarean delivery</th>
</tr>
</thead>
<tbody>
<tr>
<td>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.</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>### Numerator Details</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Number of cardiac surgery procedures in which appropriate antibiotic selection [AbxSelect (STS Adult Cardiac Surgery Database Version 2.73)] is marked “yes”</td>
<td>Data Elements: Antibiotic Administration Route Antibiotic Allergy Antibiotic Name Oral Antibiotics Vancomycin</td>
<td></td>
<td></td>
</tr>
<tr>
<td>### Denominator</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Number of patients undergoing cardiac surgery. Time window: 12 months</td>
<td>All surgical patients aged 18 years and older undergoing procedures with the indications for a first or second generation cephalosporin prophylactic antibiotic.</td>
<td>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).</td>
<td>All women undergoing cesarean delivery.</td>
</tr>
<tr>
<td>Denominator Categories</td>
<td>Female, Male; 18 and older</td>
<td></td>
<td>Female, Male; Patients aged 18 or older</td>
</tr>
<tr>
<td>Denominator Details</td>
<td>Number of cardiac surgery procedures; A cardiac procedure is determined as a procedure for</td>
<td>Report one of the following CPT Category II codes: • CPT II 4041F: Documentation of order for cefazolin OR cefuroxime for</td>
<td>Data Elements: Anesthesia End Date Anesthesia End Time Anesthesia Start Date Admission Date</td>
</tr>
</tbody>
</table>

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NQF DOCUMENT – DO NOT CITE, QUOTE, REPRODUCE, OR CIRCULATE
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<tr>
<th>Maintenance Measure #0126:</th>
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<th>Maintenance Measure #0528:</th>
<th>Endorsed Measure #0473:</th>
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</thead>
<tbody>
<tr>
<td>Selection of antibiotic prophylaxis for cardiac surgery patients</td>
<td>Selection of prophylactic antibiotic: First or second generation cephalosporin</td>
<td>Prophylactic antibiotic selection for surgical patients</td>
<td>Appropriate DVT prophylaxis in women undergoing cesarean delivery</td>
</tr>
</tbody>
</table>

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, 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

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</table>
| 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, 33301, 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,
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<tr>
<td>33463-33465, 33475, 33496, 33510-33519, 33521-33523, 33530, 33533-33536, 33542, 33545, 33548, 33572, 35211, 35241, 35271</td>
<td></td>
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<tr>
<td>General Thoracic Surgery: 19272, 21627, 21632, 21740, 21750, 21805, 21825, 31760, 31766, 31770, 31775, 31786, 31805, 32095, 32110, 32120, 32124, 32140, 32141, 32150, 32215, 32220, 32225, 32310, 32320, 32402, 32440, 32442, 32445, 32480, 32482, 32484, 32486, 32488, 32491, 32500, 32510, 32800, 32810, 32815, 32900, 32905, 32906, 32940, 33020, 33025, 33030, 33031, 33050, 33300, 33310, 33320, 34051, 35021, 35216, 35246, 35276, 35311, 35481, 35526, 36716, 38351, 38746, 38747, 39000, 39010, 39200, 39220, 39545, 39561, 60521, 60522, 64746</td>
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</tr>
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</table>

**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 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**
## National Quality Forum

<table>
<thead>
<tr>
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</tr>
</thead>
<tbody>
<tr>
<td>AbxSelect is marked “Exclusion”</td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

### 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

### 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

### 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
<table>
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<tr>
<th>Maintenance Measure #0126: Selection of antibiotic prophylaxis for cardiac surgery patients</th>
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</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td>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.</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>b. If Patient Age is greater than or equal to 18 years, continue processing and proceed to ICD-9-CM Principal Procedure Code.</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>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.</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>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.</td>
<td></td>
</tr>
<tr>
<td>Maintenance Measure #0126: Selection of antibiotic prophylaxis for cardiac surgery patients</td>
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</tbody>
</table>
| | | 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 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 Anesthesia Start Date 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 Anesthesia Start Date equals No, continue processing and proceed to Other Procedure.
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</table>
| 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. |
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<td>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.</td>
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<tr>
<td>c. If Infection Prior to Anesthesia equals No, continue processing and proceed to Perioperative Death.</td>
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<td>12. Check Perioperative Death</td>
<td>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.</td>
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<td>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.</td>
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<tr>
<td>c. If Perioperative Death equals No, continue processing and proceed to Surgical Incision Date.</td>
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<tr>
<td>13. Check Surgical Incision Date</td>
<td>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.</td>
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<tr>
<td>b. If the Surgical Incision Date equals Unable</td>
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<tr>
<td>Maintenance Measure #0126: Selection of antibiotic prophylaxis for cardiac surgery patients</td>
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<td>Maintenance Measure #0528: Prophylactic antibiotic selection for surgical patients</td>
<td>Endorsed Measure #0473: Appropriate DVT prophylaxis in women undergoing cesarean delivery</td>
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<td>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.</td>
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<td>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</td>
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<tr>
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| 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...
<table>
<thead>
<tr>
<th>Maintenance Measure #0126: Selection of antibiotic prophylaxis for cardiac surgery patients</th>
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<tr>
<td>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.</td>
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</table>
| | 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.  
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 |
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<tr>
<td>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</td>
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| 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 Code |
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<tr>
<td>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.</td>
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<td>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</td>
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<tr>
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| | | 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. If 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 |
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<tr>
<td>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</td>
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<td>Antibiotic Administration Route. Proceed only with doses where the Abxflag is equal to Yes.</td>
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<td>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.</td>
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<td>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.</td>
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<td>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.</td>
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<td>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.</td>
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<td>42. Recheck ICD-9-CM Principal Procedure Code</td>
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<td>a. If the ICD-9-CM Principal Procedure Code is on Table 5.03, continue processing and proceed to step 46 and recheck Antibiotic Administration Route.</td>
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<td>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 Name.</td>
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| 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.  

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</thead>
</table>
| 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.  
| 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... |
<table>
<thead>
<tr>
<th>Maintenance Measure #0126: Selection of antibiotic prophylaxis for cardiac surgery patients</th>
<th>Endorsed Measure #0268: Selection of prophylactic antibiotic: First or second generation cephalosporin</th>
<th>Maintenance Measure #0528: Prophylactic antibiotic selection for surgical patients</th>
<th>Endorsed Measure #0473: Appropriate DVT prophylaxis in women undergoing cesarean delivery</th>
</tr>
</thead>
</table>
| **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-Inf-2a) for The Joint Commission. |
<table>
<thead>
<tr>
<th>Maintenance Measure #0126: Selection of antibiotic prophylaxis for cardiac surgery patients</th>
<th>Endorsed Measure #0268: Selection of prophylactic antibiotic: First or second generation cephalosporin</th>
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<th>Endorsed Measure #0473: Appropriate DVT prophylaxis in women undergoing cesarean delivery</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td>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</td>
<td></td>
</tr>
<tr>
<td>Maintenance Measure #0126: Selection of antibiotic prophylaxis for cardiac surgery patients</td>
<td>Endorsed Measure #0268: Selection of prophylactic antibiotic: First or second generation cephalosporin</td>
<td>Maintenance Measure #0528: Prophylactic antibiotic selection for surgical patients</td>
<td>Endorsed Measure #0473: Appropriate DVT prophylaxis in women undergoing cesarean delivery</td>
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<tr>
<td></td>
<td></td>
<td>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.</td>
<td></td>
</tr>
<tr>
<td>Maintenance Measure #0126:</td>
<td>Endorsed Measure #0268:</td>
<td>Maintenance Measure #0528:</td>
<td>Endorsed Measure #0473:</td>
</tr>
<tr>
<td>---------------------------</td>
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<td>---------------------------</td>
<td>------------------------</td>
</tr>
<tr>
<td>Selection of antibiotic</td>
<td>Selection of prophylactic</td>
<td>Prophylactic antibiotic selection for surgical patients</td>
<td>Appropriate DVT prophylaxis in women undergoing cesarean delivery</td>
</tr>
<tr>
<td>prophylaxis for cardiac surgery patients</td>
<td>antibiotic: First or second generation cephalosporin</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

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.

3. 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

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<table>
<thead>
<tr>
<th>Step</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>58.</td>
<td>Check Overall Rate Category Assignment. 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.</td>
</tr>
<tr>
<td>59.</td>
<td>Check ICD-9-CM Principal Procedure Code. 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.</td>
</tr>
<tr>
<td>60.</td>
<td>Recheck ICD-9-CM Principal Procedure Code. 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.</td>
</tr>
</tbody>
</table>

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<table>
<thead>
<tr>
<th>Maintenance Measure #0126: Selection of antibiotic prophylaxis for cardiac surgery patients</th>
<th>Endorsed Measure #0268: Selection of prophylactic antibiotic: First or second generation cephalosporin</th>
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</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td>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 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 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 5.05 or 5.06 or 5.07 or 5.08, continue processing and recheck 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 Category Assignment for measure SCIP-Inf-2a. Stop processing.</td>
<td></td>
</tr>
<tr>
<td>Maintenance Measure #0126: Selection of antibiotic prophylaxis for cardiac surgery patients</td>
<td>Endorsed Measure #0268: Selection of prophylactic antibiotic: First or second generation cephalosporin</td>
<td>Maintenance Measure #0528: Prophylactic antibiotic selection for surgical patients</td>
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</tr>
<tr>
<td>---</td>
<td>---</td>
<td>---</td>
<td>---</td>
</tr>
</tbody>
</table>
| 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 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...
# National Quality Forum

<table>
<thead>
<tr>
<th>Maintenance Measure #0126: Selection of antibiotic prophylaxis for cardiac surgery patients</th>
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<th>Endorsed Measure #0473: Appropriate DVT prophylaxis in women undergoing cesarean delivery</th>
</tr>
</thead>
<tbody>
<tr>
<td>and achievable may help to motivate providers that are having difficulty improving care. The benchmarks represent a measurable 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 <a href="http://main.uab.edu/show.asp?durki=14527">http://main.uab.edu/show.asp?durki=14527</a></td>
<td></td>
<td></td>
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</tr>
</tbody>
</table>

### 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

<table>
<thead>
<tr>
<th>Endorsed Measure #0269: Timing of prophylactic antibiotics - administering physician</th>
<th>Maintenance Measure #0125: Timing of antibiotic prophylaxis for cardiac surgery patients</th>
<th>Endorsed Measure #0270: Timing of antibiotic prophylaxis- ordering physician</th>
<th>Maintenance Measure #0527: Prophylactic antibiotic received within 1 hour prior to surgical incision SCIP-Inf-1</th>
<th>Endorsed Measure #0472: Prophylactic antibiotic received within one hour prior to surgical incision or at the time of delivery – cesarean section</th>
</tr>
</thead>
</table>

**Status**
- Endorsed 11/2007
- Currently undergoing maintenance review
- Endorsed 7/2008
- Currently undergoing maintenance review
- Endorsed 10/2008
<table>
<thead>
<tr>
<th><strong>National Quality Forum</strong></th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Endorsed Measure #0269:</strong> Timing of prophylactic antibiotics - administering physician</td>
</tr>
<tr>
<td><strong>Steward</strong></td>
</tr>
<tr>
<td><strong>Description</strong></td>
</tr>
<tr>
<td><strong>Type of Measure</strong></td>
</tr>
<tr>
<td><strong>Numerator</strong></td>
</tr>
</tbody>
</table>
### National Quality Forum

<table>
<thead>
<tr>
<th>Endorsed Measure #0269: Timing of prophylactic antibiotics - administering physician</th>
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<th>Maintenance Measure #0527: Prophylactic antibiotic received within 1 hour prior to surgical incision SCIP-Inf-1</th>
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<td><strong>Endorsed Measure #0269:</strong> Timing of prophylactic antibiotics - administering physician</td>
<td><strong>Maintenance Measure #0125:</strong> Timing of antibiotic prophylaxis for cardiac surgery patients</td>
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<td><strong>Maintenance Measure #0527:</strong> Prophylactic antibiotic received within 1 hour prior to surgical incision SCIP-Inf-1</td>
<td><strong>Endorsed Measure #0472:</strong> Prophylactic antibiotic received within one hour prior to surgical incision or at the time of delivery – cesarean section</td>
</tr>
</tbody>
</table>
| 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 preoperatively. |

### 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
<table>
<thead>
<tr>
<th>National Quality Forum</th>
<th>Endorsed Measure #0269: Timing of prophylactic antibiotics - administering physician</th>
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<th>Maintenance Measure #0527: Prophylactic antibiotic received within 1 hour prior to surgical incision SCIP-Inf-1</th>
<th>Endorsed Measure #0472: Prophylactic antibiotic received within one hour prior to surgical incision or at the time of delivery - cesarean section</th>
</tr>
</thead>
<tbody>
<tr>
<td>submit the appropriate G-code.</td>
<td>[AbxTiming (STS Adult Cardiac Surgery Database Version 2.73)] is marked “yes”</td>
<td>for prophylactic antibiotic:</td>
<td>Time Surgical Incision Date</td>
<td></td>
<td></td>
</tr>
<tr>
<td>2. If reporting CPT Category II codes submit the appropriate CPT Category II code.</td>
<td></td>
<td></td>
<td>Surgical Incision Time</td>
<td></td>
<td></td>
</tr>
<tr>
<td>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):</td>
<td></td>
<td>• 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).</td>
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</tr>
<tr>
<td>• 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</td>
<td></td>
<td>• 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).</td>
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<tr>
<td>? CPT II XXXXF: Documentation that prophylactic antibiotic was given within one hour (if vancomycin, two hours) prior to surgical incision (or start of procedure when no incision is required).</td>
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</table>

NQF DOCUMENT – DO NOT CITE, QUOTE, REPRODUCE, OR CIRCULATE
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<tr>
<th>Endorsed Measure #0269: Timing of prophylactic antibiotics - administering physician</th>
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<th>Endorsed Measure #0472: Prophylactic antibiotic received within one hour prior to surgical incision or at the time of delivery – cesarean section</th>
</tr>
</thead>
<tbody>
<tr>
<td>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.</td>
<td></td>
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</tr>
<tr>
<td>Measure</td>
<td>Definition</td>
<td>Maintenance Requirements</td>
<td></td>
<td></td>
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<td>------------------------------------------------------------------------</td>
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<tr>
<td>Endorsed Measure #0472: Prophylactic antibiotic received within one hour prior to surgical incision or at the time of delivery – cesarean section.</td>
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</tr>
</tbody>
</table>

**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 prophylactic antibiotics for other reasons.

Number of surgical patients aged 18 years and older undergoing procedures 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, 45.77).

All patients undergoing cesarean section without evidence of prior infection or already receiving prophylactic antibiotics for other reasons.
<table>
<thead>
<tr>
<th>Denominator Categories</th>
<th>Denominator Details</th>
</tr>
</thead>
<tbody>
<tr>
<td>Electronic Collection: G-code, CPT-II code, and patient demographics (age, etc) are used to determine patients that are included in the measure:</td>
<td>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 [Mitra Valve Procedure],</td>
</tr>
<tr>
<td>Female, Male; 18 and older</td>
<td>• 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, 63042 Hip Reconstruction: 27125, 27130, 27132, 27134, 27137, 27138 Trauma (Fractures): 27235,</td>
</tr>
<tr>
<td>Female, Male; Patients aged 18 and older</td>
<td>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).</td>
</tr>
<tr>
<td><strong>Endorsed Measure #0296:</strong> Timing of prophylactic antibiotics - administering physician</td>
<td></td>
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<tr>
<td><strong>Endorsed Measure #0125:</strong> Timing of antibiotic prophylaxis for cardiac surgery patients</td>
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<td><strong>Endorsed Measure #0270:</strong> Timing of antibiotic prophylaxis- ordering physician</td>
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<td><strong>Endorsed Measure #0527:</strong> Prophylactic antibiotic received within 1 hour prior to surgical incision SCIP-Inf-1</td>
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<tr>
<td><strong>Endorsed Measure #0472:</strong> Prophylactic antibiotic received within one hour prior to surgical incision or at the time of delivery – cesarean section.</td>
<td></td>
</tr>
</tbody>
</table>

**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]

**Knee Reconstruction:** 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,
<table>
<thead>
<tr>
<th>Endorsed Measure #0269: Timing of prophylactic antibiotics - administering physician</th>
<th>Maintenance Measure #0125: Timing of antibiotic prophylaxis for cardiac surgery patients</th>
<th>Endorsed Measure #0270: Timing of antibiotic prophylaxis- ordering physician</th>
<th>Maintenance Measure #0527: Prophylactic antibiotic received within 1 hour prior to surgical incision SCIP-Inf-1</th>
<th>Endorsed Measure #0472: Prophylactic antibiotic received within one hour prior to surgical incision or at the time of delivery – cesarean section</th>
</tr>
</thead>
<tbody>
<tr>
<td>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</td>
<td>those listed previously], ECMO [Extracorporeal Membrane Oxygenation], OCarLasr [-Transmyocardial Laser Revascularization], OCarASD [Atrial Septal Defect Repair], OCarAFibSur [Atrial Fibrillation Surgical Procedure]</td>
<td>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,</td>
<td></td>
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<tr>
<td>Endorsed Measure #0269:</td>
<td>Maintenance Measure #0125:</td>
<td>Endorsed Measure #0270:</td>
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<td>Endorsed Measure #0472:</td>
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<td>Prophylactic antibiotic received within one hour prior to surgical incision or at the time of delivery - cesarean section.</td>
</tr>
<tr>
<td>procedure when no incision is required</td>
<td>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</td>
<td></td>
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<td>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 &amp; Ankle: 27702, 27703, 27704, 27870, 28192, 28193, 28293, 28296, 28299, 28300, 28306, 28307, 28308, 28309, 28310, 28320, 28322, 28415, 28420, 28445, 28465,</td>
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## National Quality Forum

<table>
<thead>
<tr>
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<th>Maintenance Measure #0125: Timing of antibiotic prophylaxis for cardiac surgery patients</th>
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<td></td>
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<td>28485, 28505, 28525, 28531, 28555, 28585, 28615, 28645, 28675, 28705, 28715, 28725, 28730, 28735, 28737, 28740, 28750, 28755, 28760</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Exclusions</td>
<td>N/A</td>
<td>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</td>
<td>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).</td>
<td>-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)</td>
</tr>
<tr>
<td>Exclusion Details</td>
<td>Endorsed Measure #0269: Timing of prophylactic antibiotics - administering physician</td>
<td>Maintenance Measure #0125: Timing of antibiotic prophylaxis for cardiac surgery patients</td>
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</table>
| Timing of appropriate antibiotic administration (AbxTiming) is marked “Exclusion” | 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 | Append modifier to CPT Category II code: 4047F-1P | Data Elements: Admission Date  
Antibiotic Received  
Birthdate  
Clinical Trial  
Discharge Date  
Infection Prior to |

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<tbody>
<tr>
<td>Risk Adjustment</td>
<td>No risk adjustment necessary</td>
<td>No risk adjustment necessary</td>
<td>No risk adjustment necessary</td>
<td>No risk adjustment necessary</td>
</tr>
<tr>
<td>Stratification</td>
<td>N/A</td>
<td>N/A</td>
<td>N/A</td>
<td>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.</td>
</tr>
<tr>
<td>Type Score</td>
<td>Rate/proportion</td>
<td>Rate/proportion</td>
<td>Rate/proportion</td>
<td>Rate/proportion</td>
</tr>
<tr>
<td>Algorithm</td>
<td>N/A</td>
<td>N/A</td>
<td>N/A</td>
<td>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,</td>
</tr>
<tr>
<td>Endorsed Measure #0269: Timing of prophylactic antibiotics - administering physician</td>
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</table>

**NATIONAL QUALITY FORUM**

1. **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.

2. **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
<table>
<thead>
<tr>
<th>Endorsed Measure #0269:</th>
<th>Maintenance Measure #0125:</th>
<th>Endorsed Measure #0270:</th>
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<tbody>
<tr>
<td>Timing of prophylactic antibiotics - administering physician</td>
<td>Timing of antibiotic prophylaxis for cardiac surgery patients</td>
<td>Timing of antibiotic prophylaxis- ordering physician</td>
<td>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</td>
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<tr>
<td>Endorsed Measure #0269:</td>
<td>Maintenance Measure #0125:</td>
<td>Endorsed Measure #0270:</td>
<td>Maintenance Measure #0527:</td>
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<td>Prophylactic antibiotic received within one hour prior to surgical incision or at the time of delivery - cesarean section.</td>
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</table>

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 Procedure 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 Commission.
<table>
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<tr>
<th>Endorsed Measure #0269:</th>
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<td>Prophylactic antibiotic received within one hour prior to surgical incision or at the time of delivery – cesarean section.</td>
</tr>
</tbody>
</table>

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

**Endorsed Measure #0270:** Timing of antibiotic prophylaxis - ordering physician

**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 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.
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<table>
<thead>
<tr>
<th>Measure</th>
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<td>#0472</td>
<td>Prophylactic antibiotic received within one hour prior to surgical incision or at the time of delivery – cesarean section.</td>
</tr>
</tbody>
</table>

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**Category Assignment**

- 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.
- 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.
- 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...
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<tbody>
<tr>
<td></td>
<td></td>
<td></td>
<td>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.</td>
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<td></td>
<td></td>
<td>b. If the Surgery Days is greater than or equal to zero, continue processing and proceed to Infection Prior to Anesthesia.</td>
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<td>12. Check Infection Prior to Anesthesia</td>
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<tr>
<td></td>
<td></td>
<td></td>
<td>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.</td>
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<tr>
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<td></td>
<td></td>
<td>b. If Infection Prior to Anesthesia equals Yes, the</td>
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<td>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 Population.</td>
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**National Quality Forum**
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<td>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</td>
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<td>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</td>
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<td>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</td>
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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.
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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
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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,
<table>
<thead>
<tr>
<th>National Quality Forum</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Endorsed Measure #0269:</strong> Timing of prophylactic antibiotics - administering physician</td>
</tr>
</tbody>
</table>

| 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.
| National Quality Forum | 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 Commission.
<table>
<thead>
<tr>
<th>National Quality Forum</th>
</tr>
</thead>
<tbody>
<tr>
<td>Endorsed Measure #0269: Timing of prophylactic antibiotics - administering physician</td>
</tr>
<tr>
<td>Maintenance Measure #0125: Timing of antibiotic prophylaxis for cardiac surgery patients</td>
</tr>
<tr>
<td>Endorsed Measure #0270: Timing of antibiotic prophylaxis - ordering physician</td>
</tr>
<tr>
<td>Maintenance Measure #0527: Prophylactic antibiotic received within 1 hour prior to surgical incision SCIP-Inf-1</td>
</tr>
<tr>
<td>Endorsed Measure #0472: Prophylactic antibiotic received within one hour prior to surgical incision or at the time of delivery - cesarean section.</td>
</tr>
</tbody>
</table>

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.
<table>
<thead>
<tr>
<th>Endorsed Measure #0269: Timing of prophylactic antibiotics - administering physician</th>
<th>Maintenance Measure #0125: Timing of antibiotic prophylaxis for cardiac surgery patients</th>
<th>Endorsed Measure #0270: Timing of antibiotic prophylaxis- ordering physician</th>
<th>Maintenance Measure #0527: Prophylactic antibiotic received within 1 hour prior to surgical incision SCIP-Inf-1</th>
<th>Endorsed Measure #0472: Prophylactic antibiotic received within one hour prior to surgical incision or at the time of delivery – cesarean section</th>
</tr>
</thead>
</table>

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
<table>
<thead>
<tr>
<th>National Quality Forum</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Endorsed Measure #0269:</strong> Timing of prophylactic antibiotics - administering physician</td>
</tr>
<tr>
<td><strong>Endorsed Measure #0270:</strong> Timing of antibiotic prophylaxis ordering physician</td>
</tr>
<tr>
<td><strong>Maintenance Measure #0125:</strong> Timing of antibiotic prophylaxis for cardiac surgery patients</td>
</tr>
<tr>
<td><strong>Maintenance Measure #0527:</strong> Prophylactic antibiotic received within 1 hour prior to surgical incision SCIP-Inf-1</td>
</tr>
<tr>
<td><strong>Endorsed Measure #0472:</strong> Prophylactic antibiotic received within one hour prior to surgical incision or at the time of delivery – cesarean section.</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Principal Procedure Code.</th>
</tr>
</thead>
<tbody>
<tr>
<td>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.</td>
</tr>
<tr>
<td>31. Recheck ICD-9-CM Principal Procedure Code only if the Antibiotic Timing I is greater than 1440 minutes for any antibiotic dose.</td>
</tr>
<tr>
<td>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.</td>
</tr>
<tr>
<td>b. If the ICD-9-CM Principal Procedure Code...</td>
</tr>
<tr>
<td>Endorsed Measure #0269: Timing of prophylactic antibiotics - administering physician</td>
</tr>
<tr>
<td>---</td>
</tr>
<tr>
<td>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 Commission.</td>
</tr>
</tbody>
</table>

**National Quality Forum**
<table>
<thead>
<tr>
<th>Endorsed Measure #0269: Timing of prophylactic antibiotics - administering physician</th>
<th>Maintenance Measure #0125: Timing of antibiotic prophylaxis for cardiac surgery patients</th>
<th>Endorsed Measure #0270: Timing of antibiotic prophylaxis- ordering physician</th>
<th>Maintenance Measure #0527: Prophylactic antibiotic received within 1 hour prior to surgical incision SCIP-Inf-1</th>
<th>Endorsed Measure #0472: Prophylactic antibiotic received within one hour prior to surgical incision or at the time of delivery – cesarean section</th>
</tr>
</thead>
<tbody>
<tr>
<td>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</td>
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</tr>
<tr>
<td>Endorsed Measure #0269: Timing of prophylactic antibiotics - administering physician</td>
<td>Maintenance Measure #0125: Timing of antibiotic prophylaxis for cardiac surgery patients</td>
<td>Endorsed Measure #0270: Timing of antibiotic prophylaxis- ordering physician</td>
<td>Maintenance Measure #0527: Prophylactic antibiotic received within 1 hour prior to surgical incision SCIP-Inf-1</td>
<td>Endorsed Measure #0472: Prophylactic antibiotic received within one hour prior to surgical incision or at the time of delivery – cesarean section</td>
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</tr>
<tr>
<td>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</td>
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</tbody>
</table>

**NATIONAL QUALITY FORUM**

NQF DOCUMENT – DO NOT CITE, QUOTE, REPRODUCE, OR CIRCULATE
<table>
<thead>
<tr>
<th>Endorsed Measure #0269: Timing of prophylactic antibiotics - administering physician</th>
<th>Maintenance Measure #0125: Timing of antibiotic prophylaxis for cardiac surgery patients</th>
<th>Endorsed Measure #0270: Timing of antibiotic prophylaxis- ordering physician</th>
<th>Maintenance Measure #0527: Prophylactic antibiotic received within 1 hour prior to surgical incision SCIP-Inf-1</th>
<th>Endorsed Measure #0472: Prophylactic antibiotic received within one hour prior to surgical incision or at the time of delivery – cesarean section</th>
</tr>
</thead>
</table>

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...
<table>
<thead>
<tr>
<th>Endorsed Measure #0269: Timing of prophylactic antibiotics - administering physician</th>
<th>Maintenance Measure #0125: Timing of antibiotic prophylaxis for cardiac surgery patients</th>
<th>Endorsed Measure #0270: Timing of antibiotic prophylaxis- ordering physician</th>
<th>Maintenance Measure #0527: Prophylactic antibiotic received within 1 hour prior to surgical incision SCIP-Inf-1</th>
<th>Endorsed Measure #0472: Prophylactic antibiotic received within one hour prior to surgical incision or at the time of delivery – cesarean section</th>
</tr>
</thead>
<tbody>
<tr>
<td>will reset the appropriate Measure Category Assignment to be equal to the overall rate’s (SCIP-Inf-1a) Measure Category Assignment.</td>
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<tr>
<td>37.Check Overall Rate Category Assignment</td>
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<td></td>
</tr>
<tr>
<td>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.</td>
<td></td>
<td></td>
<td></td>
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</tr>
<tr>
<td>b.If the Overall Rate Category Assignment is equal to D or E, continue processing and check the ICD-9-CM Principal Procedure Code.</td>
<td></td>
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<td></td>
<td></td>
</tr>
<tr>
<td>38.Check ICD-9-CM Principal Procedure Code</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>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</td>
<td></td>
<td></td>
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</tr>
<tr>
<td><strong>Endorsed Measure #0269:</strong> Timing of prophylactic antibiotics - administering physician</td>
<td><strong>Maintenance Measure #0125:</strong> Timing of antibiotic prophylaxis for cardiac surgery patients</td>
<td><strong>Endorsed Measure #0270:</strong> Timing of antibiotic prophylaxis- ordering physician</td>
<td><strong>Maintenance Measure #0527:</strong> Prophylactic antibiotic received within 1 hour prior to surgical incision SCIP-Inf-1</td>
<td><strong>Endorsed Measure #0472:</strong> Prophylactic antibiotic received within one hour prior to surgical incision or at the time of delivery – cesarean section</td>
</tr>
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</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>equal the Measure Category Assignment for measure SCIP-Inf-1a. Stop processing.</td>
<td></td>
</tr>
</tbody>
</table>

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.  

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...
<table>
<thead>
<tr>
<th>Endorsed Measure #0269: Timing of prophylactic antibiotics - administering physician</th>
<th>Maintenance Measure #0125: Timing of antibiotic prophylaxis for cardiac surgery patients</th>
<th>Endorsed Measure #0270: Timing of antibiotic prophylaxis- ordering physician</th>
<th>Maintenance Measure #0527: Prophylactic antibiotic received within 1 hour prior to surgical incision SCIP-Inf-1</th>
<th>Endorsed Measure #0472: Prophylactic antibiotic received within one hour prior to surgical incision or at the time of delivery – cesarean section</th>
</tr>
</thead>
</table>

<table>
<thead>
<tr>
<th>Principal Procedure Code</th>
</tr>
</thead>
<tbody>
<tr>
<td>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.</td>
</tr>
<tr>
<td>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.</td>
</tr>
<tr>
<td>41. Recheck ICD-9-CM Principal Procedure Code</td>
</tr>
<tr>
<td>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.</td>
</tr>
<tr>
<td>National Quality Forum</td>
</tr>
<tr>
<td>------------------------</td>
</tr>
<tr>
<td>Endorsed Measure #0269: Timing of prophylactic antibiotics - administering physician</td>
</tr>
</tbody>
</table>

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 Category Assignment for measure SCIP-Inf-1g to equal the Measure Category Assignment for measure SCIP-Inf-1a. Stop processing.
<table>
<thead>
<tr>
<th>Data Source</th>
<th>Endorsed Measure #0269: Timing of prophylactic antibiotics - administering physician</th>
<th>Maintenance Measure #0125: Timing of antibiotic prophylaxis for cardiac surgery patients</th>
<th>Endorsed Measure #0270: Timing of antibiotic prophylaxis- ordering physician</th>
<th>Maintenance Measure #0527: Prophylactic antibiotic received within 1 hour prior to surgical incision SCIP-Inf-1</th>
<th>Endorsed Measure #0472: Prophylactic antibiotic received within one hour prior to surgical incision or at the time of delivery – cesarean section</th>
</tr>
</thead>
<tbody>
<tr>
<td>Level of Measurement /Analysis</td>
<td>Electronic administrative data/claims</td>
<td>Registry data</td>
<td>Electronic administrative data/claims, lab data, paper medical record/flow-sheet</td>
<td>Electronic administrative data/claims, lab data, paper medical record/flow-sheet</td>
<td>Lab data, paper medical record/flow-sheet, survey: patient</td>
</tr>
<tr>
<td>Care Settings</td>
<td>Physicians: individual</td>
<td>Physicians: Group; Facility/agency; Population: National, regional/network, states, counties or cities</td>
<td>Physicians: Individual, group</td>
<td>Facility/agency</td>
<td>Facility/agency</td>
</tr>
<tr>
<td>Care Setting</td>
<td>Hospital, Ambulatory care: Ambulatory surgery center</td>
<td>Hospital</td>
<td>Hospital, Ambulatory care: Ambulatory surgery center</td>
<td>Hospital</td>
<td>Hospital</td>
</tr>
<tr>
<td></td>
<td><strong>Maintenance Measure #0118: Anti-lipid treatment discharge</strong></td>
<td><strong>New Candidate Measure #1519: Statin therapy at discharge after lower extremity bypass (LEB)</strong></td>
<td></td>
<td></td>
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<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>Status</strong></td>
<td>Currently undergoing maintenance review</td>
<td>Currently undergoing review</td>
<td></td>
<td></td>
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</tr>
<tr>
<td><strong>Steward</strong></td>
<td>Society of Thoracic Surgeons</td>
<td>Society of Vascular Surgery</td>
<td></td>
<td></td>
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</tr>
<tr>
<td><strong>Description</strong></td>
<td>Percent of patients aged 18 years and older undergoing isolated CABG who were discharged on a statin or other lipid-lowering regimen.</td>
<td>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.</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>Type of Measure</strong></td>
<td>Process</td>
<td>Process</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>Numerator</strong></td>
<td>Number of patients undergoing isolated CABG who were discharged on a statin or other lipid-lowering regimen.</td>
<td>Patients undergoing infrainguinal lower extremity bypass who are prescribed a statin medication at discharge.</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>Time window:</td>
<td>Time window: Lifesize for provider reporting, annual for hospital reporting.</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>Numerator Details</strong></td>
<td>Number of isolated CABG procedures in which discharge lipid lowering medication [DCLipid (STS Adult Cardiac Surgery Database Version 2.73)] is marked &quot;yes&quot;</td>
<td>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 aged 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.</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>Denominator</strong></td>
<td>All patients undergoing isolated CABG.</td>
<td>All patients aged 18 years and older undergoing lower extremity bypass as defined above who are discharged alive, excluding those patients who are</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Denominator Categories</td>
<td>Denominator Details</td>
<td>Exclusions</td>
<td>Exclusion Details</td>
<td>Risk Adjustment</td>
<td>Stratification</td>
</tr>
<tr>
<td>------------------------</td>
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</tr>
<tr>
<td>Female, Male; 18 yrs and older</td>
<td>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”</td>
<td>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.</td>
<td>Mortality Discharge Status (MtDCStat), Mortality Date (MtDate), and Discharge Date (DischDt) indicate an in-hospital mortality; DCLipid is marked as “Contraindicated”</td>
<td>No risk adjustment necessary</td>
<td>Not required</td>
</tr>
</tbody>
</table>

| Maintenance Measure #0118: Anti-lipid treatment discharge | Time window: 12 months |  |  |  |  |  |
| New Candidate Measure #1519: Statin therapy at discharge after lower extremity bypass (LEB) | Time window: Lifetime for provider reporting, annual for hospital reporting. |  |  |  |  |  |

Denominator Categories | Female, Male; 18 yrs and 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” |  |  |  |  |  |

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” |  |  |  |  |  |

Risk Adjustment | No risk adjustment necessary |  |  |  |  |  |

Stratification | Not required |  |  |  |  |  |

Type Score | Rate/proportion |  |  |  |  |  |
## Maintenance Measure #0118: Anti-lipid treatment discharge

### 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

### 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

## New Candidate Measure #1519: Statin therapy at discharge after lower extremity bypass (LEB)

### Algorithm

Data Source

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
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:

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-63426736978888638.pdf

Rating: C=Completely; P=Partially; M=Minimally; N=Not at all; NA=Not applicable
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**

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)**

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

(for NQF staff use) **Have all conditions for consideration been met?**

**Staff Notes to Steward (if submission returned):**

**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**

(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:**  
- Leavitt B, O’Connor GT, et al. Use of the internal mammary artery graft and in-hospital mortality

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.

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
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.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?

Steering Committee: Was the threshold criterion, Importance to Measure and Report, met?
Rationale:
### 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) |

### 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 |

Rating: C=Completely; P=Partially; M=Minimally; N=Not at all; NA=Not applicable
<table>
<thead>
<tr>
<th>Section</th>
<th>Description</th>
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| 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  
**Interpretation of Score:** Better quality = Higher score |
| 2a.20  | **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** *(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/STSAultCVDaDataCollectionForm2_7_Annotated_20101021.pdf](http://www.sts.org/documents/pdf/ndb2010/STSAultCVDaDataCollectionForm2_7_Annotated_20101021.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 data are collected)*:  
| Rating: C=Completely; P=Partially; M=Minimally; N=Not at all; NA=Not applicable |

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.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

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

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): 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:

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

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): 

2h. Disparities in Care

2h.1 If measure is stratified, provide stratified results (scores by stratified categories/cohorts):
2h.2 If disparities have been reported/identified, but measure is not specified to detect disparities, provide follow-up plans: N □ P □ M □ N □ NA □

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<tr>
<th>TAP/Workgroup: What are the strengths and weaknesses in relation to the subcriteria for <strong>Scientific Acceptability of Measure Properties?</strong></th>
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<tr>
<th>Steering Committee: Overall, to what extent was the criterion, <strong>Scientific Acceptability of Measure Properties</strong>, met?</th>
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<tr>
<td>C □ P □ M □ N □</td>
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### 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)

#### 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

#### 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.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

### 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:

TAP/Workgroup: What are the strengths and weaknesses in relation to the subcriteria for Usability?

### 4. FEASIBILITY

Extent to which the required data are readily available, retrievable without undue burden, and can be implemented for performance measurement. (evaluation criteria)

#### 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)

#### 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.

### 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.

### 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.

### 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:

**TAP/Workgroup:** What are the strengths and weaknesses in relation to the subcriteria for *Feasibility*?

<table>
<thead>
<tr>
<th>Rating</th>
<th>C</th>
<th>P</th>
<th>M</th>
<th>N</th>
</tr>
</thead>
<tbody>
<tr>
<td>4</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

**Steering Committee:** Overall, to what extent was the criterion, *Feasibility*, met?

**Rationale:**

### RECOMMENDATION

(for NQF staff use) Check if measure is untested and only eligible for time-limited endorsement.

**Steering Committee:** Do you recommend for endorsement?

<table>
<thead>
<tr>
<th>Comments</th>
<th>Y</th>
<th>N</th>
<th>A</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

### 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

<table>
<thead>
<tr>
<th>MEASURE DESCRIPTIVE INFORMATION</th>
</tr>
</thead>
<tbody>
<tr>
<td>De.1 Measure Title: Cardiac Surgery Patients With Controlled Postoperative Blood Glucose</td>
</tr>
<tr>
<td>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.</td>
</tr>
<tr>
<td>1.1-2 Type of Measure: Process</td>
</tr>
<tr>
<td>De.3 If included in a composite or paired with another measure, please identify composite or paired measure N/A</td>
</tr>
<tr>
<td>De.4 National Priority Partners Priority Area: Population health</td>
</tr>
<tr>
<td>De.5 IOM Quality Domain: Safety</td>
</tr>
<tr>
<td>De.6 Consumer Care Need: Getting better</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>CONDITIONS FOR CONSIDERATION BY NQF</th>
</tr>
</thead>
<tbody>
<tr>
<td>Four conditions must be met before proposed measures may be considered and evaluated for suitability as voluntary consensus standards:</td>
</tr>
<tr>
<td>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.</td>
</tr>
<tr>
<td>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</td>
</tr>
<tr>
<td>A.2 Indicate if Proprietary Measure (as defined in measure steward agreement):</td>
</tr>
<tr>
<td>A.3 Measure Steward Agreement: Government entity and in the public domain - no agreement necessary</td>
</tr>
<tr>
<td>A.4 Measure Steward Agreement attached:</td>
</tr>
<tr>
<td>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</td>
</tr>
</tbody>
</table>
NQF # 0300

<table>
<thead>
<tr>
<th>Every 3 years. Yes, information provided in contact section</th>
<th>N</th>
</tr>
</thead>
<tbody>
<tr>
<td>C. The intended use of the measure includes both public reporting and quality improvement.</td>
<td>C Y N</td>
</tr>
<tr>
<td><strong>Purpose:</strong> Payment Program, Regulatory and Accreditation Programs</td>
<td></td>
</tr>
<tr>
<td>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.</td>
<td>D Y N</td>
</tr>
<tr>
<td>D.1 Testing: Yes, fully developed and tested</td>
<td></td>
</tr>
<tr>
<td>D.2 Have NQF-endorsed measures been reviewed to identify if there are similar or related measures? Yes</td>
<td></td>
</tr>
<tr>
<td><strong>(for NQF staff use) Have all conditions for consideration been met?</strong></td>
<td></td>
</tr>
<tr>
<td>Staff Notes to Steward (if submission returned):</td>
<td></td>
</tr>
<tr>
<td>Staff Notes to Reviewers (issues or questions regarding any criteria):</td>
<td></td>
</tr>
<tr>
<td>Staff Reviewer Name(s):</td>
<td></td>
</tr>
</tbody>
</table>

**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

**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.


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
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.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,

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?

Steering Committee: Was the threshold criterion, Importance to Measure and Report, met?

Rationale:

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)

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):

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)*:

<table>
<thead>
<tr>
<th>Required data elements: Glucose</th>
</tr>
</thead>
<tbody>
<tr>
<td>Allowable values:</td>
</tr>
<tr>
<td>1. All values collected between 18 and 24 hours after Anesthesia End Time were = 180 mg/dL. (passes)</td>
</tr>
<tr>
<td>2. A single value collected between 18 and 24 hours after Anesthesia End Time was &gt; 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)</td>
</tr>
<tr>
<td>3. A single value collected between 18 and 24 hours after Anesthesia End Time was &gt; 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)</td>
</tr>
<tr>
<td>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)</td>
</tr>
<tr>
<td>5. The patient discharged prior to 24 hours after Anesthesia End Time.</td>
</tr>
</tbody>
</table>

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 Principal Procedure code or ICD-9-CM Other Procedure codes of selected surgeries AND an ICD-9-CM for ICD-9-CM codes Principal 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

<table>
<thead>
<tr>
<th>Stratum Initial Patient Population Size</th>
<th>“N” Minimum Required</th>
<th>Stratum Sample Size</th>
<th>“n”</th>
</tr>
</thead>
<tbody>
<tr>
<td>481-480</td>
<td>10% of Initial Patient Population size</td>
<td>49</td>
<td>171-170</td>
</tr>
<tr>
<td>&lt; 17</td>
<td>No sampling; 100% Initial Patient Population required</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

#### 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**

<table>
<thead>
<tr>
<th>Stratum Initial Patient Population Size</th>
<th>“N” Minimum Required</th>
<th>Stratum Sample Size</th>
<th>“n”</th>
</tr>
</thead>
<tbody>
<tr>
<td>151-150</td>
<td>10% of Initial Patient Population size</td>
<td>16</td>
<td>61-60</td>
</tr>
<tr>
<td>&lt; 6</td>
<td>No sampling; 100% Initial Patient Population required</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

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](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:


### 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.

#### 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.

#### 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.
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:

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.

<table>
<thead>
<tr>
<th>Quarter</th>
<th>Score</th>
</tr>
</thead>
<tbody>
<tr>
<td>Q1-09</td>
<td>91.9</td>
</tr>
<tr>
<td>Q2-09</td>
<td>92.3</td>
</tr>
<tr>
<td>Q3-09</td>
<td>92.9</td>
</tr>
<tr>
<td>Q4-09</td>
<td>92.9</td>
</tr>
<tr>
<td>Q1-10</td>
<td>93.4</td>
</tr>
</tbody>
</table>

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):

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:

TAP/Workgroup: What are the strengths and weaknesses in relation to the subcriteria for Scientific Acceptability of Measure Properties?

Steering Committee: Overall, to what extent was the criterion, Scientific Acceptability of Measure Properties, met?

Rationale:

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)

Ratin

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.

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?

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:

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:
### 4. FEASIBILITY

Extent to which the required data are readily available, retrievable without undue burden, and can be implemented for performance measurement. *(evaluation criteria)*

<table>
<thead>
<tr>
<th><strong>4a. Data Generated as a Byproduct of Care Processes</strong></th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>4a.1-2</strong> How are the data elements that are needed to compute measure scores generated?</td>
</tr>
<tr>
<td>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)</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th><strong>4b. Electronic Sources</strong></th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>4b.1</strong> Are all the data elements available electronically? <em>(elements that are needed to compute measure scores are in defined, computer-readable fields, e.g., electronic health record, electronic claims)</em></td>
</tr>
<tr>
<td>No</td>
</tr>
<tr>
<td><strong>4b.2</strong> If not, specify the near-term path to achieve electronic capture by most providers.</td>
</tr>
<tr>
<td>Measure will be re-tooled for EHR use in near future, possibly 2011 or 2012.</td>
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<tr>
<th><strong>4c. Exclusions</strong></th>
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</thead>
<tbody>
<tr>
<td><strong>4c.1</strong> Do the specified exclusions require additional data sources beyond what is required for the numerator and denominator specifications?</td>
</tr>
<tr>
<td>No</td>
</tr>
</tbody>
</table>

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<tr>
<th><strong>4d. Susceptibility to Inaccuracies, Errors, or Unintended Consequences</strong></th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>4d.1</strong> Identify susceptibility to inaccuracies, errors, or unintended consequences of the measure and describe how these potential problems could be audited. If audited, provide results.</td>
</tr>
<tr>
<td>Susceptibility to inaccuracies, errors or unintended consequences have not been identified.</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th><strong>4e. Data Collection Strategy/Implementation</strong></th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>4e.1</strong> 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:</td>
</tr>
<tr>
<td>According to feedback, data collection is not labor-intensive and data is available in the medical record.</td>
</tr>
<tr>
<td><strong>4e.2</strong> Costs to implement the measure <em>(costs of data collection, fees associated with proprietary measures)</em>:</td>
</tr>
<tr>
<td>Costs to implement the measure have not been assessed by the measure steward.</td>
</tr>
<tr>
<td><strong>4e.4</strong> 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.</td>
</tr>
</tbody>
</table>

**TAP/Workgroup: What are the strengths and weaknesses in relation to the subcriteria for Feasibility?**
<table>
<thead>
<tr>
<th>RECOMMENDATION</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Recommendation</strong></td>
</tr>
<tr>
<td>(for NQF staff use) Check if measure is untested and only eligible for time-limited endorsement.</td>
</tr>
<tr>
<td>Steering Committee: Do you recommend for endorsement?</td>
</tr>
<tr>
<td>Comments:</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>CONTACT INFORMATION</th>
</tr>
</thead>
</table>
| Co.1 **Measure Steward (Intellectual Property Owner)**  
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- |
| Co.3 **Measure Developer**  
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**  
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. |

<table>
<thead>
<tr>
<th>ADDITIONAL INFORMATION</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Workgroup/Expert Panel involved in measure development</strong></td>
</tr>
</tbody>
</table>
| 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 |
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 180 mg/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 to 180 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:

- Estrada CA, Young JA, Nifong LW, et al. Outcomes and perioperative hyperglycemia in patients with or without diabetes mellitus undergoing coronary

SCIP-Inf-4: Cardiac Surgery Patients With Controlled Postoperative Blood Glucose
Numerator: 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.
Denominator: Cardiac surgery patients with no evidence of prior Infection.

Variable Key:
Patient Age
Surgery Days

START
Run cases that are included in the SCIP Initial Patient Population and pass the edits defined in the Transmission Data Processing Flow: Clinical through this measure.

Patient Age (in years)= Admission Date – Birthdate
Use the month and day portion of admission date and birthdate to yield the most accurate age.

Patient Age
< 18 Years
Inf-4 B

Inf-4

Inf-4 B

ICD-9-CM Principal Procedure Code
Not on Table 5.11

Inf-4 B

On Table 5.11

ICD-9-CM Principal Diagnosis Code
On Tables 5.09, 5.14, 5.15
Inf-4 B

None on Tables 5.09, 5.14, 5.15

Inf-4 H

Variable Key:
Clinical Trial

= Y
Inf-4 B

Inf-4 H

Inf-4 X

Inf-4 H

Inf-4 H

Inf-4 H

Inf-4 H

Inf-4 H

Inf-4 H

Inf-4 H

Inf-4 H

Inf-4 H

Inf-4 H

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Inf-4 H

Inf-4 H

Inf-4 H

Inf-4 H

Inf-4 H
\[ \text{Surgery Days (in days)} = \text{Anesthesia Start Date} - \text{Admission Date} \]

- If surgery days < 0, missing data, and infection prior to anesthesia = N, then case will be rejected.
- If surgery days ≥ 0, glucose = 1, 2, 3, 4, and infection prior to anesthesia = Y, then not in measure population.
- If glucose = 3, 4, then in measure population.
- If glucose = 1, 2, then in numerator population.

STOP
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)

### MEASURE DESCRIPTIVE INFORMATION

<table>
<thead>
<tr>
<th>De.1 Measure Title:</th>
<th>Surgery patients on beta blocker therapy prior to admission who received a beta blocker during the perioperative period</th>
</tr>
</thead>
<tbody>
<tr>
<td>De.2 Brief description of measure:</td>
<td>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.</td>
</tr>
<tr>
<td>1.1-2 Type of Measure:</td>
<td>Process</td>
</tr>
<tr>
<td>De.3 If included in a composite or paired with another measure, please identify composite or paired measure</td>
<td>NA</td>
</tr>
<tr>
<td>De.4 National Priority Partners Priority Area:</td>
<td>Safety</td>
</tr>
<tr>
<td>De.5 IOM Quality Domain:</td>
<td>Safety</td>
</tr>
<tr>
<td>De.6 Consumer Quality Need:</td>
<td>Staying healthy</td>
</tr>
</tbody>
</table>

### CONDITIONS FOR CONSIDERATION BY NQF

Four conditions must be met before proposed measures may be considered and evaluated for suitability as voluntary consensus standards:

<table>
<thead>
<tr>
<th>Condition</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>A. The measure is in the public domain or an intellectual property (measure steward agreement) is signed.</td>
<td>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.</td>
</tr>
<tr>
<td>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)?</td>
<td>Yes</td>
</tr>
<tr>
<td>A.2 Indicate if Proprietary Measure (as defined in measure steward agreement):</td>
<td></td>
</tr>
<tr>
<td>A.3 Measure Steward Agreement:</td>
<td>Government entity and in the public domain - no agreement necessary</td>
</tr>
<tr>
<td>A.4 Measure Steward Agreement attached:</td>
<td></td>
</tr>
</tbody>
</table>

Rating: C=Completely; P=Partially; M=Minimally; N=Not at all; NA=Not applicable
### 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

<table>
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<tr>
<th>B</th>
<th>Y</th>
<th>N</th>
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### C. The intended use of the measure includes both public reporting and quality improvement.

**Purpose:** Payment Program, Regulatory and Accreditation Programs

<table>
<thead>
<tr>
<th>C</th>
<th>Y</th>
<th>N</th>
</tr>
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</table>

### 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

(for NQF staff use) Have all conditions for consideration been met?

<table>
<thead>
<tr>
<th>Met</th>
<th>Y</th>
<th>N</th>
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</thead>
</table>

Staff Notes to Steward (if submission returned):

Staff Notes to Reviewers (issues or questions regarding any criteria):

Staff Reviewer Name(s):

<p>| | |</p>
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### TAP/Workgroup Reviewer Name:

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### Steering Committee Reviewer Name:

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### 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

(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: 

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...
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.

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 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:


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

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 Ia
**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 IIb
Benefit > Risk
Additional studies with broad objectives needed; additional registry data would be helpful
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?

Steering Committee: Was the threshold criterion, Importance to Measure and Report, met?
Rationale:

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)

2a. MEASURE SPECIFICATIONS

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
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
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

<table>
<thead>
<tr>
<th>Hospital’s Measure</th>
<th>Average Quarterly</th>
<th>Stratum Initial Patient Population Size</th>
<th>“N” Minimum Required</th>
<th>Stratum Sample Size</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td>“n”</td>
<td>&gt; / = 481</td>
<td>49</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>171-480</td>
<td>10% of Initial Patient Population size</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>17-170</td>
<td>17</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>&lt; 17</td>
<td>No sampling; 100% Initial Patient Population required</td>
</tr>
</tbody>
</table>

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

<table>
<thead>
<tr>
<th>Hospital’s Measure</th>
<th>Average Monthly</th>
<th>Stratum Initial Patient Population Size</th>
<th>“N” Minimum Required</th>
<th>Stratum Sample Size</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td>“n”</td>
<td>&gt; / = 151</td>
<td>16</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>61-150</td>
<td>10% of Initial Patient Population size</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>6-60</td>
<td>6</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>&lt; 6</td>
<td>No sampling; 100% Initial Patient Population required</td>
</tr>
</tbody>
</table>

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
### 2a. Data source/data collection instrument reference web page URL or attachment:

### 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)
- 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 51 charts. 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%

### 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.

### 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 distribution 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

### 2d. Exclusions Justified

Rating: C=Completely; P=Partially; M=Minimally; N=Not at all; NA=Not applicable
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

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

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%.

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

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.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?

Steering Committee: Overall, to what extent was the criterion, Scientific Acceptability of Measure Properties, met?
Rationale:

### 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)*

#### 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

#### 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?*

3c. Distinctive or Additive Value

3c.1 *Describe the distinctive, improved, or additive value this measure provides to existing NQF-endorsed measures:*

Rating: C=Completely; P=Partially; M=Minimally; N=Not at all; NA=Not applicable
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.

TAP/Workgroup: What are the strengths and weaknesses in relation to the subcriteria for Usability?

Steering Committee: Overall, to what extent was the criterion, Usability, met?

Rationale:

<table>
<thead>
<tr>
<th>4. FEASIBILITY</th>
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<tbody>
<tr>
<td>Extent to which the required data are readily available, retrievable without undue burden, and can be implemented for performance measurement.</td>
</tr>
</tbody>
</table>

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)

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.

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.

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.

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:
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?

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<td>4</td>
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</table>

Steering Committee: Overall, to what extent was the criterion, Feasibility, met?

Rationale:

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<td></td>
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<tr>
<td>M</td>
<td></td>
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<tr>
<td>N</td>
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RECOMMENDATION

(for NQF staff use) Check if measure is untested and only eligible for time-limited endorsement.

Steering Committee: Do you recommend for endorsement?

Comments:

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<tr>
<td></td>
<td>Y</td>
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<tr>
<td>N</td>
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<tr>
<td>A</td>
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</tbody>
</table>

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.6 If adapted, provide original specifications URL or attachment
Attachment SCIP Card2_MIFplusDEs

Ad.10 Copyright statement/disclaimers: Trend Report (BM= Benchmark, rate = national score)

Q209
BM: 99.7 Rate: 90.5
Q309
BM: 99.8 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 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)

<table>
<thead>
<tr>
<th>(for NQF staff use) NQF Review #: 0365</th>
<th>NQF Project: Surgery Endorsement Maintenance 2010</th>
</tr>
</thead>
</table>

### MEASURE DESCRIPTIVE INFORMATION

<table>
<thead>
<tr>
<th>De.1 Measure Title: Pancreatic Resection Mortality Rate (IQI 9)</th>
</tr>
</thead>
<tbody>
<tr>
<td>De.2 Brief description of measure: Percentage of discharges with procedure code of pancreatic resection with an in-hospital death.</td>
</tr>
<tr>
<td>1.1-2 Type of Measure: Outcome</td>
</tr>
<tr>
<td>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</td>
</tr>
<tr>
<td>De.4 National Priority Partners Priority Area: Population health, Safety</td>
</tr>
<tr>
<td>De.5 IOM Quality Domain: Effectiveness</td>
</tr>
<tr>
<td>De.6 Consumer Care Need: Getting better</td>
</tr>
</tbody>
</table>

### CONDITIONS FOR CONSIDERATION BY NQF

Four conditions must be met before proposed measures may be considered and evaluated for suitability as voluntary consensus standards:

| 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: |
| 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 |

Rating: C=Completely; P=Partially; M=Minimally; N=Not at all; NA=Not applicable
every 3 years. Yes, information provided in contact section

C. The intended use of the measure includes both public reporting and quality improvement.

| Purpose: Public Reporting, Quality Improvement (Internal to the specific organization) |

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

(for NQF staff use) Have all conditions for consideration been met?

| Staff Notes to Steward (if submission returned): |

Staff Notes to Reviewers (issues or questions regarding any criteria):

| Staff Reviewer Name(s): |

---

### 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

1a.1 Demonstrated High Impact Aspect of Healthcare: Patient/societal consequences of poor quality

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 inhospital 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


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
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

<table>
<thead>
<tr>
<th>Location</th>
<th>Mean</th>
<th>Standard error</th>
<th>P-value: Relative to Northeast</th>
</tr>
</thead>
<tbody>
<tr>
<td>Northeast</td>
<td>47.761</td>
<td>6.121</td>
<td>1.000</td>
</tr>
<tr>
<td>Midwest</td>
<td>26.717</td>
<td>5.586</td>
<td>0.011</td>
</tr>
<tr>
<td>South</td>
<td>34.519</td>
<td>3.804</td>
<td>0.066</td>
</tr>
<tr>
<td>West</td>
<td>28.151</td>
<td>5.436</td>
<td>0.017</td>
</tr>
</tbody>
</table>

1b.3 Citations for data on performance gap:

1b.4 Summary of Data on disparities by population group:
Adjusted per 1,000 rates by patient characteristics, 2007

<table>
<thead>
<tr>
<th>Age: for conditions affecting any age</th>
<th>Estimate</th>
<th>Standard error</th>
<th>Age: for conditions affecting elderly</th>
</tr>
</thead>
<tbody>
<tr>
<td>18-44</td>
<td>25.496</td>
<td>6.203</td>
<td>65-69</td>
</tr>
<tr>
<td>45-64</td>
<td>20.639</td>
<td>2.915</td>
<td>70-74</td>
</tr>
<tr>
<td>65 and over</td>
<td>43.180</td>
<td>3.987</td>
<td>75-79</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Gender</th>
<th>Estimate</th>
<th>Standard error</th>
</tr>
</thead>
<tbody>
<tr>
<td>Male</td>
<td>40.432</td>
<td>3.541</td>
</tr>
<tr>
<td>Female</td>
<td>25.181</td>
<td>3.554</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Median income of patient’s ZIP code</th>
<th>Estimate</th>
<th>Standard error</th>
</tr>
</thead>
<tbody>
<tr>
<td>First quartile (lowest income)</td>
<td>32.207</td>
<td>4.894</td>
</tr>
<tr>
<td>Second quartile</td>
<td>50.614</td>
<td>5.663</td>
</tr>
<tr>
<td>Third quartile</td>
<td>34.671</td>
<td>5.002</td>
</tr>
<tr>
<td>Fourth quartile (highest income)</td>
<td>23.771</td>
<td>4.527</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Location of patient residence (NCHS)</th>
<th>Estimate</th>
<th>Standard error</th>
</tr>
</thead>
<tbody>
<tr>
<td>Large central metropolitan</td>
<td>39.145</td>
<td>4.453</td>
</tr>
<tr>
<td>Large fringe metropolitan</td>
<td>34.657</td>
<td>5.007</td>
</tr>
<tr>
<td>Medium metropolitan</td>
<td>34.612</td>
<td>5.208</td>
</tr>
<tr>
<td>Small metropolitan</td>
<td>35.870</td>
<td>10.635</td>
</tr>
<tr>
<td>Micropolitan</td>
<td>*</td>
<td>*</td>
</tr>
<tr>
<td>Not metropolitan or micropolitan</td>
<td>*</td>
<td>*</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Expected payment source</th>
<th>Estimate</th>
<th>Standard error</th>
</tr>
</thead>
<tbody>
<tr>
<td>Estimate</td>
<td>Standard error</td>
<td>Hospital Ownership/control</td>
</tr>
<tr>
<td>----------</td>
<td>----------------</td>
<td>---------------------------</td>
</tr>
<tr>
<td>24.43308661</td>
<td>4.746</td>
<td>Private insurance</td>
</tr>
<tr>
<td>33.50889221</td>
<td>3.078</td>
<td>Medicare</td>
</tr>
<tr>
<td>56.92297577</td>
<td>11.372</td>
<td>Medicaid</td>
</tr>
<tr>
<td>168.3490653</td>
<td>28.408</td>
<td>Other insurance</td>
</tr>
<tr>
<td>70.49679743</td>
<td>18.397</td>
<td>Uninsured / self-pay / no charge</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Estimate</th>
<th>Standard error</th>
<th>Teaching status</th>
</tr>
</thead>
<tbody>
<tr>
<td>26.71084935</td>
<td>3.052</td>
<td>Teaching</td>
</tr>
<tr>
<td>48.35344955</td>
<td>4.291</td>
<td>Nonteaching</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Estimate</th>
<th>Standard error</th>
<th>Location of hospital</th>
</tr>
</thead>
<tbody>
<tr>
<td>27.41877829</td>
<td>3.309</td>
<td>Large central metropolitan</td>
</tr>
<tr>
<td>70.90692851</td>
<td>8.270</td>
<td>Large fringe metropolitan</td>
</tr>
<tr>
<td>33.81007218</td>
<td>4.897</td>
<td>Medium metropolitan</td>
</tr>
<tr>
<td>44.21470167</td>
<td>9.807</td>
<td>Small metropolitan</td>
</tr>
</tbody>
</table>

* * * Micropolitan
* * * Not metropolitan or micropolitan

<table>
<thead>
<tr>
<th>Estimate</th>
<th>Standard error</th>
<th>Bed size of hospital</th>
</tr>
</thead>
<tbody>
<tr>
<td>* * *</td>
<td></td>
<td>Less than 100</td>
</tr>
<tr>
<td>46.62748379</td>
<td>5.684</td>
<td>100 - 299</td>
</tr>
<tr>
<td>44.13589384</td>
<td>4.564</td>
<td>300 - 499</td>
</tr>
<tr>
<td>23.4343551</td>
<td>3.502</td>
<td>500 or more</td>
</tr>
</tbody>
</table>

1b.5 Citations for data on Disparities:

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
volume was less significantly associated with mortality (6-13% across three volume categories). [2]


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:
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

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?

Steering Committee: Was the threshold criterion, Importance to Measure and Report, met?
Rationale:

Rating: C=Completely; P=Partially; M=Minimally; N=Not at all; NA=Not applicable

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)

### 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

Rating: C=Completely; P=Partially; M=Minimally; N=Not at all; NA=Not applicable
(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 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), 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

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/E). We examined the trends in VA-and VISN-level rates using weighted linear regression, variation in VISN-level O/E, 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]


#### 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 from 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.
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

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

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

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):

<table>
<thead>
<tr>
<th>5th</th>
<th>25th</th>
<th>Median</th>
<th>75th</th>
<th>95th</th>
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</thead>
<tbody>
<tr>
<td>0.018408</td>
<td>0.033661</td>
<td>0.048378</td>
<td>0.066901</td>
<td>0.100833</td>
</tr>
</tbody>
</table>

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

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

TAP/Workgroup: What are the strengths and weaknesses in relation to the subcriteria for Scientific Acceptability of Measure Properties?

Steering Committee: Overall, to what extent was the criterion, Scientific Acceptability of Measure Properties, met?
Rationale:

3. USABILITY

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

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

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.

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

Rating: C=Completely; P=Partially; M=Minimally; N=Not at all; NA=Not applicable
### 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.

### TAP/Workgroup: What are the strengths and weaknesses in relation to the subcriteria for Usability?

#### Steering Committee: Overall, to what extent was the criterion, Usability, met?

<table>
<thead>
<tr>
<th>Rating</th>
<th>C</th>
<th>P</th>
<th>M</th>
<th>N</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
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</tbody>
</table>

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### 4. FEASIBILITY

#### Extent to which the required data are readily available, retrievable without undue burden, and can be implemented for performance measurement. ([evaluation criteria](#))

<table>
<thead>
<tr>
<th>Rating</th>
<th>C</th>
<th>P</th>
<th>M</th>
<th>N</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
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</tbody>
</table>

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#### 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)

##### 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.**

#### 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.

#### 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.

#### 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.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

<table>
<thead>
<tr>
<th>TAP/Workgroup: What are the strengths and weaknesses in relation to the subcriteria for Feasibility?</th>
<th>4</th>
</tr>
</thead>
<tbody>
<tr>
<td>Steering Committee: Overall, to what extent was the criterion, Feasibility, met? Rationale:</td>
<td>4</td>
</tr>
<tr>
<td><strong>RECOMMENDATION</strong></td>
<td></td>
</tr>
<tr>
<td>(for NQF staff use) Check if measure is untested and only eligible for time-limited endorsement.</td>
<td></td>
</tr>
<tr>
<td><strong>CONTACT INFORMATION</strong></td>
<td></td>
</tr>
<tr>
<td>Co.1 Measure Steward (Intellectual Property Owner)</td>
<td></td>
</tr>
<tr>
<td>Co.1 Organization</td>
<td></td>
</tr>
<tr>
<td>Agency for Healthcare Research and Quality, 540 Gaither Road, Rockville, Maryland, 20850</td>
<td></td>
</tr>
<tr>
<td>Co.2 Point of Contact</td>
<td></td>
</tr>
<tr>
<td>John, Bott, MSSW, MBA, <a href="mailto:John.Bott@AHRQ.hhs.gov">John.Bott@AHRQ.hhs.gov</a>, 301-427-1317-</td>
<td></td>
</tr>
<tr>
<td>Measure Developer If different from Measure Steward</td>
<td></td>
</tr>
<tr>
<td>Co.3 Organization</td>
<td></td>
</tr>
<tr>
<td>Agency for Healthcare Research and Quality, 540 Gaither Road, Rockville, Maryland, 20850</td>
<td></td>
</tr>
<tr>
<td>Co.4 Point of Contact</td>
<td></td>
</tr>
<tr>
<td>John, Bott, MSSW, MBA, <a href="mailto:John.Bott@AHRQ.hhs.gov">John.Bott@AHRQ.hhs.gov</a>, 301-427-1317-</td>
<td></td>
</tr>
<tr>
<td>Co.5 Submitter If different from Measure Steward POC</td>
<td></td>
</tr>
<tr>
<td>John, Bott, MSSW, MBA, <a href="mailto:John.Bott@AHRQ.hhs.gov">John.Bott@AHRQ.hhs.gov</a>, 301-427-1317-, Agency for Healthcare Research and Quality</td>
<td></td>
</tr>
<tr>
<td>Co.6 Additional organizations that sponsored/participated in measure development</td>
<td></td>
</tr>
</tbody>
</table>

**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,
<table>
<thead>
<tr>
<th>Measure Developer/Steward Updates and Ongoing Maintenance</th>
</tr>
</thead>
<tbody>
<tr>
<td>Ad.2 If adapted, provide name of original measure: None</td>
</tr>
<tr>
<td>Ad.3-5 If adapted, provide original specifications URL or attachment</td>
</tr>
</tbody>
</table>

| Year the measure was first released: 2001 |
| Month and Year of most recent revision: 10, 2010 |
| What is your frequency for review/update of this measure? Annual |
| When is the next scheduled review/update for this measure? 05, 2011 |

| Copyright statement/disclaimers: The AHRQ QI software is publicly available; no copyright disclaimers |
| Additional Information web page URL or attachment: |

| Date of Submission (MM/DD/YY): 06/14/2011 |
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)

---

### MEASURE DESCRIPTIVE INFORMATION

<table>
<thead>
<tr>
<th>De.1 Measure Title:</th>
<th>Pancreatic Resection Volume (IQI 2)</th>
</tr>
</thead>
<tbody>
<tr>
<td>De.2 Brief description of measure:</td>
<td>Number of discharges with procedure for pancreatic resection.</td>
</tr>
<tr>
<td>1.1-2 Type of Measure:</td>
<td>Structure</td>
</tr>
<tr>
<td>De.3 If included in a composite or paired with another measure, please identify composite or paired measure</td>
<td>Pancreatic Resection Mortality (IQI 9) NQF #0365</td>
</tr>
<tr>
<td>De.4 National Priority Partners Priority Area:</td>
<td>Population health, Safety</td>
</tr>
<tr>
<td>De.5 IOM Quality Domain:</td>
<td>Effectiveness, Safety</td>
</tr>
<tr>
<td>De.6 Consumer Care Need:</td>
<td>Getting better</td>
</tr>
</tbody>
</table>

---

### CONDITIONS FOR CONSIDERATION BY NQF

<table>
<thead>
<tr>
<th>Four conditions must be met before proposed measures may be considered and evaluated for suitability as voluntary consensus standards:</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>A.</strong> The measure is in the public domain or an intellectual property (<a href="https://example.com">measure steward agreement</a>) is signed.</td>
</tr>
<tr>
<td>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.</td>
</tr>
<tr>
<td><strong>A.1</strong> 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)? <strong>Yes</strong></td>
</tr>
<tr>
<td><strong>A.2</strong> Indicate if Proprietary Measure (as defined in measure steward agreement): <strong>Y</strong></td>
</tr>
<tr>
<td><strong>A.3</strong> Measure Steward Agreement: Government entity and in the public domain - no agreement necessary <strong>A</strong></td>
</tr>
<tr>
<td><strong>A.4</strong> Measure Steward Agreement attached: <strong>N</strong></td>
</tr>
<tr>
<td><strong>B.</strong> 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. <strong>Yes</strong>, information provided in contact section</td>
</tr>
</tbody>
</table>

---

Rating: C=Completely; P=Partially; M=Minimally; N=Not at all; NA=Not applicable
C. The intended use of the measure includes both public reporting and quality improvement.

**Purpose:** Public Reporting, Quality Improvement (Internal to the specific organization)

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  

(for NQF staff use) Have all conditions for consideration been met?  

Staff Notes to Steward (if submission returned):

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

(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]
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). At threshold 2, 27.0% were performed at high-volume providers (and 4.2% of providers are high volume). 

1a.4 Citations for Evidence of High Impact: Updated citations will be presented in the May Steering Committee meeting


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):

<table>
<thead>
<tr>
<th>Sex</th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>Male</td>
<td>1,109</td>
</tr>
<tr>
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<td>1,117</td>
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<table>
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<tr>
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<td>18 to 39</td>
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<tr>
<td>40 to 64</td>
<td>960</td>
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<tr>
<td>65 to 74</td>
<td>673</td>
</tr>
<tr>
<td>75+</td>
<td>459</td>
</tr>
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</table>

<table>
<thead>
<tr>
<th>Coverage</th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>Medicare</td>
<td>1,049</td>
</tr>
<tr>
<td>Medicaid</td>
<td>129</td>
</tr>
<tr>
<td>Other</td>
<td>1,034</td>
</tr>
</tbody>
</table>

1b.3 Citations for data on performance gap:

1b.4 Summary of Data on disparities by population group:
Comparative Data for the IQI based on the 2008 Nationwide Inpatient Sample (NIS):

<table>
<thead>
<tr>
<th>Sex</th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>Male</td>
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<tr>
<td>Female</td>
<td>1,117</td>
</tr>
</tbody>
</table>

Rating: C=Completely; P=Partially; M=Minimally; N=Not at all; NA=Not applicable
1b.5 Citations for data on Disparities:

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 6-10 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]

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 risk-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:
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

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?

Steering Committee: Was the threshold criterion, Importance to Measure and Report, met?
Rationale:
### 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)

<table>
<thead>
<tr>
<th>Eval Rating</th>
</tr>
</thead>
</table>

### 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

<table>
<thead>
<tr>
<th><strong>2a.1 Numerator Statement</strong> (Brief, text description of the numerator - what is being measured about the target population, e.g. target condition, event, or outcome):</th>
</tr>
</thead>
<tbody>
<tr>
<td>Discharges, age 18 years and older, with ICD-9-CM codes for pancreatic resection procedure.</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th><strong>2a.2 Numerator Time Window</strong> (The time period in which cases are eligible for inclusion in the numerator):</th>
</tr>
</thead>
<tbody>
<tr>
<td>Time window can be determined by user, but is generally a calendar year.</td>
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</tbody>
</table>

<table>
<thead>
<tr>
<th><strong>2a.3 Numerator Details</strong> (All information required to collect/calculate the numerator, including all codes, logic, and definitions):</th>
</tr>
</thead>
<tbody>
<tr>
<td>Discharges, age 18 years and older, with ICD-9-CM codes for pancreatic resection procedure.</td>
</tr>
</tbody>
</table>

**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)

<table>
<thead>
<tr>
<th><strong>2a.4 Denominator Statement</strong> (Brief, text description of the denominator - target population being measured):</th>
</tr>
</thead>
<tbody>
<tr>
<td>not applicable</td>
</tr>
</tbody>
</table>

| **2a.5 Target population gender:** Female, Male  
**2a.6 Target population age range:** 18 and older |

<table>
<thead>
<tr>
<th><strong>2a.7 Denominator Time Window</strong> (The time period in which cases are eligible for inclusion in the denominator):</th>
</tr>
</thead>
<tbody>
<tr>
<td>Not applicable</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th><strong>2a.8 Denominator Details</strong> (All information required to collect/calculate the denominator - the target population being measured - including all codes, logic, and definitions):</th>
</tr>
</thead>
<tbody>
<tr>
<td>Not applicable</td>
</tr>
</tbody>
</table>

| **2a.9 Denominator Exclusions** (Brief text description of exclusions from the target population): Not |

Rating: C=Completely; P=Partially; M=Minimally; N=Not at all; NA=Not applicable
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

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):
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.

### 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. 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. 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.

### 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

### 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):
<table>
<thead>
<tr>
<th>Section</th>
<th>Description</th>
<th>Rating</th>
</tr>
</thead>
<tbody>
<tr>
<td>2e.4</td>
<td>If outcome or resource use measure is not risk adjusted, provide rationale:</td>
<td>Not applicable</td>
</tr>
<tr>
<td>2f</td>
<td>Identification of Meaningful Differences in Performance</td>
<td></td>
</tr>
<tr>
<td>2f.1</td>
<td>Data/sample from Testing or Current Use (description of data/sample and size):</td>
<td>AHRQ 2007 State Inpatient Databases (SID) with 4,000 hospitals and 30 million adult discharges</td>
</tr>
<tr>
<td>2f.2</td>
<td>Methods to identify statistically significant and practically/meaningfully differences in performance (type of analysis &amp; rationale):</td>
<td>Empirical analysis</td>
</tr>
<tr>
<td>2f.3</td>
<td>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):</td>
<td></td>
</tr>
<tr>
<td>2f.4</td>
<td>Identification of Meaningful Differences in Performance</td>
<td></td>
</tr>
<tr>
<td>2g</td>
<td>Comparability of Multiple Data Sources/Methods</td>
<td></td>
</tr>
<tr>
<td>2g.1</td>
<td>Data/sample (description of data/sample and size):</td>
<td>Not applicable</td>
</tr>
<tr>
<td>2g.2</td>
<td>Analytic Method (type of analysis &amp; rationale):</td>
<td>Not applicable</td>
</tr>
<tr>
<td>2g.3</td>
<td>Testing Results (e.g., correlation statistics, comparison of rankings):</td>
<td>Not applicable</td>
</tr>
<tr>
<td>2h</td>
<td>Disparities in Care</td>
<td></td>
</tr>
<tr>
<td>2h.1</td>
<td>If measure is stratified, provide stratified results (scores by stratified categories/cohorts):</td>
<td>Not applicable</td>
</tr>
<tr>
<td>2h.2</td>
<td>If disparities have been reported/identified, but measure is not specified to detect disparities, provide follow-up plans:</td>
<td>Not applicable</td>
</tr>
<tr>
<td>3</td>
<td>USABILITY</td>
<td></td>
</tr>
<tr>
<td>3a</td>
<td>Meaningful, Understandable, and Useful Information</td>
<td></td>
</tr>
<tr>
<td>3a.1</td>
<td>Current Use:</td>
<td>In use</td>
</tr>
<tr>
<td>3a.2</td>
<td>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</td>
<td></td>
</tr>
</tbody>
</table>
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

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=%3E3E%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

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

TAP/Workgroup: What are the strengths and weaknesses in relation to the subcriteria for Usability?
### Steering Committee: Overall, to what extent was the criterion, *Usability*, met?

**Rationale:**

<table>
<thead>
<tr>
<th>C</th>
<th>P</th>
<th>M</th>
<th>N</th>
</tr>
</thead>
<tbody>
<tr>
<td>3</td>
<td></td>
<td></td>
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</tbody>
</table>

### 4. FEASIBILITY

Extent to which the required data are readily available, retrievable without undue burden, and can be implemented for performance measurement. *(evaluation criteria)*

#### 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)*

#### 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.**

#### 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.**

#### 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 5-year period; therefore, this indicator is expected to have poor precision.*

#### 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:**
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?

Steering Committee: Overall, to what extent was the criterion, Feasibility, met?
Rationale:

<table>
<thead>
<tr>
<th>RECOMMENDATION</th>
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</thead>
<tbody>
<tr>
<td>(for NQF staff use) Check if measure is untested and only eligible for time-limited endorsement.</td>
</tr>
<tr>
<td>Time-limited</td>
</tr>
</tbody>
</table>

Steering Committee: Do you recommend for endorsement?
Comments:

<table>
<thead>
<tr>
<th>CONTACT INFORMATION</th>
</tr>
</thead>
<tbody>
<tr>
<td>Co.1 Measure Steward (Intellectual Property Owner)</td>
</tr>
<tr>
<td>Co.1 Organization</td>
</tr>
<tr>
<td>Agency for Healthcare Research and Quality, 540 Gaither Road, Rockville, Maryland, 20850</td>
</tr>
<tr>
<td>Co.2 Point of Contact</td>
</tr>
<tr>
<td>Joh, Bott, MSSW, MBA, <a href="mailto:david.atkins@ahrq.hhs.gov">david.atkins@ahrq.hhs.gov</a>, 301-427-1317-</td>
</tr>
<tr>
<td>Measure Developer if different from Measure Steward</td>
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<tr>
<td>Co.3 Organization</td>
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<tr>
<td>Agency for Healthcare Research and Quality, 540 Gaither Road, Rockville, Maryland, 20850</td>
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<tr>
<td>Co.5 Submitter if different from Measure Steward POC</td>
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<tr>
<td>Joh, Bott, MSSW, MBA, <a href="mailto:david.atkins@ahrq.hhs.gov">david.atkins@ahrq.hhs.gov</a>, 301-427-1317-, Agency for Healthcare Research and Quality</td>
</tr>
<tr>
<td>Co.6 Additional organizations that sponsored/participated in measure development</td>
</tr>
<tr>
<td>UC Davis, Stanford University, Battelle Memorial Institute</td>
</tr>
</tbody>
</table>

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 | Additional Information web page URL or attachment: | |
| Date of Submission (MM/DD/YY): | 06/14/2011 |
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

<table>
<thead>
<tr>
<th>De.1 Measure Title</th>
<th>Hospital Transfer/Admission</th>
</tr>
</thead>
<tbody>
<tr>
<td>De.2 Brief description of measure</td>
<td>Rate of ASC admissions requiring a hospital transfer or hospital admission upon discharge from the ASC</td>
</tr>
<tr>
<td>1.1-2 Type of Measure</td>
<td>Outcome</td>
</tr>
<tr>
<td>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</td>
<td></td>
</tr>
<tr>
<td>De.4 National Priority Partners Priority Area</td>
<td>Safety</td>
</tr>
<tr>
<td>De.5 IOM Quality Domain</td>
<td>Effectiveness</td>
</tr>
<tr>
<td>De.6 Consumer Care Need</td>
<td>Staying healthy</td>
</tr>
</tbody>
</table>

### CONDITIONS FOR CONSIDERATION BY NQF

Four conditions must be met before proposed measures may be considered and evaluated for suitability as voluntary consensus standards:

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

Rating: C=Completely; P=Partially; M=Minimally; N=Not at all; NA=Not applicable
### 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

### 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)

### 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

(for NQF staff use) **Have all conditions for consideration been met?**  Yes

Staff Notes to Steward (if submission returned):

**Staff Notes to Reviewers (issues or questions regarding any criteria):**

Staff Reviewer Name(s):

---

### TAP/Workgroup Reviewer Name:

**Steering Committee Reviewer Name:**

<table>
<thead>
<tr>
<th>1. IMPORTANCE TO MEASURE AND REPORT</th>
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**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

(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
aggressive treatment of pain and postoperative nausea and vomiting. 3-10


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.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):  


Rating: C=Completely; P=Partially; M=Minimally; N=Not at all; NA=Not applicable


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?

Steering Committee: Was the threshold criterion, Importance to Measure and Report, met?
Rationale: Y

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)

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): 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.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)
- 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.

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
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

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.

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
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

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.

TAP/Workgroup: What are the strengths and weaknesses in relation to the subcriteria for Scientific Acceptability of Measure Properties?
Steering Committee: Overall, to what extent was the criterion, Scientific Acceptability of Measure Properties, met?
Rationale:

3. USABILITY
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)

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?

<table>
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<tr>
<th>Rating: M N NA</th>
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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:

### 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

### TAP/Workgroup: What are the strengths and weaknesses in relation to the subcriteria for Usability?

Steering Committee: Overall, to what extent was the criterion, Usability, met?

#### Rationale:

### 4. FEASIBILITY

Extent to which the required data are readily available, retrievable without undue burden, and can be implemented for performance measurement. ([evaluation criteria](#))

### 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)

### 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.

### 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.

### 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.

### 4e. Data Collection Strategy/Implementation

Rating: C=Completely; P=Partially; M=Minimally; N=Not at all; NA=Not applicable
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

TAP/Workgroup: What are the strengths and weaknesses in relation to the subcriteria for Feasibility?

Steering Committee: Overall, to what extent was the criterion, Feasibility, met?
Rationale:

RECOMMENDATION
(for NQF staff use) Check if measure is untested and only eligible for time-limited endorsement.

Steering Committee: Do you recommend for endorsement?
Comments:

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

Rating: C=Completely; P=Partially; M=Minimally; N=Not at all; NA=Not applicable
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

<table>
<thead>
<tr>
<th>MEASURE DESCRIPTIVE INFORMATION</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>De.1 Measure Title:</strong> Statin Therapy at Discharge after Lower Extremity Bypass (LEB)</td>
</tr>
<tr>
<td><strong>De.2 Brief description of measure:</strong> 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.</td>
</tr>
<tr>
<td><strong>1.1-2 Type of Measure:</strong> Process</td>
</tr>
<tr>
<td><strong>De.3 If included in a composite or paired with another measure, please identify composite or paired measure NA</strong></td>
</tr>
<tr>
<td><strong>De.4 National Priority Partners Priority Area:</strong> Population health, Safety</td>
</tr>
<tr>
<td><strong>De.5 IOM Quality Domain:</strong> Effectiveness, Patient-centered</td>
</tr>
<tr>
<td><strong>De.6 Consumer Care Need:</strong> Getting better</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>CONDITIONS FOR CONSIDERATION BY NQF</th>
</tr>
</thead>
<tbody>
<tr>
<td>Four conditions must be met before proposed measures may be considered and evaluated for suitability as voluntary consensus standards:</td>
</tr>
<tr>
<td><strong>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.</strong></td>
</tr>
<tr>
<td><strong>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)?</strong> Yes</td>
</tr>
<tr>
<td><strong>A.2 Indicate if Proprietary Measure (as defined in measure steward agreement):</strong></td>
</tr>
<tr>
<td><strong>A.3 Measure Steward Agreement:</strong> Agreement will be signed and submitted prior to or at the time of measure submission</td>
</tr>
<tr>
<td><strong>A.4 Measure Steward Agreement attached:</strong> Agreement With Measure Stewards_Agreement Between_National Quality Forum (12-6-2010)-63427851683518374.pdf</td>
</tr>
</tbody>
</table>

Rating: C=Completely; P=Partially; M=Minimally; N=Not at all; NA=Not applicable
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

C. The intended use of the measure includes both public reporting and quality improvement.

Purpose: Payment Program

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

(for NQF staff use) Have all conditions for consideration been met?
Staff Notes to Steward (if submission returned):

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

(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 loss but also an increased risk for cardiovascular events. 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. 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 analysis 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...
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

been collected on 3,693 patients who have undergone LEB. Unpublished analyses of these data demonstrate that only 45% of patients were prescribed statin therapy on hospital discharge.8 In patients undergoing lower extremity bypass, the Vascular Study Group of New England (VSGNE) recommends that all PAD patients be treated, independent of LDL level.10

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

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 management of PAD risk factors. The episode of care associated 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. 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.

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).8 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...
that only 41% of patients were taking statins preoperatively before LEB in 2004. Through quality improvement efforts, this percentage of patients discharged 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:
17. Henke PK, Blackburn S, Proctor MC, Stevens J, Mukherjee D, Rajagopal S, et al. Patients undergoing infrainguinal bypass to treat atherosclerotic vascular disease are underprescribed


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.
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

1c.7 Summary of Controversy/Contradictory Evidence: None

Rating: C=Completely; P=Partially; M=Minimally; N=Not at all; NA=Not applicable
1c.8 Citations for Evidence (other than guidelines):  
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.  

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.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?

Steering Committee: Was the threshold criterion, Importance to Measure and Report, met?

Rationale:

Y

1

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)

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.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 discrepancies 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

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 validity 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.
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

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%.

### 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

### 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 statistical 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):
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

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

TAP/Workgroup: What are the strengths and weaknesses in relation to the subcriteria for Scientific Acceptability of Measure Properties?

Steering Committee: Overall, to what extent was the criterion, Scientific Acceptability of Measure Properties, met?
Rationale:

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)

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 perioperative 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 discharge 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.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):
Benchmark 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

### 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:

<table>
<thead>
<tr>
<th>TAP/Workgroup: What are the strengths and weaknesses in relation to the subcriteria for Usability?</th>
<th>3</th>
</tr>
</thead>
<tbody>
<tr>
<td>Steering Committee: Overall, to what extent was the criterion, Usability, met?</td>
<td>3</td>
</tr>
<tr>
<td>Rationale:</td>
<td></td>
</tr>
</tbody>
</table>

### 4. FEASIBILITY
Extent to which the required data are readily available, retrievable without undue burden, and can be implemented for performance measurement. (*evaluation criteria*)

#### 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)

#### 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.

### 4c. Exclusions

Rating: C=Completely; P=Partially; M=Minimally; N=Not at all; NA=Not applicable
| 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. | |

## 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 inaccurately code statin status. We have overcome this by providing each site with a list of generic and trade names for known statin medications. |

## 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: |
| TAP/Workgroup: What are the strengths and weaknesses in relation to the subcriteria for Feasibility? |

## Steering Committee: Overall, to what extent was the criterion, Feasibility, met? |

### Rationale:

## 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:

## 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
<table>
<thead>
<tr>
<th>Co.3 Organization</th>
<th>Society for Vascular Surgery, 633 N. Saint Clair St., 22nd Floor, Chicago, Illinois, 60611</th>
</tr>
</thead>
<tbody>
<tr>
<td>Co.4 Point of Contact</td>
<td>Sarah, Murphy, Staff, <a href="mailto:smurphy@vascularsociety.org">smurphy@vascularsociety.org</a>, 312-334-2305-</td>
</tr>
<tr>
<td>Co.5 Submitter if different from Measure Steward POC</td>
<td>Sarah, Murphy, Staff, <a href="mailto:smurphy@vascularsociety.org">smurphy@vascularsociety.org</a>, 312-334-2305-, Society for Vascular Surgery</td>
</tr>
<tr>
<td>Co.6 Additional organizations that sponsored/participated in measure development</td>
<td>The Vascular Study Group of New England</td>
</tr>
</tbody>
</table>

### 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**
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**

<table>
<thead>
<tr>
<th>De.1 Measure Title:</th>
<th>Abdominal Aortic Aneurysm (AAA) Repair Volume (IQI 4)</th>
</tr>
</thead>
<tbody>
<tr>
<td>De.2 Brief description of measure:</td>
<td>Count of discharges with a procedure code of provider-level AAA repair.</td>
</tr>
</tbody>
</table>

**CONDITIONS FOR CONSIDERATION BY NQF**

Four conditions must be met before proposed measures may be considered and evaluated for suitability as voluntary consensus standards:

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:

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
C. The intended use of the measure includes **both** public reporting and quality improvement.

**Purpose:** Public Reporting, Quality Improvement (Internal to the specific organization)

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

<table>
<thead>
<tr>
<th>(for NQF staff use) Have all conditions for consideration been met?</th>
<th>Met</th>
</tr>
</thead>
</table>

**Staff Notes to Steward (if submission returned):**

**Staff Notes to Reviewers (issues or questions regarding any criteria):**

**Staff Reviewer Name(s):**

---

**1. IMPORTANCE TO MEASURE AND REPORT**

**Extant 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

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


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):

<table>
<thead>
<tr>
<th>SEX</th>
<th>Males</th>
<th>Females</th>
</tr>
</thead>
<tbody>
<tr>
<td>7,795</td>
<td></td>
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<td>1,574</td>
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<td></td>
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<tr>
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<td>2,243</td>
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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:

1b.4 Summary of Data on disparities by population group:

Comparative Data for the IQI based on the 2008 Nationwide Inpatient Sample (NIS):

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</table>

Information about NIS can be found at this AHRQ link: http://www.hcup-us.ahrq.gov/nisoverview.jsp#Whatis
1b.5 Citations for data on Disparities:

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]


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
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) carries 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


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?

Steering Committee: Was the threshold criterion, Importance to Measure and Report, met?
Rationale:

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)

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 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.
### Detail of Risk Model

#### 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

#### 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.

#### 2c. Validity testing

#### 2c.1 Data/sample (description of data/sample and size):
AHRQ 2007 State Inpatient Databases (SID) with

---

Rating: C=Completely; P=Partially; M=Minimally; N=Not at all; NA=Not applicable
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:

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

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
(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):

<table>
<thead>
<tr>
<th>Q1</th>
<th>Q2</th>
<th>Q3</th>
<th>Q4</th>
</tr>
</thead>
<tbody>
<tr>
<td>1.9</td>
<td>5.6</td>
<td>13.8</td>
<td>47.3</td>
</tr>
</tbody>
</table>

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

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

TAP/Workgroup: What are the strengths and weaknesses in relation to the subcriteria for Scientific Acceptability of Measure Properties?

Steering Committee: Overall, to what extent was the criterion, Scientific Acceptability of Measure Properties, met?
Rationale:

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)

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
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

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%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://monaahrq.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

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

**TAP/Workgroup: What are the strengths and weaknesses in relation to the subcriteria for Usability?**

Rating: C=Completely; P=Partially; M=Minimally; N=Not at all; NA=Not applicable
### Steering Committee: Overall, to what extent was the criterion, *Usability*, met?

**Rationale:**

<table>
<thead>
<tr>
<th>3</th>
<th>C</th>
<th>P</th>
<th>M</th>
<th>N</th>
</tr>
</thead>
</table>

### 4. FEASIBILITY

Extent to which the required data are readily available, retrievable without undue burden, and can be implemented for performance measurement. ([evaluation criteria](#))

#### 4a. Data Generated as a Byproduct of Care Processes

<table>
<thead>
<tr>
<th>4a</th>
<th>C</th>
<th>P</th>
<th>M</th>
<th>N</th>
</tr>
</thead>
</table>

**Rationale:**

#### 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)_

<table>
<thead>
<tr>
<th>4a.1</th>
<th>C</th>
<th>P</th>
<th>M</th>
<th>N</th>
</tr>
</thead>
</table>

#### 4b. Electronic Sources

<table>
<thead>
<tr>
<th>4b</th>
<th>C</th>
<th>P</th>
<th>M</th>
<th>N</th>
</tr>
</thead>
</table>

**Rationale:**

#### 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**

<table>
<thead>
<tr>
<th>4b.2</th>
<th>C</th>
<th>P</th>
<th>M</th>
<th>N</th>
</tr>
</thead>
</table>

#### 4c. Exclusions

<table>
<thead>
<tr>
<th>4c</th>
<th>C</th>
<th>P</th>
<th>M</th>
<th>N</th>
</tr>
</thead>
</table>

**Rationale:**

#### 4c.1 Do the specified exclusions require additional data sources beyond what is required for the numerator and denominator specifications?

**No**

<table>
<thead>
<tr>
<th>4c.2</th>
<th>C</th>
<th>P</th>
<th>M</th>
<th>N</th>
</tr>
</thead>
</table>

#### 4d. Susceptibility to Inaccuracies, Errors, or Unintended Consequences

<table>
<thead>
<tr>
<th>4d</th>
<th>C</th>
<th>P</th>
<th>M</th>
<th>N</th>
</tr>
</thead>
</table>

**Rationale:**

#### 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.

<table>
<thead>
<tr>
<th>4e</th>
<th>C</th>
<th>P</th>
<th>M</th>
<th>N</th>
</tr>
</thead>
</table>

### 4e. Data Collection Strategy/Implementation

<table>
<thead>
<tr>
<th>4e</th>
<th>C</th>
<th>P</th>
<th>M</th>
<th>N</th>
</tr>
</thead>
</table>

**Rationale:**

#### 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](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: |  |

| RECOMMENDATION |
| (for NQF staff use) Check if measure is untested and only eligible for time-limited endorsement. |  |
| Steering Committee: Do you recommend for endorsement? |  |
| Comments: |  |

| 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- |
| Co.3 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 | Additional Information web page URL or attachment: |
| Date of Submission (MM/DD/YY): | 06/14/2011 |
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.

### Measure Descriptive Information

<table>
<thead>
<tr>
<th>De.1 Measure Title:</th>
<th>Abdominal Aortic Artery (AAA) Repair Mortality Rate (IQI 11)</th>
</tr>
</thead>
<tbody>
<tr>
<td>De.2 Brief description of measure:</td>
<td>Percent of discharges with procedure code of AAA repair with an in-hospital death.</td>
</tr>
<tr>
<td>1.1-2 Type of Measure:</td>
<td>Outcome</td>
</tr>
<tr>
<td>1.1.3 If included in a composite or paired with another measure, please identify composite or paired measure</td>
<td>Abdominal Aortic Artery (AAA) Repair Volume (IQI 4) (NQF #0357)</td>
</tr>
<tr>
<td>De.4 National Priority Partners Priority Area:</td>
<td>Population health, Safety</td>
</tr>
<tr>
<td>De.5 IOM Quality Domain:</td>
<td>Effectiveness, Safety</td>
</tr>
<tr>
<td>De.6 Consumer Care Need:</td>
<td>Getting better</td>
</tr>
</tbody>
</table>

### Conditions for Consideration by NQF

Four conditions must be met before proposed measures may be considered and evaluated for suitability as voluntary consensus standards:

<table>
<thead>
<tr>
<th>A. The measure is in the public domain or an intellectual property (measure steward agreement) is signed.</th>
</tr>
</thead>
<tbody>
<tr>
<td>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.</td>
</tr>
<tr>
<td>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</td>
</tr>
<tr>
<td>A.2 Indicate if Proprietary Measure (as defined in measure steward agreement):</td>
</tr>
<tr>
<td>A.3 Measure Steward Agreement: Government entity and in the public domain - no agreement necessary</td>
</tr>
<tr>
<td>A.4 Measure Steward Agreement attached:</td>
</tr>
</tbody>
</table>

| 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 |

Rating: C=Completely; P=Partially; M=Minimally; N=Not at all; NA=Not applicable
### 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.**

#### 1a. High Impact

**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


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.

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

<table>
<thead>
<tr>
<th>Estimate</th>
<th>Standard error</th>
<th>Age: for conditions affecting any age</th>
</tr>
</thead>
<tbody>
<tr>
<td>*</td>
<td>*</td>
<td>18-44</td>
</tr>
<tr>
<td>23.652</td>
<td>1.960</td>
<td>45-64</td>
</tr>
<tr>
<td>66.393</td>
<td>1.451</td>
<td>65 and over</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Estimate</th>
<th>Standard error</th>
<th>Age: for conditions affecting elderly</th>
</tr>
</thead>
<tbody>
<tr>
<td>43.864</td>
<td>2.381</td>
<td>65-69</td>
</tr>
<tr>
<td>50.251</td>
<td>2.498</td>
<td>70-74</td>
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<tr>
<td>79.688</td>
<td>3.095</td>
<td>75-79</td>
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<td>72.624</td>
<td>3.695</td>
<td>80-84</td>
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<tr>
<td>107.763</td>
<td>6.188</td>
<td>85 and over</td>
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<td>3.249</td>
<td>Female</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Estimate</th>
<th>Standard error</th>
<th>Median income of patient’s ZIP code</th>
</tr>
</thead>
<tbody>
<tr>
<td>59.088</td>
<td>2.445</td>
<td>First quartile (lowest income)</td>
</tr>
<tr>
<td>54.793</td>
<td>2.336</td>
<td>Second quartile</td>
</tr>
<tr>
<td>58.174</td>
<td>2.397</td>
<td>Third quartile</td>
</tr>
<tr>
<td>54.942</td>
<td>2.561</td>
<td>Fourth quartile (highest income)</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Estimate</th>
<th>Standard error</th>
<th>Location of patient residence (NCHS)</th>
</tr>
</thead>
<tbody>
<tr>
<td>48.893</td>
<td>2.572</td>
<td>Large central metropolitan</td>
</tr>
<tr>
<td>57.852</td>
<td>2.538</td>
<td>Large fringe metropolitan</td>
</tr>
<tr>
<td>57.678</td>
<td>2.492</td>
<td>Medium metropolitan</td>
</tr>
<tr>
<td>64.648</td>
<td>3.682</td>
<td>Small metropolitan</td>
</tr>
<tr>
<td>56.657</td>
<td>3.484</td>
<td>Micropolitan</td>
</tr>
<tr>
<td>62.375</td>
<td>4.327</td>
<td>Not metropolitan or micropolitan</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Estimate</th>
<th>Standard error</th>
<th>Expected payment source</th>
</tr>
</thead>
<tbody>
<tr>
<td>45.140</td>
<td>3.185</td>
<td>Private insurance</td>
</tr>
<tr>
<td>57.658</td>
<td>1.353</td>
<td>Medicare</td>
</tr>
<tr>
<td>85.285</td>
<td>9.645</td>
<td>Medicaid</td>
</tr>
<tr>
<td>76.100</td>
<td>9.933</td>
<td>Other insurance</td>
</tr>
<tr>
<td>73.418</td>
<td>9.344</td>
<td>Uninsured / self-pay / no charge</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Estimate</th>
<th>Standard error</th>
<th>Hospital Ownership/control</th>
</tr>
</thead>
<tbody>
<tr>
<td>56.433</td>
<td>1.380</td>
<td>Private, not-for-profit</td>
</tr>
<tr>
<td>56.869</td>
<td>3.651</td>
<td>Private, for-profit</td>
</tr>
</tbody>
</table>
### 58.869 3.602 Public

#### Estimate Standard error Teaching status

<table>
<thead>
<tr>
<th>Estimate</th>
<th>Standard error</th>
<th>Teaching status</th>
</tr>
</thead>
<tbody>
<tr>
<td>52.177</td>
<td>1.899</td>
<td>Teaching</td>
</tr>
<tr>
<td>59.950</td>
<td>1.582</td>
<td>Nonteaching</td>
</tr>
</tbody>
</table>

#### Estimate Standard error Location of hospital

<table>
<thead>
<tr>
<th>Estimate</th>
<th>Standard error</th>
<th>Location</th>
</tr>
</thead>
<tbody>
<tr>
<td>49.673</td>
<td>2.096</td>
<td>Large central metropolitan</td>
</tr>
<tr>
<td>59.498</td>
<td>2.865</td>
<td>Large fringe metropolitan</td>
</tr>
<tr>
<td>57.560</td>
<td>2.322</td>
<td>Medium metropolitan</td>
</tr>
<tr>
<td>68.001</td>
<td>3.190</td>
<td>Small metropolitan</td>
</tr>
<tr>
<td>60.056</td>
<td>4.952</td>
<td>Micropolitan</td>
</tr>
<tr>
<td>*</td>
<td>*</td>
<td>Not metropolitan or micropolitan</td>
</tr>
</tbody>
</table>

#### Estimate Standard error Bed size of hospital

<table>
<thead>
<tr>
<th>Estimate</th>
<th>Standard error</th>
<th>Bed size of hospital</th>
</tr>
</thead>
<tbody>
<tr>
<td>55.838</td>
<td>6.706</td>
<td>Less than 100</td>
</tr>
<tr>
<td>66.185</td>
<td>2.122</td>
<td>100 - 299</td>
</tr>
<tr>
<td>54.707</td>
<td>1.998</td>
<td>300 - 499</td>
</tr>
<tr>
<td>48.492</td>
<td>2.343</td>
<td>500 or more</td>
</tr>
</tbody>
</table>

### 1b.3 Citations for data on performance gap:

### 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, micropolitan and metropolitan and payer.

#### Adjusted per 1,000 rates by patient and hospital characteristics, 2007

<table>
<thead>
<tr>
<th>Mean (Standard error)</th>
<th>Location</th>
<th>P-value: Relative to Northeast</th>
</tr>
</thead>
<tbody>
<tr>
<td>61.859 (2.711)</td>
<td>Northeast</td>
<td>1.000</td>
</tr>
<tr>
<td>49.824 (2.554)</td>
<td>Midwest</td>
<td>0.001</td>
</tr>
<tr>
<td>53.232 (2.053)</td>
<td>South</td>
<td>0.011</td>
</tr>
<tr>
<td>65.177 (2.577)</td>
<td>West</td>
<td>0.375</td>
</tr>
</tbody>
</table>

#### RACE / ETHNICITY

<table>
<thead>
<tr>
<th>Rate per 100</th>
</tr>
</thead>
<tbody>
<tr>
<td>White</td>
</tr>
<tr>
<td>Black</td>
</tr>
<tr>
<td>Hispanic</td>
</tr>
<tr>
<td>Asian and NH/PI</td>
</tr>
<tr>
<td>Amer Indian/AN458</td>
</tr>
<tr>
<td>Other</td>
</tr>
</tbody>
</table>

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”
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
combines a subset of the SID data, hospital-level variables, and hospital and discharge weights for producing
can be broken down into three components: variation within a provider
(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.
• 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.
• 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:
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• 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.

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


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?
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)

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 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)
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

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

<table>
<thead>
<tr>
<th>Parameter</th>
<th>Label</th>
<th>DF</th>
<th>Estimate</th>
<th>Standard Error</th>
<th>Wald Chi-Square</th>
<th>Pr &gt; Chi-Square</th>
</tr>
</thead>
<tbody>
<tr>
<td>Intercept</td>
<td>1</td>
<td></td>
<td>-6.6044</td>
<td>0.1713</td>
<td>1486.040.0000</td>
<td></td>
</tr>
<tr>
<td>Sex</td>
<td>Female</td>
<td>1</td>
<td>0.4539</td>
<td>0.0747</td>
<td>36.95</td>
<td>0.0000</td>
</tr>
<tr>
<td>Age</td>
<td>65 to 74</td>
<td>1</td>
<td>0.4879</td>
<td>0.1072</td>
<td>20.72</td>
<td>0.0000</td>
</tr>
<tr>
<td>Age</td>
<td>75 to 79</td>
<td>1</td>
<td>0.8737</td>
<td>0.1201</td>
<td>52.97</td>
<td>0.0000</td>
</tr>
<tr>
<td>Age</td>
<td>80 to 84</td>
<td>1</td>
<td>1.1092</td>
<td>0.1200</td>
<td>85.50</td>
<td>0.0000</td>
</tr>
<tr>
<td>Age</td>
<td>85+</td>
<td>1</td>
<td>1.4440</td>
<td>0.1359</td>
<td>112.97</td>
<td>0.0000</td>
</tr>
<tr>
<td>APR-DRG</td>
<td>‘1691’ to ‘1692’</td>
<td>1</td>
<td>1.6789</td>
<td>0.1623</td>
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<td>647.42</td>
<td>0.0000</td>
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<td></td>
<td></td>
<td>0.937</td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

2c. Validation 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 from 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]
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) ($r=.17$, $p<.01$).[4]

References:


[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

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

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

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):
<table>
<thead>
<tr>
<th>5th</th>
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<th>Median</th>
<th>75th</th>
<th>95th</th>
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<td>0.036333</td>
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<td>0.055099</td>
<td>0.071948</td>
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</tbody>
</table>

2g. Comarbbilaty 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

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:
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:

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?

Steering Committee: Overall, to what extent was the criterion, Scientific Acceptability of Measure Properties, met?
Rationale:

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)

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-imici_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

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

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%3E%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 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?
The Leapfrog measure is based on the AHRQ specification, but is not risk-adjusted

#### 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

TAP/Workgroup: What are the strengths and weaknesses in relation to the subcriteria for Usability?
Steering Committee: Overall, to what extent was the criterion, Usability, met?
Rationale:

### 4. FEASIBILITY

Extent to which the required data are readily available, retrievable without undue burden, and can be implemented for performance measurement. (evaluation criteria)

#### 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)

#### 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.

#### 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.

#### 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 detailed guidelines, are subject to training and credentialing requirements, peer review and audit.

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 website, 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 website, 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 website, which is available at no cost.

TAP/Workgroup: What are the strengths and weaknesses in relation to the subcriteria for Feasibility?

Steering Committee: Overall, to what extent was the criterion, Feasibility, met?
Rationale:

RECOMMENDATION

(for NQF staff use) Check if measure is untested and only eligible for time-limited endorsement.

Steering Committee: Do you recommend for endorsement?
Comments:

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
<table>
<thead>
<tr>
<th>Workgroup/Expert Panel involved in measure development</th>
</tr>
</thead>
<tbody>
<tr>
<td>Ad.1 Provide a list of sponsoring organizations and workgroup/panel members’ names and organizations. Describe the members’ role in measure development.</td>
</tr>
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<td>None</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Measure Developer/Steward Updates and Ongoing Maintenance</th>
</tr>
</thead>
<tbody>
<tr>
<td>Ad.2 If adapted, provide name of original measure: None</td>
</tr>
<tr>
<td>Ad.3-5 If adapted, provide original specifications URL or attachment</td>
</tr>
<tr>
<td>Ad.6 Year the measure was first released: 2001</td>
</tr>
<tr>
<td>Ad.7 Month and Year of most recent revision: 10, 2010</td>
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<tr>
<td>Ad.8 What is your frequency for review/update of this measure? Annual</td>
</tr>
<tr>
<td>Ad.9 When is the next scheduled review/update for this measure? 05, 2011</td>
</tr>
<tr>
<td>Ad.10 Copyright statement/disclaimers: The AHRQ QI software is publicly available; no copyright disclaimers</td>
</tr>
<tr>
<td>Ad.11 -13 Additional Information web page URL or attachment: URL <a href="http://www.qualityindicators.ahrq.gov/downloads/technical/qi_technical_review.zip">http://www.qualityindicators.ahrq.gov/downloads/technical/qi_technical_review.zip</a></td>
</tr>
</tbody>
</table>

| Date of Submission (MM/DD/YY): 06/14/2011 |
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

<table>
<thead>
<tr>
<th>De.1 Measure Title:</th>
<th>In-hospital mortality following elective open repair of small AAAs</th>
</tr>
</thead>
<tbody>
<tr>
<td>De.2 Brief description of measure:</td>
<td>Percentage of asymptomatic 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.</td>
</tr>
<tr>
<td>1.1-2 Type of Measure:</td>
<td>Outcome</td>
</tr>
<tr>
<td>De.3 If included in a composite or paired with another measure, please identify composite or paired measure</td>
<td>Submitted SVS measure: In-hospital mortality following elective endovascular repair of small AAAs</td>
</tr>
<tr>
<td>De.4 National Priority Partners Priority Area:</td>
<td>Population health, Safety, Overuse</td>
</tr>
<tr>
<td>De.5 IOM Quality Domain:</td>
<td>Effectiveness, Efficiency, Safety</td>
</tr>
<tr>
<td>De.6 Consumer Care Need:</td>
<td>Staying healthy</td>
</tr>
</tbody>
</table>

CONDITIONS FOR CONSIDERATION BY NQF

Four conditions must be met before proposed measures may be considered and evaluated for suitability as voluntary consensus standards:

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

Rating: C=Completely; P=Partially; M=Minimally; N=Not at all; NA=Not applicable
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

C. The intended use of the measure includes both public reporting and quality improvement.

**Purpose:** Payment Program

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

(for NQF staff use) Have all conditions for consideration been met?

Staff Notes to Steward (if submission returned):

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

(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 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 cause of death overall and the 10th leading cause 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)


#### 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 assessed 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
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 (<6 cm 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 performance gap and opportunity for further improvement.

1b.3 Citations for data on performance gap:

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):
Mortality 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.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?

Steering Committee: Was the threshold criterion, Importance to Measure and Report, met?

Rationale:

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)

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 (i.e., 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 open infrarenal AAA repair if their aneurysm was asymptomatic and small (<6 cm dia in men, <5.5 cm dia in women, judged by preoperative imaging (CT, MR or ultrasound)).

<table>
<thead>
<tr>
<th>2a.4 Denominator Statement (Brief, text description of the denominator - target population being measured):</th>
<th>All elective open repairs of asymptomatic AAAs in men with &lt; 6 cm dia and women with &lt; 5.5 cm dia AAAs</th>
</tr>
</thead>
<tbody>
<tr>
<td>2a.5 Target population gender: Female, Male</td>
<td></td>
</tr>
<tr>
<td>2a.6 Target population age range: 18 years or older</td>
<td></td>
</tr>
<tr>
<td>2a.7 Denominator Time Window (The time period in which cases are eligible for inclusion in the denominator):</td>
<td>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 &lt;10 procedures (ie, reported as too low volume to report).</td>
</tr>
<tr>
<td>2a.8 Denominator Details (All information required to collect/calculate the denominator - the target population being measured - including all codes, logic, and definitions):</td>
<td>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 (&lt;6 cm dia in men, &lt;5.5 cm dia in women, judged by preoperative imaging (CT, MR or ultrasound)).</td>
</tr>
<tr>
<td>2a.9 Denominator Exclusions (Brief text description of exclusions from the target population): &gt; 6 cm minor diameter - men &gt; 5.5 cm minor diameter - women Symptomatic AAAs that required urgent/emergent (non-elective) repair</td>
<td></td>
</tr>
<tr>
<td>2a.10 Denominator Exclusion Details (All information required to collect exclusions to the denominator, including all codes, logic, and definitions):</td>
<td>Patients undergoing non-elective open repair of symptomatic AAAs or those with AAAs larger than the diameters noted above.</td>
</tr>
<tr>
<td>2a.11 Stratification Details/Variables (All information required to stratify the measure including the stratification variables, all codes, logic, and definitions):</td>
<td>Not required</td>
</tr>
<tr>
<td>2a.12-13 Risk Adjustment Type: No risk adjustment necessary</td>
<td></td>
</tr>
<tr>
<td>2a.14 Risk Adjustment Methodology/Variables (List risk adjustment variables and describe conceptual models, statistical models, or other aspects of model or method):</td>
<td>See &quot;Scientific Acceptability&quot; section for rationale</td>
</tr>
<tr>
<td>2a.15-17 Detailed risk model available Web page URL or attachment:</td>
<td></td>
</tr>
<tr>
<td>2a.18-19 Type of Score: Rate/proportion</td>
<td></td>
</tr>
<tr>
<td>2a.20 Interpretation of Score: Better quality = Lower score</td>
<td></td>
</tr>
<tr>
<td>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 &gt;6 cm, and women with AAA &gt;5.5, find number of deaths Outcome = deaths/ # cases</td>
<td></td>
</tr>
<tr>
<td>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.</td>
<td></td>
</tr>
<tr>
<td>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):</td>
<td></td>
</tr>
<tr>
<td>N/A</td>
<td></td>
</tr>
<tr>
<td>-----</td>
<td></td>
</tr>
<tr>
<td><strong>2a.24 Data Source</strong> <em>(Check the source(s) for which the measure is specified and tested)</em></td>
<td></td>
</tr>
<tr>
<td>Electronic Clinical Data: Registry</td>
<td></td>
</tr>
<tr>
<td><strong>2a.25 Data source/data collection instrument</strong> <em>(Identify the specific data source/data collection instrument, e.g. name of database, clinical registry, collection instrument, etc.)</em></td>
<td></td>
</tr>
<tr>
<td>Society for Vascular Surgery Vascular Quality Initiative Registry</td>
<td></td>
</tr>
<tr>
<td>Vascular Study Group of New England Registry</td>
<td></td>
</tr>
<tr>
<td><strong>2a.26-28 Data source/data collection instrument reference web page URL or attachment:</strong> Attachment Open_AAA_Repair_v1.9.xlsx</td>
<td></td>
</tr>
<tr>
<td><strong>2a.29-31 Data dictionary/code table web page URL or attachment:</strong> Attachment OPEN AAA defs v.01.09.doc</td>
<td></td>
</tr>
<tr>
<td><strong>2a.32-35 Level of Measurement/Analysis</strong> <em>(Check the level(s) for which the measure is specified and tested)</em></td>
<td></td>
</tr>
<tr>
<td>Clinician: Group/Practice, Clinician: Individual, Facility</td>
<td></td>
</tr>
<tr>
<td><strong>2a.36-37 Care Settings</strong> <em>(Check the setting(s) for which the measure is specified and tested)</em></td>
<td></td>
</tr>
<tr>
<td>Hospital/Acute Care Facility</td>
<td></td>
</tr>
<tr>
<td><strong>2a.38-41 Clinical Services</strong> <em>(Healthcare services being measured, check all that apply)</em></td>
<td></td>
</tr>
<tr>
<td>Clinicians: Physicians (MD/DO)</td>
<td></td>
</tr>
</tbody>
</table>

### 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 discrepancies 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 |

#### 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)*:

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:**


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)*:

<table>
<thead>
<tr>
<th>Men, &lt; 6 cm AAA</th>
<th>mdn 0% mortality, range 0-4.1% among 10 centers</th>
</tr>
</thead>
<tbody>
<tr>
<td>Women, &lt; 5.5 cm dia AAAs</td>
<td>mdn mortality 0%, range 0-10% among 9 centers</td>
</tr>
</tbody>
</table>

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

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**: N/A
(type of analysis & rationale): Standard statistical 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):

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.

TAP/Workgroup: What are the strengths and weaknesses in relation to the subcriteria for Scientific Acceptability of Measure Properties?

Steering Committee: Overall, to what extent was the criterion, Scientific Acceptability of Measure Properties, met?
Rationale:

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)

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*):
Benchmark 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?**

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:

**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:

**4. FEASIBILITY**
Extent to which the required data are readily available, retrievable without undue burden, and can be implemented for performance measurement. *(evaluation criteria)*

**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)

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.**

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.

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.

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 hospital 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:

TAP/Workgroup: What are the strengths and weaknesses in relation to the subcriteria for Feasibility?

Steering Committee: Overall, to what extent was the criterion, Feasibility, met?
Rationale:

RECOMMENDATION

(for NQF staff use) Check if measure is untested and only eligible for time-limited endorsement.

Steering Committee: Do you recommend for endorsement?
Comments:

CONTACT INFORMATION

Co.1 Measure Steward (Intellectual Property Owner)
Co.1 Organization

Co.2 Point of Contact
Sarah, Murphy, Staff, smurphy@vascularsociety.org, 312-334-2305

Measure Developer If different from Measure Steward
Co.3 Organization

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
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:

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

Rating: C=Completely; P=Partially; M=Minimally; N=Not at all; NA=Not applicable
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

C. The intended use of the measure includes both public reporting and quality improvement.

► Purpose: Payment Program

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

(for NQF staff use) Have all conditions for consideration been met?

Staff Notes to Steward (if submission returned):

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

(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)

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 assessed 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

Rating: C=Completely; P=Partially; M=Minimally; N=Not at all; NA=Not applicable
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 (<6 cm 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 performance gap and opportunity for further improvement.

1b.3 Citations for data on performance gap:


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):

Mortality 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.7 Summary of Controversy/Contradictory Evidence: None


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

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

Rating: C=Completely; P=Partially; M=Minimally; N=Not at all; NA=Not applicable
endovascular infrarenal AAA repair if their aneurysm was asymptomatic and small (< 6 cm 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 (< 6 cm 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 Acceptability" 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):
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 discrepancies 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

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):**
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:

#### 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):
<table>
<thead>
<tr>
<th>Group</th>
<th>AAA Diameter</th>
<th>Mortality Rate</th>
</tr>
</thead>
<tbody>
<tr>
<td>Men, &lt; 6 cm</td>
<td>AAA</td>
<td>0%</td>
</tr>
<tr>
<td>Men, &gt;= 6 cm</td>
<td>AAA</td>
<td>0%</td>
</tr>
<tr>
<td>Women, &lt; 5.5 cm</td>
<td>Dia AAAs</td>
<td>0%</td>
</tr>
<tr>
<td>Women, &gt;= 5.5 cm</td>
<td>Dia AAAs</td>
<td>0.9%</td>
</tr>
</tbody>
</table>

### 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

### 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 statistical 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): N/A

2g.3 Testing Results (e.g., correlation statistics, comparison of rankings): N/A

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.

TAP/Workgroup: What are the strengths and weaknesses in relation to the subcriteria for Scientific Acceptability of Measure Properties?

Steering Committee: Overall, to what extent was the criterion, Scientific Acceptability of Measure Properties, met?
Rationale:

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)

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):*
Benchmark 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?

#### 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:

### TAP/Workgroup: What are the strengths and weaknesses in relation to the subcriteria for Usability?

### Steering Committee: Overall, to what extent was the criterion, Usability, met?

### Rationale:

### 4. FEASIBILITY
Extent to which the required data are readily available, retrievable without undue burden, and can be implemented for performance measurement. *(evaluation criteria)*

#### 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)

#### 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.

#### 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.

**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.

<table>
<thead>
<tr>
<th>NA</th>
<th>4d</th>
<th>C</th>
<th>P</th>
<th>M</th>
<th>N</th>
</tr>
</thead>
</table>

### 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 hospital 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

TAP/Workgroup: What are the strengths and weaknesses in relation to the subcriteria for Feasibility?

<table>
<thead>
<tr>
<th>4</th>
<th>4C</th>
<th>4P</th>
<th>4M</th>
<th>4N</th>
</tr>
</thead>
</table>

RECOMMENDATION

(for NQF staff use) Check if measure is untested and only eligible for time-limited endorsement.

<table>
<thead>
<tr>
<th>Y</th>
<th>N</th>
<th>A</th>
</tr>
</thead>
</table>

Steering Committee: Do you recommend for endorsement?

Comments:

<table>
<thead>
<tr>
<th>Y</th>
<th>N</th>
<th>A</th>
</tr>
</thead>
</table>

### CONTACT INFORMATION

**Co.1 Measure Steward (Intellectual Property Owner)**

**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

**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

<table>
<thead>
<tr>
<th>MEASURE DESCRIPTIVE INFORMATION</th>
</tr>
</thead>
<tbody>
<tr>
<td>De.1 Measure Title: Postoperative Stroke or Death in Asymptomatic Patients undergoing Carotid Endarterectomy</td>
</tr>
<tr>
<td>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.</td>
</tr>
<tr>
<td>1.1-2 Type of Measure: Outcome</td>
</tr>
<tr>
<td>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</td>
</tr>
<tr>
<td>De.4 National Priority Partners Priority Area: Population health, Safety, Overuse</td>
</tr>
<tr>
<td>De.5 IOM Quality Domain: Effectiveness, Efficiency, Safety</td>
</tr>
<tr>
<td>De.6 Consumer Care Need: Staying healthy</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>CONDITIONS FOR CONSIDERATION BY NQF</th>
</tr>
</thead>
<tbody>
<tr>
<td>Four conditions must be met before proposed measures may be considered and evaluated for suitability as voluntary consensus standards:</td>
</tr>
<tr>
<td>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.</td>
</tr>
<tr>
<td>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</td>
</tr>
<tr>
<td>A.2 Indicate if Proprietary Measure (as defined in measure steward agreement):</td>
</tr>
<tr>
<td>A.3 Measure Steward Agreement: Agreement will be signed and submitted prior to or at the time of measure submission</td>
</tr>
</tbody>
</table>

Rating: C=Completely; P=Partially; M=Minimally; N=Not at all; NA=Not applicable
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

| C. The intended use of the measure includes both public reporting and quality improvement. |
| Purpose: Payment Program |

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

(for NQF staff use) Have all conditions for consideration been met?

| Met |

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

Extant 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

(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

Rating: C=Completely; P=Partially; M=Minimally; N=Not at all; NA=Not applicable
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 lesion 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:

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.

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 parameter 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 proposal we reviewed 4,613 CEAs performed for asymptomatic patients in VSGNE between 2003 to 2010. Among 17 hospitals, 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

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 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):

Stoke/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)**:

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


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...
2a. MEASURE SPECIFICATIONS

- **Do you have a web page where current detailed measure specifications can be obtained?**
- **If yes, provide web page URL:**

<table>
<thead>
<tr>
<th>2a.1 Numerator Statement</th>
<th>Brief, text description of the numerator - what is being measured about the target population, e.g. target condition, event, or outcome:</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Patients age 18 or older without preoperative carotid territory neurologic or retinal symptoms within the one year immediately preceding CEA who experience stroke or death during their hospitalization following carotid endarterectomy</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>2a.2 Numerator Time Window</th>
<th>The time period in which cases are eligible for inclusion in the numerator:</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>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 &lt; 10 procedures (ie, reported as too low volume to report).</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>2a.3 Numerator Details</th>
<th>All information required to collect/calculate the numerator, including all codes, logic, and definitions:</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>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.</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>2a.4 Denominator Statement</th>
<th>Brief, text description of the denominator - target population being measured:</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Asymptomatic patients (based on NASCET criteria) on the within one year of CEA</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>2a.5 Target population gender</th>
<th>Female, Male</th>
</tr>
</thead>
<tbody>
<tr>
<td>2a.6 Target population age range</td>
<td>18 years or older</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>2a.7 Denominator Time Window</th>
<th>The time period in which cases are eligible for inclusion in the denominator:</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>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 &lt; 10 procedures (ie, reported as too low volume to report).</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>2a.8 Denominator Details</th>
<th>All information required to collect/calculate the denominator - the target</th>
</tr>
</thead>
</table>
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 Acceptability” 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 in-hospital 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 discrepancies 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)

#### 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 corresponds to published results for asymptomatic patients.

#### 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:**

**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

Rating: C=Completely; P=Partially; M=Minimally; N=Not at all; NA=Not applicable
2e. Risk Adjustment for Outcomes/ Resource Use Measures

2e.1 Data/sample (description of data/sample and size): See “Scientific Acceptability” 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 patient 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 eliminates 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:

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 statistical 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): other sample not available

2g.2 Analytic Method (type of analysis & rationale):

2g.3 Testing Results (e.g., correlation statistics, comparison of rankings):

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.

TAP/Workgroup: What are the strengths and weaknesses in relation to the subcriteria for Scientific Acceptability of Measure Properties?

Steering Committee: Overall, to what extent was the criterion, Scientific Acceptability of Measure Properties, met?
Rationale:
<table>
<thead>
<tr>
<th>Section</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>3a.1</td>
<td><strong>Current Use:</strong> In use</td>
</tr>
<tr>
<td>3a.2</td>
<td><strong>Use in a public reporting initiative:</strong> If used in a public reporting initiative, provide name of initiative(s), locations, Web page URL(s). <em>If not publicly reported, state the plans to achieve public reporting within 3 years.</em> 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.</td>
</tr>
<tr>
<td>3a.3</td>
<td><strong>If used in other programs/initiatives:</strong> If used in quality improvement or other programs/initiatives, name of initiative(s), locations, Web page URL(s). <em>If not used for QI, state the plans to achieve use for QI within 3 years.</em> Vascular Study Group of New England <a href="http://www.vsgne.org">www.vsgne.org</a> Real time reports of outcome measures are provided to practitioners online. These are then used in regional quality improvement programs.</td>
</tr>
<tr>
<td>3a.4</td>
<td><strong>Data/sample:</strong> VSGNE samples previously described</td>
</tr>
<tr>
<td>3a.5</td>
<td><strong>Methods:</strong> Semi-annual meetings of providers in VSGNE</td>
</tr>
<tr>
<td>3a.6</td>
<td><strong>Results:</strong> Benchmark 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.</td>
</tr>
<tr>
<td>3b.1</td>
<td><strong>NQF # and Title of similar or related measures:</strong></td>
</tr>
<tr>
<td>3b.2</td>
<td><strong>Harmonization:</strong> 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):</td>
</tr>
<tr>
<td>3c.1</td>
<td><strong>Distinctive or Additive Value:</strong> Describe the distinctive, improved, or additive value this measure provides to existing NQF-endorsed measures:</td>
</tr>
<tr>
<td>3c.2</td>
<td><strong>If this measure is similar to measure(s) already endorsed by NQF:</strong> If not, why?</td>
</tr>
</tbody>
</table>

**TAP/Workgroup:** What are the strengths and weaknesses in relation to the subcriteria for *Usability*?

**Steering Committee:** Overall, to what extent was the criterion, *Usability*, met?

**Rationale:**
<table>
<thead>
<tr>
<th>Evaluation Criteria</th>
<th>Rating</th>
</tr>
</thead>
<tbody>
<tr>
<td>Extent to which the required data are readily available, retrievable without undue burden, and can be implemented for performance measurement.</td>
<td>4a</td>
</tr>
<tr>
<td>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)</td>
<td>4b</td>
</tr>
<tr>
<td>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)</td>
<td>4c</td>
</tr>
<tr>
<td>Identify susceptibility to inaccuracies, errors, or unintended consequences of the measure and describe how these potential problems could be audited. If audited, provide results.</td>
<td>4d</td>
</tr>
<tr>
<td>Data collection strategy/implementation</td>
<td>4e</td>
</tr>
</tbody>
</table>

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)

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.

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.

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 symptoms. 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.

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:

TAP/Workgroup: What are the strengths and weaknesses in relation to the subcriteria for feasibility?
| 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.

| 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
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

<table>
<thead>
<tr>
<th>MEASURE DESCRIPTIVE INFORMATION</th>
</tr>
</thead>
<tbody>
<tr>
<td>De.1 Measure Title: Postoperative Stroke or Death in Asymptomatic Patients undergoing Carotid Artery Stenting (CAS)</td>
</tr>
<tr>
<td>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.</td>
</tr>
<tr>
<td>De.3 If included in a composite or paired with another measure, please identify composite or paired measure</td>
</tr>
<tr>
<td>Submitted SVS measure: Postoperative Stroke or Death in Asymptomatic Patients undergoing Carotid Endarterectomy</td>
</tr>
<tr>
<td>De.4 National Priority Partners Priority Area: Population health, Safety, Overuse</td>
</tr>
<tr>
<td>De.5 IOM Quality Domain: Effectiveness, Efficiency, Safety</td>
</tr>
<tr>
<td>De.6 Consumer Care Need: Staying healthy</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>CONDITIONS FOR CONSIDERATION BY NQF</th>
</tr>
</thead>
<tbody>
<tr>
<td>Four conditions must be met before proposed measures may be considered and evaluated for suitability as voluntary consensus standards:</td>
</tr>
<tr>
<td>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.</td>
</tr>
<tr>
<td>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</td>
</tr>
<tr>
<td>A.2 Indicate if Proprietary Measure (as defined in measure steward agreement):</td>
</tr>
<tr>
<td>A.3 Measure Steward Agreement: Agreement will be signed and submitted prior to or at the time of</td>
</tr>
</tbody>
</table>

Rating: C=Completely; P=Partially; M=Minimally; N=Not at all; NA=Not applicable
### 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

#### C. The intended use of the measure includes both public reporting and quality improvement.

**Purpose:** Payment Program

#### 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

*(for NQF staff use) Have all conditions for consideration been met?*

**Staff Notes to Steward (if submission returned):**

**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

*(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 disparate 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

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<td>1a</td>
<td>C</td>
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</table>
variation and opportunity for improvement. 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)


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 lesion 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
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.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 less 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:**

<table>
<thead>
<tr>
<th>TAP/Workgroup: What are the strengths and weaknesses in relation to the subcriteria for Importance to Measure and Report?</th>
<th>1</th>
</tr>
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<tbody>
<tr>
<td><strong>Steering Committee:</strong> Was the threshold criterion, Importance to Measure and Report, met? Rationale:</td>
<td>1</td>
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</tbody>
</table>

**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)

<table>
<thead>
<tr>
<th><strong>2a. MEASURE SPECIFICATIONS</strong></th>
<th>Eval Rating</th>
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<tbody>
<tr>
<td><strong>S.1 Do you have a web page where current detailed measure specifications can be obtained?</strong></td>
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<tr>
<td><strong>S.2 If yes, provide web page URL:</strong></td>
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<tr>
<td><strong>2a. Precisely Specified</strong></td>
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</table>
| **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 symptoms 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, |  |
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 preceding 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 Acceptability" 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)

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 discrepancies 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)

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 corresponds to published results for asymptomatic patients.

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:**

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

2e. **Risk Adjustment for Outcomes/ Resource Use Measures**

2e.1 **Data/sample (description of data/sample and size):** 
See "Scientific Acceptability" 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

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 statistical 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):*

<table>
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### 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.

**TAP/Workgroup:** What are the strengths and weaknesses in relation to the subcriteria for Scientific Acceptability of Measure Properties?

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#### Steering Committee: Overall, to what extent was the criterion, Scientific Acceptability of Measure Properties, met?

**Rationale:**

#### 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)*

### 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):**

Benchmark 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

Rating: C=Completely; P=Partially; M=Minimally; N=Not at all; NA=Not applicable
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?

<table>
<thead>
<tr>
<th>3c. Distinctive or Additive Value</th>
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<tbody>
<tr>
<td>3c.1 Describe the distinctive, improved, or additive value this measure provides to existing NQF-endorsed measures:</td>
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<tr>
<td>N/A</td>
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</table>

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 |

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?

| 3 |

Rationale:

4. FEASIBILITY

Extent to which the required data are readily available, retrievable without undue burden, and can be implemented for performance measurement. (evaluation criteria)

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 |

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 |

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 |

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 symptoms. 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 |
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

TAP/Workgroup: What are the strengths and weaknesses in relation to the subcriteria for Feasibility?

Steering Committee: Overall, to what extent was the criterion, Feasibility, met?
Rationale:

RECOMMENDATION
(for NQF staff use) Check if measure is untested and only eligible for time-limited endorsement.

Steering Committee: Do you recommend for endorsement?
Comments:

CONTACT INFORMATION

Co.1 Measure Steward (Intellectual Property Owner)
Co.1 Organization

Co.2 Point of Contact
Sarah, Murphy, Staff, smurphy@vascularsociety.org, 312-334-2305-

Measure Developer If different from Measure Steward
Co.3 Organization

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 | |
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)

<table>
<thead>
<tr>
<th>(for NQF staff use) NQF Review #: 1531</th>
<th>NQF Project: Surgery Endorsement Maintenance 2010</th>
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</thead>
<tbody>
<tr>
<td><strong>MEASURE DESCRIPTIVE INFORMATION</strong></td>
<td></td>
</tr>
<tr>
<td><strong>De.1 Measure Title:</strong> Follow-up assessment of stroke or death after carotid revascularization</td>
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</tr>
<tr>
<td><strong>De.2 Brief description of measure:</strong> 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.</td>
<td></td>
</tr>
<tr>
<td><strong>1.1-2 Type of Measure:</strong> Process</td>
<td></td>
</tr>
<tr>
<td><strong>De.3 If included in a composite or paired with another measure, please identify composite or paired measure</strong></td>
<td>N/A</td>
</tr>
<tr>
<td><strong>De.4 National Priority Partners Priority Area:</strong> Care coordination, Safety</td>
<td></td>
</tr>
<tr>
<td><strong>De.5 IOM Quality Domain:</strong> Effectiveness, Safety, Timeliness</td>
<td></td>
</tr>
<tr>
<td><strong>De.6 Consumer Care Need:</strong> Getting better, Staying healthy, Living with illness</td>
<td></td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>CONDITIONS FOR CONSIDERATION BY NQF</th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>Four conditions must be met before proposed measures may be considered and evaluated for suitability as voluntary consensus standards:</td>
<td>NQF Staff</td>
</tr>
<tr>
<td>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.</td>
<td></td>
</tr>
<tr>
<td>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)? <strong>Yes</strong></td>
<td>A</td>
</tr>
<tr>
<td>A.2 Indicate if Proprietary Measure (as defined in measure steward agreement):</td>
<td>Y</td>
</tr>
<tr>
<td>A.3 Measure Steward Agreement: Agreement will be signed and submitted prior to or at the time of measure submission</td>
<td></td>
</tr>
<tr>
<td>A.4 Measure Steward Agreement attached: NQF - signed.pdf</td>
<td>N</td>
</tr>
</tbody>
</table>
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

C. The intended use of the measure includes both public reporting and quality improvement.
   ►Purpose:  Payment Program, Regulatory and Accreditation Programs

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

(for NQF staff use) Have all conditions for consideration been met?
Staff Notes to Steward (if submission returned):

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

(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.


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
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;

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).
3. 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:**


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?**

Steering Committee: Was the threshold criterion, Importance to Measure and Report, met?

Rating: C=Completely; P=Partially; M=Minimally; N=Not at all; NA=Not applicable
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)

<table>
<thead>
<tr>
<th>2a. MEASURE SPECIFICATIONS</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>S.1</strong> Do you have a web page where current detailed measure specifications can be obtained?</td>
</tr>
<tr>
<td><strong>S.2</strong> If yes, provide web page URL:</td>
</tr>
<tr>
<td><strong>2a. Precisely Specified</strong></td>
</tr>
<tr>
<td><strong>2a.1 Numerator Statement</strong> <em>(Brief, text description of the numerator - what is being measured about the target population, e.g. target condition, event, or outcome):</em></td>
</tr>
<tr>
<td>Patients with documentation of a follow-up assessment between 21 and 60 days after the date of carotid revascularization for both:</td>
</tr>
<tr>
<td>1. Neurologic status with an assessment using the NIH Stroke Scale (by an examiner who is certified by the American Stroke Association), AND</td>
</tr>
<tr>
<td>2. Vital Status (alive or expired)</td>
</tr>
<tr>
<td><strong>2a.2 Numerator Time Window</strong> <em>(The time period in which cases are eligible for inclusion in the numerator):</em></td>
</tr>
<tr>
<td>1 year</td>
</tr>
<tr>
<td><strong>2a.3 Numerator Details</strong> <em>(All information required to collect/calculate the numerator, including all codes, logic, and definitions):</em></td>
</tr>
<tr>
<td>Patient status = alive or deceased</td>
</tr>
<tr>
<td>Follow-up NIH Stroke Scale Administered = yes. Supporting definitions:</td>
</tr>
<tr>
<td>The NIHSS is a standardized neurological examination for patients with acute ischemic stroke that quantitatively measures the level of stroke severity.</td>
</tr>
<tr>
<td>Examiner certified = yes</td>
</tr>
<tr>
<td>Supporting definitions:</td>
</tr>
<tr>
<td>The Stroke Scale assessment should be conducted by someone other than the operator for the current procedure.</td>
</tr>
<tr>
<td>Note - NIHSS examiners may become certified through the American Stroke Association.</td>
</tr>
<tr>
<td>NIH Stroke Scale Certification is currently available online free of charge:</td>
</tr>
<tr>
<td><a href="http://learn.heart.org/ihml/application/student/interface.heart2/nihss.html">http://learn.heart.org/ihml/application/student/interface.heart2/nihss.html</a></td>
</tr>
<tr>
<td><strong>2a.4 Denominator Statement</strong> <em>(Brief, text description of the denominator - target population being measured):</em></td>
</tr>
<tr>
<td>Patients with carotid revascularization (surgery or stent) procedures</td>
</tr>
<tr>
<td><strong>2a.5 Target population gender:</strong> Female, Male</td>
</tr>
<tr>
<td><strong>2a.6 Target population age range:</strong> 18 and over</td>
</tr>
<tr>
<td><strong>2a.7 Denominator Time Window</strong> <em>(The time period in which cases are eligible for inclusion in the denominator):</em></td>
</tr>
<tr>
<td>1 year</td>
</tr>
<tr>
<td><strong>2a.8 Denominator Details</strong> <em>(All information required to collect/calculate the denominator - the target population being measured - including all codes, logic, and definitions):</em></td>
</tr>
<tr>
<td>Carotid artery stenting or carotid endarterectomy procedure performed.</td>
</tr>
<tr>
<td><strong>2a.9 Denominator Exclusions</strong> <em>(Brief text description of exclusions from the target population):</em> Patients with pre-procedure conditions of:</td>
</tr>
<tr>
<td>1. Acute evolving stroke, or</td>
</tr>
<tr>
<td>2. Carotid artery dissection</td>
</tr>
</tbody>
</table>
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.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): 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.

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.

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)*:

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

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%

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

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:

TAP/Workgroup: What are the strengths and weaknesses in relation to the subcriteria for Scientific Acceptability of Measure Properties?

Steering Committee: Overall, to what extent was the criterion, Scientific Acceptability of Measure Properties, met?
Rationale:
### 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)*

<table>
<thead>
<tr>
<th>3a. Meaningful, Understandable, and Useful Information</th>
</tr>
</thead>
<tbody>
<tr>
<td>3a.1 Current Use: In use</td>
</tr>
<tr>
<td>3a.2 Use in a public reporting initiative (disclosure of performance results to the public at large) <em>(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):</em></td>
</tr>
<tr>
<td>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.</td>
</tr>
<tr>
<td>3a.3 If used in other programs/initiatives <em>(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):</em></td>
</tr>
<tr>
<td>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.</td>
</tr>
<tr>
<td>3a.4 Data/sample <em>(description of data/sample and size):</em> None</td>
</tr>
<tr>
<td>3a.5 Methods <em>(e.g., focus group, survey, QI project):</em> None</td>
</tr>
<tr>
<td>3a.6 Results <em>(qualitative and/or quantitative results and conclusions):</em> None</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>3b/3c. Relation to other NQF-endorsed measures</th>
</tr>
</thead>
<tbody>
<tr>
<td>3b.1 NQF # and Title of similar or related measures:</td>
</tr>
<tr>
<td><em>(for NQF staff use) Notes on similar/related endorsed or submitted measures:</em></td>
</tr>
<tr>
<td>3b. Harmonization</td>
</tr>
<tr>
<td>If this measure is related to measure(s) already endorsed by NQF <em>(e.g., same topic, but different target population/setting/data source or different topic but same target population):</em></td>
</tr>
<tr>
<td>3b.2 Are the measure specifications harmonized? If not, why?</td>
</tr>
<tr>
<td>3c. Distinctive or Additive Value</td>
</tr>
<tr>
<td>3c.1 Describe the distinctive, improved, or additive value this measure provides to existing NQF-endorsed measures:</td>
</tr>
</tbody>
</table>
| 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:

<table>
<thead>
<tr>
<th>TAP/Workgroup: What are the strengths and weaknesses in relation to the subcriteria for Usability?</th>
</tr>
</thead>
<tbody>
<tr>
<td>Steering Committee: Overall, to what extent was the criterion, Usability, met?</td>
</tr>
<tr>
<td>Rationale:</td>
</tr>
</tbody>
</table>

### 4. FEASIBILITY

Extent to which the required data are readily available, retrievable without undue burden, and can be implemented for performance measurement. *(evaluation criteria)*

#### 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)

#### 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.

#### 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.

#### 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...
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.

<table>
<thead>
<tr>
<th>4e. Data Collection Strategy/Implementation</th>
</tr>
</thead>
<tbody>
<tr>
<td>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.</td>
</tr>
</tbody>
</table>
| 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:
| 4e.4 Business case documentation: |

TAP/Workgroup: What are the strengths and weaknesses in relation to the subcriteria for Feasibility?

Steering Committee: Overall, to what extent was the criterion, Feasibility, met?
Rationale:

<table>
<thead>
<tr>
<th>RECOMMENDATION</th>
</tr>
</thead>
<tbody>
<tr>
<td>(for NQF staff use) Check if measure is untested and only eligible for time-limited endorsement.</td>
</tr>
<tr>
<td>Time-limited</td>
</tr>
</tbody>
</table>

Steering Committee: Do you recommend for endorsement?
Comments:

<table>
<thead>
<tr>
<th>CONTACT INFORMATION</th>
</tr>
</thead>
<tbody>
<tr>
<td>Co.1 Measure Steward (Intellectual Property Owner)</td>
</tr>
<tr>
<td>Co.1 Organization American College of Cardiology Foundation (ACCF), 2400 N Street NW, Washington, District Of Columbia, 20037</td>
</tr>
</tbody>
</table>
### 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
- Walter Koroshetz, MD, FAAN
- William Gray, MD

Public Reporting Workgroup:
- Fred Masoudi, MD, MSPH, FACC, FAHA, FACP
- H. Vernon Anderson, MD, FACC, FSCAI
- David Malenka, MD, FACC
- Matt Roe, MD, FACC
- Steve Hammill, MD, FHRS, FACC
- 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: © 2010 American College of Cardiology Foundation All Rights Reserved

Ad.11 -13 Additional Information web page URL or attachment: Attachment CAREmeasureTesting.docx
Date of Submission (MM/DD/YY): 06/10/2011
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

<table>
<thead>
<tr>
<th>MEASURE DESCRIPTIVE INFORMATION</th>
</tr>
</thead>
<tbody>
<tr>
<td>De.1 Measure Title: Pediatric Heart Surgery Mortality (PDI 6)</td>
</tr>
<tr>
<td>De.2 Brief description of measure: Percentage of cases undergoing surgery for congenital heart disease with an in-hospital death.</td>
</tr>
<tr>
<td>1.1-2 Type of Measure: Outcome</td>
</tr>
<tr>
<td>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)</td>
</tr>
<tr>
<td>De.4 National Priority Partners Priority Area: Population health, Safety</td>
</tr>
<tr>
<td>De.5 IOM Quality Domain: Effectiveness</td>
</tr>
<tr>
<td>De.6 Consumer Care Need: Getting better</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>CONDITIONS FOR CONSIDERATION BY NQF</th>
</tr>
</thead>
<tbody>
<tr>
<td>Four conditions must be met before proposed measures may be considered and evaluated for suitability as voluntary consensus standards:</td>
</tr>
<tr>
<td>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-governmental organizations must sign a measure steward agreement even if measures are made publicly and freely available.</td>
</tr>
<tr>
<td>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</td>
</tr>
<tr>
<td>A.2 Indicate if Proprietary Measure (as defined in measure steward agreement):</td>
</tr>
<tr>
<td>A.3 Measure Steward Agreement: Government entity and in the public domain - no agreement necessary</td>
</tr>
<tr>
<td>A.4 Measure Steward Agreement attached:</td>
</tr>
<tr>
<td>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</td>
</tr>
</tbody>
</table>

Rating: C=Completely; P=Partially; M=Minimally; N=Not at all; NA=Not applicable
1. IMPORTANCE TO MEASURE AND REPORT

**1a. High Impact**

1a.1 Demonstrated High Impact Aspect of Healthcare: Patient/societal consequences of poor quality

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:


1a.4 Citations for Evidence of High Impact: Updated citations will be presented in the May Steering Committee meeting


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:
Adjusted per 1,000 rates by patient and hospital characteristics, 2007

<table>
<thead>
<tr>
<th>Location</th>
<th>Mean</th>
<th>Standard error</th>
<th>P-value: Relative to Northeast</th>
</tr>
</thead>
<tbody>
<tr>
<td>Northeast</td>
<td>63.931</td>
<td>7.946</td>
<td>1.000</td>
</tr>
<tr>
<td>Midwest</td>
<td>30.730</td>
<td>2.637</td>
<td>0.000</td>
</tr>
<tr>
<td>South</td>
<td>44.326</td>
<td>1.760</td>
<td>0.016</td>
</tr>
<tr>
<td>West</td>
<td>33.496</td>
<td>3.316</td>
<td>0.000</td>
</tr>
</tbody>
</table>

1b.3 Citations for data on performance gap:

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

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 increases. 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

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](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?**

Steering Committee: Was the threshold criterion, *Importance to Measure and Report*, met?

<table>
<thead>
<tr>
<th>Rationale:</th>
<th>1</th>
</tr>
</thead>
<tbody>
<tr>
<td>No</td>
<td>Y</td>
</tr>
</tbody>
</table>

**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](#))

**2a. MEASURE SPECIFICATIONS**

<table>
<thead>
<tr>
<th>S.1 Do you have a web page where current detailed measure specifications can be obtained?</th>
<th>2a. Precisely Specified</th>
</tr>
</thead>
</table>

<table>
<thead>
<tr>
<th>S.2 If yes, provide web page URL:</th>
</tr>
</thead>
</table>

| 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 code of pediatric heart surgery with ICD-9-CM diagnosis of congenital heart disease in any field. |
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
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<thead>
<tr>
<th>Code</th>
<th>Description</th>
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</thead>
<tbody>
<tr>
<td>3532</td>
<td>PAPILLARY MUSCLE OPS</td>
</tr>
<tr>
<td>3533</td>
<td>CHORDAE TENDINEAE OPS</td>
</tr>
<tr>
<td>3534</td>
<td>ANNULOPLASTY</td>
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<tr>
<td>3535</td>
<td>INFUNDIBULECTOMY</td>
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<td>3598</td>
<td>HEART REPAIR REVISION</td>
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<td>OTHER HEART SEPTA OPS</td>
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<td>3699</td>
<td>OTHER OP ON HRT VALVES</td>
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<tr>
<td>3733</td>
<td>OTHER OPERATIONS ON VESSEL OF HEART</td>
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<tr>
<td>3736</td>
<td>EXCISION OR DESTRUCTION OF OTHER LESION OR TISSUE OF HEART</td>
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<tr>
<td>375</td>
<td>HEART TRANSPLANTATION</td>
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<tr>
<td>3751</td>
<td>HEART TRANSPLANTATION OCT03-</td>
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<td>3752</td>
<td>IMPLANT TOT REP HRT SYS OCT03-</td>
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<td>390</td>
<td>SYSTEMIC-PULM ART SHUNT</td>
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<tr>
<td>3921</td>
<td>CAVAL-PULM ART ANASTOM</td>
</tr>
<tr>
<td>3834</td>
<td>Non-specific cardiac procedures (2P):</td>
</tr>
<tr>
<td>3835</td>
<td>RESECTION OF ABDOMINAL AORTA WITH ANASTOMOSI</td>
</tr>
<tr>
<td>3844</td>
<td>THOR VESSEL RESECT/ANAST</td>
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<tr>
<td>3845</td>
<td>RESECTION OF ABDOMINAL AORTA WITH REPLACEMENT</td>
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<td>RESECT THORAC VES W REPL</td>
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<td>3865</td>
<td>OTHER EXCISION OF ABDOMINAL AORTA</td>
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<td>OTHER EXCISION OF THORACIC VESSEL</td>
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<td>OTHER SURGICAL OCCLUSION OF ABDOMINAL AORTA</td>
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<td>OTHER REVISION OF VASCULAR PROCEDURE</td>
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<td>REPAIR OF BLOOD VESSEL WITH TISSUE PATCH GRAFT</td>
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<td>REPAIR OF BLOOD VESSEL WITH SYNTHETIC PATCH GRAFT</td>
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<tr>
<td>3959</td>
<td>REPAIR OF BLOOD VESSEL WITH UNSPECIFIED TYPE OF PATCH GRAFT</td>
</tr>
<tr>
<td>3960</td>
<td>REPAIR OF VESSEL NEC</td>
</tr>
</tbody>
</table>

Congenital heart disease diagnoses (2D):

<table>
<thead>
<tr>
<th>Code</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>7450</td>
<td>COMMON TRUNCUS</td>
</tr>
<tr>
<td>74510</td>
<td>COMPL TRANSPOS GREAT VES</td>
</tr>
<tr>
<td>74511</td>
<td>DOUBLE OUTLET RT VENTRIC</td>
</tr>
</tbody>
</table>

Rating: C=Completely; P=Partially; M=Minimally; N=Not at all; NA=Not applicable
<table>
<thead>
<tr>
<th>Code</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>74519</td>
<td>CORRECT TRANSPOS GRT VES</td>
</tr>
<tr>
<td>7452</td>
<td>TRANSPOS GREAT VESS NEC</td>
</tr>
<tr>
<td>7453</td>
<td>TETRALOGY OF FALLOT</td>
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<td>7454</td>
<td>COMMON VENTRICLE</td>
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<tr>
<td>7455</td>
<td>VENTRICULAR SEPT DEFECT</td>
</tr>
<tr>
<td>74560</td>
<td>SECUNDUM ATRIAL SEPT DEF</td>
</tr>
<tr>
<td>74561</td>
<td>ENDOCARD CUSHION DEF NOS</td>
</tr>
<tr>
<td>74569</td>
<td>OSTIUM PRIMUM DEFECT</td>
</tr>
<tr>
<td>7457</td>
<td>ENDOCARD CUSHION DEF NEC</td>
</tr>
<tr>
<td>7458</td>
<td>COR BILOCULARE</td>
</tr>
<tr>
<td>7459</td>
<td>SEPTAL CLOSURE ANOM NEC</td>
</tr>
<tr>
<td>74600</td>
<td>PULMONARY VALVE ANOM NOS</td>
</tr>
<tr>
<td>74601</td>
<td>CONG PULMON VALV ATRESIA</td>
</tr>
<tr>
<td>74602</td>
<td>CONG PULMON VALVE STENOS</td>
</tr>
<tr>
<td>74609</td>
<td>PULMONARY VALVE ANOM NEC</td>
</tr>
<tr>
<td>7461</td>
<td>CONG TRICUSP ATRES/STEN</td>
</tr>
<tr>
<td>7462</td>
<td>EBSTEIN’S ANOMALY</td>
</tr>
<tr>
<td>7463</td>
<td>CONG AORTA VALV STENOS</td>
</tr>
<tr>
<td>7464</td>
<td>CONG AORTA VALV INSUFFIC</td>
</tr>
<tr>
<td>7465</td>
<td>CONGEN MITRAL STENOS</td>
</tr>
<tr>
<td>7466</td>
<td>CONG MITRAL INSUFFICIENC</td>
</tr>
<tr>
<td>7467</td>
<td>HYPOPLAS LEFT HEART SYND</td>
</tr>
<tr>
<td>74681</td>
<td>CONG SUBAORTIC STENOS</td>
</tr>
<tr>
<td>74682</td>
<td>COR TRIATRIATUM</td>
</tr>
<tr>
<td>74683</td>
<td>INFUNDIB PULMON STENOS</td>
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<tr>
<td>74684</td>
<td>OBRUCT HEART ANOM NEC</td>
</tr>
<tr>
<td>74685</td>
<td>CORONARY ARTERY ANOMALY</td>
</tr>
<tr>
<td>74687</td>
<td>MALPOSITION OF HEART</td>
</tr>
</tbody>
</table>

Rating: C=Completely; P=Partially; M=Minimally; N=Not at all; NA=Not applicable
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 HOSP 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
V3800
LIVEBORN NOS-HOSP W/O CS OCT05
V3801
LIVEBORN NOS-HOSP W CS OCT05

Neonate Observation and Evaluation codes:
V290
NB OBSRV SUSPECT INFECT
V291
NB OBSRV SUSPECT NEURLGCL
V292
OBSRV NB SUSPECT RESP COND
V293
NB OBS GENETC/METABL CND
V298
NB OBSRV OTH SUSPECT COND
V299
NB OBSRV UNSP SUSPECT 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 IMMATURE WTNOS
76501
EXTREME IMMATURE <500G
76502
EXTREME IMMATURE 500-749G
76503
EXTREME IMMATURE 750-999G
76504
EXTREME IMMATURE 1000-1249G
76505
EXTREME IMMATURE 1250-1499G
76506
EXTREME IMMATURE 1500-1749G
76507
EXTREME IMMATURE 1750-1999G
76508
EXTREME IMMATURE 2000-2499G
76509
EXTREME IMMATURE 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

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

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): 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

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

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

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

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.
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

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
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

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

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):
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<tr>
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<th>25th</th>
<th>Median</th>
<th>75th</th>
<th>95th</th>
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</thead>
<tbody>
<tr>
<td>0.025200</td>
<td>0.037077</td>
<td>0.047287</td>
<td>0.059225</td>
<td>0.079624</td>
</tr>
</tbody>
</table>

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

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:
 Users may stratify based on gender and race/ethnicity

<table>
<thead>
<tr>
<th>TAP/Workgroup: What are the strengths and weaknesses in relation to the subcriteria for Scientific Acceptability of Measure Properties?</th>
<th>2</th>
</tr>
</thead>
<tbody>
<tr>
<td>Steering Committee: Overall, to what extent was the criterion, Scientific Acceptability of Measure Properties, met?</td>
<td>2</td>
</tr>
<tr>
<td>Rationale:</td>
<td></td>
</tr>
</tbody>
</table>

### 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)**

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

  The measure is also reported on HCUPnet:
  - http://hcupnet.ahrq.gov/HCUPnet.jsp?id=EB57801381F71C41&Form=MAINSEL&JS=Y&Action=%3E%3E%3ENext%3E%3E%3E&MAINSEL=AHRC%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 hospitals. UCH reports the AHRQ QIs to their member hospitals. (See www.uhc.edu. Note that measure 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 measure results are reported to hospitals; not reported on the NACHRI site).
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?

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.

TAP/Workgroup: What are the strengths and weaknesses in relation to the subcriteria for *Usability*?

<table>
<thead>
<tr>
<th>Rating</th>
<th>C</th>
<th>P</th>
<th>M</th>
<th>N</th>
<th>NA</th>
</tr>
</thead>
<tbody>
<tr>
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<td>3</td>
<td></td>
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</tbody>
</table>

Steering Committee: Overall, to what extent was the criterion, *Usability*, met?

<table>
<thead>
<tr>
<th>Rating</th>
<th>C</th>
<th>P</th>
<th>M</th>
<th>N</th>
<th>NA</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>3</td>
<td></td>
<td></td>
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</tr>
</tbody>
</table>

Rationale:

4. FEASIBILITY

Extent to which the required data are readily available, retrievable without undue burden, and can be implemented for performance measurement. ([evaluation criteria](#))

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)

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.

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.

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.

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 website, 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

<table>
<thead>
<tr>
<th>Tap/Workgroup: What are the strengths and weaknesses in relation to the subcriteria for Feasibility?</th>
</tr>
</thead>
<tbody>
<tr>
<td>Steering Committee: Overall, to what extent was the criterion, Feasibility, met?</td>
</tr>
<tr>
<td>Rationale:</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Recommendation (for NQF staff use) Check if measure is untested and only eligible for time-limited endorsement.</th>
</tr>
</thead>
<tbody>
<tr>
<td>Steering Committee: Do you recommend for endorsement?</td>
</tr>
<tr>
<td>Comments:</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Contact information</th>
</tr>
</thead>
<tbody>
<tr>
<td>Co.1 Measure Steward (Intellectual Property Owner)</td>
</tr>
<tr>
<td>Co.1 Organization</td>
</tr>
<tr>
<td>Agency for Healthcare Research and Quality, 540 Gaither Road, Rockville, Maryland, 20850</td>
</tr>
<tr>
<td>Co.2 Point of Contact</td>
</tr>
<tr>
<td>John, Bott, MSSW, MBA, <a href="mailto:John.Bott@AHRQ.hhs.gov">John.Bott@AHRQ.hhs.gov</a>, 301-427-1317-</td>
</tr>
<tr>
<td>Measure Developer If different from Measure Steward</td>
</tr>
<tr>
<td>Co.3 Organization</td>
</tr>
<tr>
<td>Agency for Healthcare Research and Quality, 540 Gaither Road, Rockville, Maryland, 20850</td>
</tr>
<tr>
<td>Co.4 Point of Contact</td>
</tr>
<tr>
<td>John, Bott, MSSW, MBA, <a href="mailto:John.Bott@AHRQ.hhs.gov">John.Bott@AHRQ.hhs.gov</a>, 301-427-1317-</td>
</tr>
<tr>
<td>Co.5 Submitter If different from Measure Steward POC</td>
</tr>
<tr>
<td>John, Bott, MSSW, MBA, <a href="mailto:John.Bott@AHRQ.hhs.gov">John.Bott@AHRQ.hhs.gov</a>, 301-427-1317-, Agency for Healthcare Research and Quality</td>
</tr>
<tr>
<td>Co.6 Additional organizations that sponsored/participated in measure development</td>
</tr>
<tr>
<td>UC Davis, Stanford University, Battelle Memorial Institute</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Additional information</th>
</tr>
</thead>
<tbody>
<tr>
<td>Workgroup/Expert Panel involved in measure development</td>
</tr>
<tr>
<td>Ad.1 Provide a list of sponsoring organizations and workgroup/panel members’ names and organizations. Describe the members’ role in measure development.</td>
</tr>
<tr>
<td>None</td>
</tr>
<tr>
<td>Ad.2 If adapted, provide name of original measure: None</td>
</tr>
<tr>
<td>Ad.3-5 If adapted, provide original specifications URL or attachment</td>
</tr>
<tr>
<td>Ad.6</td>
</tr>
<tr>
<td>Ad.7</td>
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<tr>
<td>Ad.8</td>
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<tr>
<td>Ad.9</td>
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<tr>
<td>Ad.10</td>
</tr>
<tr>
<td>Ad.11-13</td>
</tr>
<tr>
<td>Date of Submission (MM/DD/YY):</td>
</tr>
</tbody>
</table>
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

<table>
<thead>
<tr>
<th>Measure Title</th>
<th>Type of Measure</th>
<th>National Priority Partners Priority Area</th>
<th>IOM Quality Domain</th>
<th>Consumer Care Need</th>
</tr>
</thead>
<tbody>
<tr>
<td>Pediatric Heart Surgery Volume (PDI 7)</td>
<td>Structure</td>
<td>Population health, Safety</td>
<td>Effectiveness, Safety</td>
<td>Getting better</td>
</tr>
</tbody>
</table>

**Brief description of measure:** Number of discharges with procedure for pediatric heart surgery

**If included in a composite or paired with another measure, please identify composite or paired measure:** Pediatric Heart Surgery Mortality (PDI 6) (NQF #0339)

### CONDITIONS FOR CONSIDERATION BY NQF

Four conditions must be met before proposed measures may be considered and evaluated for suitability as voluntary consensus standards:

<table>
<thead>
<tr>
<th>Condition</th>
<th>NQF Staff</th>
</tr>
</thead>
<tbody>
<tr>
<td>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-governmental organizations must sign a measure steward agreement even if measures are made publicly and freely available.</td>
<td>A</td>
</tr>
<tr>
<td>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)?</td>
<td>Yes</td>
</tr>
<tr>
<td>A.2 Indicate if Proprietary Measure (as defined in measure steward agreement):</td>
<td></td>
</tr>
<tr>
<td>A.3 Measure Steward Agreement: Government entity and in the public domain - no agreement necessary</td>
<td></td>
</tr>
<tr>
<td>A.4 Measure Steward Agreement attached:</td>
<td></td>
</tr>
<tr>
<td>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.</td>
<td></td>
</tr>
</tbody>
</table>

Rating: C=Completely; P=Partially; M=Minimally; N=Not at all; NA=Not applicable
### C. The intended use of the measure includes both public reporting and quality improvement.

**Purpose:** Public Reporting, Quality Improvement (Internal to the specific organization)

<table>
<thead>
<tr>
<th>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.</th>
</tr>
</thead>
<tbody>
<tr>
<td>D.1 Testing: Yes, fully developed and tested</td>
</tr>
<tr>
<td>D.2 Have NQF-endorsed measures been reviewed to identify if there are similar or related measures? Yes</td>
</tr>
</tbody>
</table>

(for NQF staff use) Have all conditions for consideration been met?

Staff Notes to Steward (if submission returned):

Staff Notes to Reviewers (issues or questions regarding any criteria):

Staff Reviewer Name(s):

### 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

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


#### 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...
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

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)
method. With both RACHS-1 and ABC, as complexity increases, discharge mortality also increases. 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


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?

Steering Committee: Was the threshold criterion, Importance to Measure and Report, met?
Rationale:
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)

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/calculated 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

Rating: C=Completely; P=Partially; M=Minimally; N=Not at all; NA=Not applicable
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
<table>
<thead>
<tr>
<th>Code</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>3592</td>
<td>CONDUIT RT VENT-PUL ART</td>
</tr>
<tr>
<td>3593</td>
<td>CONDUIT LEFT VENTR-AORTA</td>
</tr>
<tr>
<td>3594</td>
<td>CONDUIT ARTIUM-PULM ART</td>
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<tr>
<td>3595</td>
<td>HEART REPAIR REVISION</td>
</tr>
<tr>
<td>3598</td>
<td>OTHER HEART SEPTA OPS</td>
</tr>
<tr>
<td>3599</td>
<td>OTHER OP ON HRT VALVES</td>
</tr>
<tr>
<td>3699</td>
<td>OTHER OPERATIONS ON VESSEL OF HEART</td>
</tr>
<tr>
<td>3733</td>
<td>EXCISION OR DESTRUCTION OF OTHER LESION OR TISSUE OF HEART</td>
</tr>
<tr>
<td>3736</td>
<td>EXCISION OR DESTRUCTION OF LEFT ATRIAL APPENDAGE (LAA) OCT08 -</td>
</tr>
<tr>
<td>375</td>
<td>HEART TRANSPLANTATION (invalid as of OCT03)</td>
</tr>
<tr>
<td>3751</td>
<td>HEART TRANSPLANTATION OCT03-</td>
</tr>
<tr>
<td>3752</td>
<td>IMPLANT TOT REP HRT SYS OCT03-</td>
</tr>
<tr>
<td>390</td>
<td>SYSTEMIC-PULM ART SHUNT</td>
</tr>
<tr>
<td>3921</td>
<td>CAVAL-PULMON ART ANASTOM</td>
</tr>
</tbody>
</table>

Non-specific cardiac procedures (2P):
<table>
<thead>
<tr>
<th>Code</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>3834</td>
<td>RESECTION OF ABDOMINAL AORTA WITH ANASTOMOSIS</td>
</tr>
<tr>
<td>3835</td>
<td>THOR VESSEL RESECT/ANAST</td>
</tr>
<tr>
<td>3844</td>
<td>RESECTION OF ABDOMINAL AORTA WITH REPLACEMENT</td>
</tr>
<tr>
<td>3845</td>
<td>RESECT THORAC VES W REPL</td>
</tr>
<tr>
<td>3864</td>
<td>OTHER EXCISION OF ABDOMINAL AORTA</td>
</tr>
<tr>
<td>3865</td>
<td>OTHER EXCISION OF THORACIC VESSEL</td>
</tr>
<tr>
<td>3884</td>
<td>OTHER SURGICAL OCCLUSION OF ABDOMINAL AORTA</td>
</tr>
<tr>
<td>3885</td>
<td>OCCLUDE THORACIC VES NEC</td>
</tr>
<tr>
<td>3949</td>
<td>OTHER REVISION OF VASCULAR PROCEDURE</td>
</tr>
<tr>
<td>3956</td>
<td>REPAIR OF BLOOD VESSEL WITH TISSUE PATCH GRAFT</td>
</tr>
<tr>
<td>3957</td>
<td>REPAIR OF BLOOD VESSEL WITH SYNTHETIC PATCH GRAFT</td>
</tr>
<tr>
<td>3958</td>
<td>REPAIR OF BLOOD VESSEL WITH UNSPECIFIED TYPE OF PATCH GRAFT</td>
</tr>
<tr>
<td>3959</td>
<td>REPAIR OF VESSEL NEC</td>
</tr>
<tr>
<td>3999</td>
<td>OTHER REVISION OF VASCULAR PROCEDURE</td>
</tr>
<tr>
<td>3999</td>
<td>OTHER REVISION OF VASCULAR PROCEDURE</td>
</tr>
</tbody>
</table>

Congenital heart disease diagnoses (2D):
<table>
<thead>
<tr>
<th>Code</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>7450</td>
<td>COMMON TRUNCUS</td>
</tr>
<tr>
<td>74510</td>
<td>COMPL TRANSPOS GREAT VES</td>
</tr>
<tr>
<td>74511</td>
<td>DOUBLE OUTLET RT VENTRIC</td>
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<tr>
<td>74512</td>
<td>CORRECT TRANSPOS GRT VES</td>
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<tr>
<td>74519</td>
<td>TRANSPOS GREAT VESS NEC</td>
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<td>7452</td>
<td>TETRALOGY OF FALLOT</td>
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<td>7453</td>
<td>COMMON VENTRICLE</td>
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<tr>
<td>7454</td>
<td>VENTRICULAR SEPT DEFECT</td>
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<tr>
<td>7455</td>
<td>SECUNDUM ATRIAL SEPT DEF</td>
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<tr>
<td>74560</td>
<td>ENDOCARD CUSHION DEF NOS</td>
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<tr>
<td>74561</td>
<td>OSTIUM PRIMUM DEFECT</td>
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<tr>
<td>74569</td>
<td>ENDOCARD CUSHION DEF NEC</td>
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<td>7457</td>
<td>COR BILOCULARE</td>
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<td>7458</td>
<td>SEPTAL CLOSURE ANOM NEC</td>
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<td>7459</td>
<td>SEPTAL CLOSURE ANOM NOS</td>
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<tr>
<td>74600</td>
<td>PULMONARY VALVE ANOM NOS</td>
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<tr>
<td>74601</td>
<td>CONG PULMON VALV ATRESIA</td>
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<tr>
<td>74602</td>
<td>CONG PULMON VALVE STENOS</td>
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<td>74609</td>
<td>PULMONARY VALVE ANOM NEC</td>
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<td>7461</td>
<td>CONG TRICUSP ATRES/STEN</td>
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<td>7462</td>
<td>EBSTEIN’S ANOMALY</td>
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<td>7463</td>
<td>CONG AORTA VALV STENOSIS</td>
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<td>HYPOPLAS LEFT HEART SYND</td>
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<td>74681</td>
<td>CONG SUBAORTIC STENOSIS</td>
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<tr>
<td>74682</td>
<td>COR TRIATRIATUM</td>
</tr>
<tr>
<td>74683</td>
<td>INFUNDIB PULMON STENOSIS</td>
</tr>
</tbody>
</table>
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
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.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)

<table>
<thead>
<tr>
<th>TESTING/ANALYSIS</th>
</tr>
</thead>
<tbody>
<tr>
<td>2b. Reliability testing</td>
</tr>
</tbody>
</table>

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.

<table>
<thead>
<tr>
<th>2c. Validity testing</th>
</tr>
</thead>
</table>

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. 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).

Rating: C=Completely; P=Partially; M=Minimally; N=Not at all; NA=Not applicable
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


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

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

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)*:
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.

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

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

TAP/Workgroup: What are the strengths and weaknesses in relation to the subcriteria for Scientific Acceptability of Measure Properties?

Steering Committee: Overall, to what extent was the criterion, Scientific Acceptability of Measure Properties, met?
Rationale:

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)*

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/

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

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 hospitals. UCH reports the AHRQ QIs to their member hospitals. (See www.uhc.edu. Note that measure 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 measure 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 measure 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?

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.

TAP/Workgroup: What are the strengths and weaknesses in relation to the subcriteria for **Usability**?

Steering Committee: Overall, to what extent was the criterion, **Usability**, met?

Rationale:

### 4. FEASIBILITY

Extent to which the required data are readily available, retrievable without undue burden, and can be implemented for performance measurement. (evaluation criteria)

4a. Data Generated as a Byproduct of Care Processes

Rating: C=Completely; P=Partially; M=Minimally; N=Not at all; NA=Not applicable
### 4a. 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.**

#### 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.**

#### 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

#### 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 web 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](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](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](http://www.qualityindicators.ahrq.gov/software.htm)

---

**TAP/Workgroup: What are the strengths and weaknesses in relation to the subcriteria for Feasibility?**

**Rationale:**

---

**RECOMMENDATION**

(for NQF staff use) Check if measure is untested and only eligible for time-limited endorsement.

---

Rating: C=Completely; P=Partially; M=Minimally; N=Not at all; NA=Not applicable
<table>
<thead>
<tr>
<th>CONTACT INFORMATION</th>
</tr>
</thead>
<tbody>
<tr>
<td>Co.1 Measure Steward (Intellectual Property Owner)</td>
</tr>
<tr>
<td>Agency for Healthcare Research and Quality, 540 Gaither Road, Rockville, Maryland, 20850</td>
</tr>
<tr>
<td>Co.2 Point of Contact</td>
</tr>
<tr>
<td>John, Bott, MSSW, MBA, <a href="mailto:John.Bott@AHRQ.hhs.gov">John.Bott@AHRQ.hhs.gov</a>, 301-427-1317-</td>
</tr>
<tr>
<td>Measure Developer if different from Measure Steward</td>
</tr>
<tr>
<td>Co.3 Organization</td>
</tr>
<tr>
<td>Agency for Healthcare Research and Quality, 540 Gaither Road, Rockville, Maryland, 20850</td>
</tr>
<tr>
<td>Co.4 Point of Contact</td>
</tr>
<tr>
<td>John, Bott, MSSW, MBA, <a href="mailto:John.Bott@AHRQ.hhs.gov">John.Bott@AHRQ.hhs.gov</a>, 301-427-1317-</td>
</tr>
<tr>
<td>Co.5 Submitter if different from Measure Steward POC</td>
</tr>
<tr>
<td>John, Bott, MSSW, MBA, <a href="mailto:John.Bott@AHRQ.hhs.gov">John.Bott@AHRQ.hhs.gov</a>, 301-427-1317-, Agency for Healthcare Research and Quality</td>
</tr>
<tr>
<td>Co.6 Additional organizations that sponsored/participated in measure development</td>
</tr>
<tr>
<td>UC Davis, Stanford University, Battelle Memorial Institute</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>ADDITIONAL INFORMATION</th>
</tr>
</thead>
<tbody>
<tr>
<td>Workgroup/Expert Panel involved in measure development</td>
</tr>
<tr>
<td>Ad.1 Provide a list of sponsoring organizations and workgroup/panel members’ names and organizations.</td>
</tr>
<tr>
<td>Describe the members’ role in measure development.</td>
</tr>
<tr>
<td>None</td>
</tr>
<tr>
<td>Ad.2 If adapted, provide name of original measure: None</td>
</tr>
<tr>
<td>Ad.3-5 If adapted, provide original specifications URL or attachment</td>
</tr>
<tr>
<td>Measure Developer/Stafford Updates and Ongoing Maintenance</td>
</tr>
<tr>
<td>Ad.6 Year the measure was first released: 2001</td>
</tr>
<tr>
<td>Ad.7 Month and Year of most recent revision: 10, 2010</td>
</tr>
<tr>
<td>Ad.8 What is your frequency for review/update of this measure? Annual</td>
</tr>
<tr>
<td>Ad.9 When is the next scheduled review/update for this measure? 05, 2011</td>
</tr>
<tr>
<td>Ad.10 Copyright statement/disclaimers: The AHRQ QI software is publicly available; no copyright disclaimers.</td>
</tr>
<tr>
<td>Ad.11-13 Additional Information web page URL or attachment:</td>
</tr>
<tr>
<td>Date of Submission (MM/DD/YY): 06/14/2011</td>
</tr>
</tbody>
</table>
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

<table>
<thead>
<tr>
<th>MEASURE DESCRIPTIVE INFORMATION</th>
</tr>
</thead>
<tbody>
<tr>
<td>De.1 Measure Title: Failure to Rescue In-Hospital Mortality (risk adjusted)</td>
</tr>
<tr>
<td>De.2 Brief description of measure: Percentage of patients who died with a complications in the hospital.</td>
</tr>
<tr>
<td>De.3 If included in a composite or paired with another measure, please identify composite or paired measure.</td>
</tr>
<tr>
<td>Failure to Rescue 30-day Mortality (risk adjusted)</td>
</tr>
<tr>
<td>De.4 National Priority Partners Priority Area: Safety</td>
</tr>
<tr>
<td>De.5 IOM Quality Domain: Patient-centered</td>
</tr>
<tr>
<td>De.6 Consumer Care Need: Getting better</td>
</tr>
</tbody>
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<thead>
<tr>
<th>CONDITIONS FOR CONSIDERATION BY NQF</th>
</tr>
</thead>
<tbody>
<tr>
<td>Four conditions must be met before proposed measures may be considered and evaluated for suitability as voluntary consensus standards:</td>
</tr>
<tr>
<td>A. The measure is in the public domain or an intellectual property (measure steward agreement) is signed.</td>
</tr>
<tr>
<td>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.</td>
</tr>
<tr>
<td>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</td>
</tr>
<tr>
<td>A.2 Indicate if Proprietary Measure (as defined in measure steward agreement): Proprietary measure</td>
</tr>
<tr>
<td>A.3 Measure Steward Agreement: Agreement will be signed and submitted prior to or at the time of measure submission</td>
</tr>
<tr>
<td>A.4 Measure Steward Agreement attached:</td>
</tr>
<tr>
<td>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</td>
</tr>
</tbody>
</table>

Rating: C=Completely; P=Partially; M=Minimally; N=Not at all; NA=Not applicable
### 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

### TAP/Workgroup Reviewer Name:

<table>
<thead>
<tr>
<th>Staff Reviewer Name(s):</th>
</tr>
</thead>
</table>

### Steering Committee Reviewer Name:

### 1. IMPORTANCE TO MEASURE AND REPORT

**1. IMPACT 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.**

**1a. High Impact**

**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:**


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 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 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.

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
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):


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 D1 and D2 and adverse occurrence rates A1 and A2 it can be shown that whenever F1 >= F2, D1 >= 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 D1 < 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 1 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.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*?

Steering Committee: Was the threshold criterion, *Importance to Measure and Report*, met?

**Rationale:**

### 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](#))

<table>
<thead>
<tr>
<th>2a. MEASURE SPECIFICATIONS</th>
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<tbody>
<tr>
<td>S.1 Do you have a web page where current detailed measure specifications can be obtained?</td>
</tr>
<tr>
<td>S.2 If yes, provide web page URL:</td>
</tr>
<tr>
<td>2a. Precisely Specified</td>
</tr>
</tbody>
</table>

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](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](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](http://www.research.chop.edu/programs/cor/outcomes.php))

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):*
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](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.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.

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
(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:

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

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 Occurrence and Failure to Rescue Med Care 1992).

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.

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

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 uniformly 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

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.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.

### 3. Usability

**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.

**3b/3c. Relation to other NQF-endorsed 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?

### 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 (i.e., 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 consensus 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 to Silber et al. Med Care 2007)

### 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:

### 4. FEASIBILITY

Extent to which the required data are readily available, retrievable without undue burden, and can be implemented for performance measurement. (evaluation criteria)

#### 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)

#### 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.

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.

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.

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

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:

RECOMMENDATION

(for NQF staff use) Check if measure is untested and only eligible for time-limited endorsement.

Steering Committee: Do you recommend for endorsement?
Comments:
### CONTACT INFORMATION

<table>
<thead>
<tr>
<th>Co.1</th>
<th>Measure Steward (Intellectual Property Owner)</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td><strong>Organization</strong></td>
</tr>
<tr>
<td></td>
<td><em>The Children’s Hospital of Philadelphia, 3535 Market Street, Suite 1029, Philadelphia, Pennsylvania, 19104</em></td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Co.2</th>
<th>Point of Contact</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td><strong>Jeffrey H. Silber, MD, PhD, <a href="mailto:silber@email.chop.edu">silber@email.chop.edu</a>, 215-590-2540-</strong></td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Co.3</th>
<th>Measure Developer If different from Measure Steward</th>
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<tbody>
<tr>
<td></td>
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<tr>
<th>Co.4</th>
<th>Point of Contact</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td><strong>Orit, Even-Shoshan, MS, <a href="mailto:shoshan@email.chop.edu">shoshan@email.chop.edu</a>, 215-590-2809-</strong></td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Co.5</th>
<th>Submitter If different from Measure Steward POC</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td><strong>Orit, Even-Shoshan, MS, <a href="mailto:shoshan@email.chop.edu">shoshan@email.chop.edu</a>, 215-590-2809-, The Children’s Hospital of Philadelphia</strong></td>
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<table>
<thead>
<tr>
<th>Co.6</th>
<th>Additional organizations that sponsored/participated in measure development</th>
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<tbody>
<tr>
<td></td>
<td><strong>N/A</strong></td>
</tr>
</tbody>
</table>

### ADDITIONAL INFORMATION

<table>
<thead>
<tr>
<th>Ad.1</th>
<th>Workgroup/Expert Panel involved in measure development</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td><strong>Provide a list of sponsoring organizations and workgroup/panel members’ names and organizations. Describe the members’ role in measure development.</strong></td>
</tr>
<tr>
<td></td>
<td>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.</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Ad.2</th>
<th>If adapted, provide name of original measure: <strong>N/A</strong></th>
</tr>
</thead>
<tbody>
<tr>
<td>Ad.3</td>
<td>If adapted, provide original specifications URL or attachment</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Ad.4</th>
<th>Measure Developer/Steward Updates and Ongoing Maintenance</th>
</tr>
</thead>
<tbody>
<tr>
<td>Ad.6</td>
<td><strong>Year the measure was first released:</strong></td>
</tr>
</tbody>
</table>

| 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?** |

<table>
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<tr>
<th>Ad.10</th>
<th>Copyright statement/disclaimers:</th>
</tr>
</thead>
</table>

| 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** |
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

<table>
<thead>
<tr>
<th>MEASURE DESCRIPTIVE INFORMATION</th>
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</thead>
<tbody>
<tr>
<td>De.1 Measure Title: Failure to Rescue 30-Day Mortality (risk adjusted)</td>
</tr>
<tr>
<td>De.2 Brief description of measure: Percentage of patients who died with a complication within 30 days from admission.</td>
</tr>
<tr>
<td>1.1-2 Type of Measure: Outcome</td>
</tr>
<tr>
<td>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)</td>
</tr>
<tr>
<td>De.4 National Priority Partners Priority Area: Safety</td>
</tr>
<tr>
<td>De.5 IOM Quality Domain:</td>
</tr>
<tr>
<td>De.6 Consumer Care Need: Getting better</td>
</tr>
</tbody>
</table>

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<tr>
<th>CONDITIONS FOR CONSIDERATION BY NQF</th>
</tr>
</thead>
<tbody>
<tr>
<td>Four conditions must be met before proposed measures may be considered and evaluated for suitability as voluntary consensus standards:</td>
</tr>
<tr>
<td>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.</td>
</tr>
<tr>
<td>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</td>
</tr>
<tr>
<td>A.2 Indicate if Proprietary Measure (as defined in measure steward agreement): Proprietary measure</td>
</tr>
<tr>
<td>A.3 Measure Steward Agreement: Agreement will be signed and submitted prior to or at the time of measure submission</td>
</tr>
<tr>
<td>A.4 Measure Steward Agreement attached:</td>
</tr>
<tr>
<td>B. The measure owner/steward verifies there is an identified responsible entity and process to maintain and</td>
</tr>
</tbody>
</table>
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**

### C. The intended use of the measure includes both public reporting and quality improvement.

**Purpose:** Public Reporting, Quality Improvement (Internal to the specific organization)

### 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**

(for NQF staff use) **Have all conditions for consideration been met?**

**Staff Notes to Steward (if submission returned):**

**Staff Notes to Reviewers (issues or questions regarding any criteria):**

**Staff Reviewer Name(s):**

---

### 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**

(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:**

4. Silber JH, Rosenbaum PR, Williams SV, et al. The relationship between choice of outcome measure and


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.

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 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):

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 D1 and D2 and adverse occurrence rates A1 and A2 it can be shown that whenever F1>= F2, D1>= 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 D1 < 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 1 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.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?

Steering Committee: Was the threshold criterion, Importance to Measure and Report, met?

Rationale:

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)

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/caluculate 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)
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/](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](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)*


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.

#### 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

Rating: C=Completely; P=Partially; M=Minimally; N=Not at all; NA=Not applicable
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)).

2c) The relative contribution of patient-to-hospital characteristics that predicted each outcome of interest, as provided by the omega statistic. 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:

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

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 Occurrence and Failure to Rescue Med Care 1992).
2.) 2,021,214 patients with medicare claims on general, orthopedic, and vascular surgery admissions in the
### 2e. 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

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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): 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.

---

### 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 uniformly 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

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### 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.

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TAP/Workgroup: What are the strengths and weaknesses in relation to the subcriteria for Scientific
Acceptability of Measure Properties?

<table>
<thead>
<tr>
<th>Steering Committee: Overall, to what extent was the criterion, Scientific Acceptability of Measure Properties, met?</th>
<th>C</th>
<th>P</th>
<th>M</th>
</tr>
</thead>
<tbody>
<tr>
<td>Rationale:</td>
<td>2</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

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)

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”

3a.4 Testing of Interpretability (Testing that demonstrates the results are understood by the potential users for public reporting and quality improvement)

3a.5 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.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.

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?

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 (i.e., 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 consensus 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)

TAP/Workgroup: What are the strengths and weaknesses in relation to the subcriteria for Usability?

Steering Committee: Overall, to what extent was the criterion, Usability, met? Rationale:

4. FEASIBILITY

Extent to which the required data are readily available, retrievable without undue burden, and can be implemented for performance measurement. (evaluation criteria)

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)

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.
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.

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.

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

TAP/Workgroup: What are the strengths and weaknesses in relation to the subcriteria for Feasibility?

Steering Committee: Overall, to what extent was the criterion, Feasibility, met?
Rationale:

RECOMMENDATION

(for NQF staff use) Check if measure is untested and only eligible for time-limited endorsement.

Steering Committee: Do you recommend for endorsement?
Comments:

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
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)

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### 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 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 |

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### CONDITIONS FOR CONSIDERATION BY NQF

Four conditions must be met before proposed measures may be considered and evaluated for suitability as voluntary consensus standards:

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:

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
The intended use of the measure includes both public reporting and quality improvement.

**Purpose:** Public Reporting, Quality Improvement (Internal to the specific organization)

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

(for NQF staff use) Have all conditions for consideration been met?

Staff Notes to Steward (if submission returned):

Staff Notes to Reviewers (issues or questions regarding any criteria):

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

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

Rating: C=Completely; P=Partially; M=Minimally; N=Not at all; NA=Not applicable
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 insurance 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
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. 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. Failure rates were strongly associated with risk adjusted mortality rates, as expected, but not with complication rates. 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.

More recently, Needleman and Buerhaus 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. 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.
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.
   • 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. 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:

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

### 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?

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<td><strong>Steering Committee: Was the threshold criterion, Importance to Measure and Report, met?</strong></td>
<td>Y</td>
</tr>
<tr>
<td><strong>Rationale:</strong></td>
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#### 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)**

#### 2a. MEASURE SPECIFICATIONS

**S.1** Do you have a web page where current detailed measure specifications can be obtained?

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<table>
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<td><strong>S.2</strong> If yes, provide web page URL:</td>
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**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*
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
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<td>DUE TO INHALATION OF FOOD OR VOMITUS</td>
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<td>PULMONARY CONGESTION AND HYPOSTASIS</td>
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**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 INFECTION W/O ORGAN DYSFUNCTION
99592 SYSTEMIC INFLAMMATORY RESPONSE SYNDROME DUE TO INFECTION W/ ORGAN DYSFUNCTION
9980 POSTOPERATIVE SHOCK
*No longer valid in FY2005

FTR 5 - Shock or Cardiac Arrest: Denominator
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
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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
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
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<td>Gastric Ulcer Chronic or Unspecified W/ Hemorrhage and Perforation w/ Obstruction</td>
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<td>ICD-9-CM</td>
<td>Description</td>
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<td>GASTRITIS AND DUODENITIS, ATROPHIC GASTRITIS W/ HEMORRHAGE</td>
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<td>GASTRITIS AND DUODENITIS, GASTRIC MUCOSAL HYPERTROPHY, W/ HEMORRHAGE</td>
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<td>GASTRITIS AND DUODENITIS, ALCOHOLIC GASTRITIS, W/ HEMORRHAGE</td>
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<td>GASTRITIS AND DUODENITIS, OTHER SPECIFIED GASTRITIS - W/ HEMORRHAGE</td>
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<td>GASTRITIS AND DUODENITIS, UNSPECIFIED GASTRITIS AND GASTRODUODENITIS - W/ HEMORRHAGE</td>
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<td>GASTRITIS AND DUODENITIS, DUODENITIS - W/ HEMORRHAGE</td>
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<td>OTHER SPECIFIED DISORDERS OF STOMACH AND DUODENUM, ANGIODYSPLASIA OF STOMACH AND DUODENUM - W/ HEMORRHAGE</td>
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<td>DIEULAFOY LESION (HEMORRHAGIC) OF STOMACH AND DUODENUM</td>
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<td>DIVERTICULITIS OF COLON - W/ HEMORRHAGE</td>
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<td>HEMORRHAGE OF RECTUM AND ANUS</td>
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<td>ANGIODYSPLASIA OF INTESTINE - W/ HEMORRHAGE</td>
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<td>DIEULAFOY LESION (HEMORRHAGIC) OF INTESTINE</td>
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<td>GASTROINTESTINAL HEMORRHAGE, HEMATEMESIS</td>
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<td>5781</td>
<td>GASTROINTESTINAL HEMORRHAGE, BLOOD IN STOOL</td>
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<td>GASTROINTESTINAL HEMORRHAGE, HEMORRHAGE OF GASTROINTESTINAL TRACT, UNSPECIFIED</td>
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ICD-9-CM Abortion-related Shock diagnosis codes:

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<tr>
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<td>SPONTANEOUS ABORTION W/ SHOCK - COMPLETE</td>
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<td>63650</td>
<td>ILLEGAL ABORTION W/ SHOCK - UNSPECIFIED</td>
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</table>
NQF #0351

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
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<td>OTHER AND UNSPECIFIED ALCOHOL DEPENDENCE - EPISODIC</td>
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<td>OTHER AND UNSPECIFIED ALCOHOL DEPENDENCE - IN REMISSION</td>
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<td>30500</td>
<td>NONDEPENDENT ABUSE OF DRUGS, ALCOHOL ABUSE - UNSPECIFIED</td>
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<td>NONDEPENDENT ABUSE OF DRUGS, ALCOHOL ABUSE - CONTINUOUS</td>
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<td>NONDEPENDENT ABUSE OF DRUGS, ALCOHOL ABUSE - EPISODIC</td>
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<tr>
<td>30509</td>
<td>NONDEPENDENT ABUSE OF DRUGS, ALCOHOL ABUSE - IN REMISSION</td>
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<tr>
<td>4255</td>
<td>TOXIC EFFECT OF ALCOHOL, ETHYL ALCOHOL</td>
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<td>ALCOHOLIC GASTRITIS, W/O MENTION OF HEMORRHAGE</td>
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<td>53531</td>
<td>ALCOHOLIC GASTRITIS, W/ HEMORRHAGE</td>
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<tr>
<td>5710</td>
<td>ALCOHOLIC FATTY LIVER</td>
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<td>5711</td>
<td>ACUTE ALCOHOLIC HEPATITIS</td>
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<td>5712</td>
<td>ALCOHOLIC CIRRHOSIS OF LIVER</td>
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<td>5713</td>
<td>ALCOHOLIC LIVER DAMAGE, UNSPECIFIED</td>
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<tr>
<td>9800</td>
<td>TOXIC EFFECT OF ALCOHOL, ETHYL ALCOHOL</td>
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<tr>
<td>9809</td>
<td>TOXIC EFFECT OF ALCOHOL, UNSPECIFIED ALCOHOL</td>
</tr>
</tbody>
</table>

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

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](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](http://www.qualityindicators.ahrq.gov/software.htm)


**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**
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

2c. Validity testing

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
### 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

### 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):

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</table>

### 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

### 2h. Disparities in Care

#### 2h.1 If measure is stratified, provide stratified results (scores by stratified categories/cohorts):

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.


#### 2h.2 If disparities have been reported/identified, but measure is not specified to detect disparities, provide follow-up plans:
TAP/Workgroup: What are the strengths and weaknesses in relation to the subcriteria for Scientific Acceptability of Measure Properties?

Steering Committee: Overall, to what extent was the criterion, Scientific Acceptability of Measure Properties, met?

Rationale:

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)

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?

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

Rating: C=Completely; P=Partially; M=Minimally; N=Not at all; NA=Not applicable
http://www.myhealthfinder.com/

Rhode Island (NY QIO)
Why Not the Best?

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?

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:

TAP/Workgroup: What are the strengths and weaknesses in relation to the subcriteria for Usability?

Steering Committee: Overall, to what extent was the criterion, Usability, met?

Rationale:

4. FEASIBILITY
Extent to which the required data are readily available, retrievable without undue burden, and can be
implemented for performance measurement. *(evaluation criteria)*

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)*

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.
### 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.

### 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.

### 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 website, 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 website, 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 website, which is available at no cost.

TAP/Workgroup: What are the strengths and weaknesses in relation to the subcriteria for Feasibility?

Steering Committee: Overall, to what extent was the criterion, Feasibility, met?

Rationale:

**RECOMMENDATION**

(for NQF staff use) Check if measure is untested and only eligible for time-limited endorsement.

Steering Committee: Do you recommend for endorsement?

Comments:

**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
<table>
<thead>
<tr>
<th>Measure Developer If different from Measure Steward</th>
<th>Co.3 Organization</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Agency for Healthcare Research and Quality, 540 Gaither Road, Rockville, Maryland, 20850</td>
</tr>
</tbody>
</table>

| 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

<table>
<thead>
<tr>
<th>Workgroup/Expert Panel involved in measure development</th>
</tr>
</thead>
<tbody>
<tr>
<td>Ad.1 Provide a list of sponsoring organizations and workgroup/panel members’ names and organizations. Describe the members’ role in measure development.</td>
</tr>
<tr>
<td>None</td>
</tr>
</tbody>
</table>

| Ad.2 If adapted, provide name of original measure: | None |
| Ad.3-5 If adapted, provide original specifications URL or attachment |

<table>
<thead>
<tr>
<th>Measure Developer/Steward Updates and Ongoing Maintenance</th>
</tr>
</thead>
<tbody>
<tr>
<td>Ad.6 Year the measure was first released:</td>
</tr>
<tr>
<td>Ad.7 Month and Year of most recent revision:</td>
</tr>
<tr>
<td>Ad.8 What is your frequency for review/update of this measure?</td>
</tr>
<tr>
<td>Ad.9 When is the next scheduled review/update for this measure?</td>
</tr>
</tbody>
</table>

| 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 |
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:

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

Rating: C=Completely; P=Partially; M=Minimally; N=Not at all; NA=Not applicable
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

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)

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

(for NQF staff use) Have all conditions for consideration been met?

Met

Staff Notes to Steward (if submission returned):

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

(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.


Rating: C=Completely; P=Partially; M=Minimally; N=Not at all; NA=Not applicable

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:

1b.4 Summary of Data on disparities by population group:

1b.5 Citations for data on Disparities:

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

Rating: C=Completely; P=Partially; M=Minimally; N=Not at all; NA=Not applicable
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 fracture 122; 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

Rating: C=Completely; P=Partially; M=Minimally; N=Not at all; NA=Not applicable
- 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.8 Citations for Evidence (other than guidelines):

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.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):
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?

Steering Committee: Was the threshold criterion, Importance to Measure and Report, met?
Rationale:

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)

2a. MEASURE SPECIFICATIONS

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.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 postoperative 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

<table>
<thead>
<tr>
<th>Mean VF-14 (postoperative)</th>
<th>Total</th>
<th>92.7</th>
</tr>
</thead>
<tbody>
<tr>
<td>- With ocular comorbidity</td>
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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
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**Hereditary corneal dystrophies**

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**Hereditary choroidal dystrophies**

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**Hereditary retinal dystrophies**

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**High myopia**

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**Injury to optic nerve and pathways**

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**Keratitis**

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**Moderate or severe impairment, better eye, profound impairment lesser eye**

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**Nystagmus and other irregular eye movements**

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**Open wound of eyeball**

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References:

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:

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 become 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 Pesudos.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.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.

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:


A reference describing more of the Rasch analysis is:


Original references for the VF-14 include:


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, with 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 an 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 conducted):
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 α = 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):

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:

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
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 an ocular comorbidity and 84% had a systemic comorbidity.

2.2 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.

2.3 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.

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

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
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:

TAP/Workgroup: What are the strengths and weaknesses in relation to the subcriteria for Scientific Acceptability of Measure Properties?

Steering Committee: Overall, to what extent was the criterion, Scientific Acceptability of Measure Properties, met?
Rationale:

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)
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):

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?

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:

TAP/Workgroup: What are the strengths and weaknesses in relation to the subcriterion for Usability?

Steering Committee: Overall, to what extent was the criterion, Usability, met?
Rationale:

4. FEASIBILITY

Extent to which the required data are readily available, retrievable without undue burden, and can be implemented for performance measurement. (evaluation criteria)
### 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

### 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.

### 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.

### 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.

### 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
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?

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Steering Committee: Overall, to what extent was the criterion, Feasibility, met?

Rationale:

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RECOMMENDATION

(for NQF staff use) Check if measure is untested and only eligible for time-limited endorsement.

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Steering Committee: Do you recommend for endorsement?

Comments:

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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

Rating: C=Completely; P=Partially; M=Minimally; N=Not at all; NA=Not applicable
<table>
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<th>Ad.7</th>
<th>Month and Year of most recent revision:</th>
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<tr>
<td>Ad.8</td>
<td>What is your frequency for review/update of this measure?</td>
<td>Every 3 years</td>
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<td>Ad.9</td>
<td>When is the next scheduled review/update for this measure?</td>
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<td>Ad.11</td>
<td>Additional Information web page URL or attachment:</td>
<td>Attachment visual function and patient satisfaction measure Nov 2010.doc</td>
</tr>
<tr>
<td></td>
<td>Date of Submission (MM/DD/YY):</td>
<td>06/10/2011</td>
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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:

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-governmental 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
### 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

<table>
<thead>
<tr>
<th>(for NQF staff use) Specific NPP goal:</th>
</tr>
</thead>
<tbody>
<tr>
<td>1a.1 Demonstrated High Impact Aspect of Healthcare: Affects large numbers, Frequently performed procedure, Leading cause of morbidity/mortality, High resource use</td>
</tr>
<tr>
<td>1a.2</td>
</tr>
<tr>
<td>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.</td>
</tr>
</tbody>
</table>


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:

1b.4 Summary of Data on disparities by population group:

1b.5 Citations for data on Disparities:

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

Rating: C=Completely; P=Partially; M=Minimally; N=Not at all; NA=Not applicable
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):**


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.11 **National Guideline Clearinghouse or other URL:**

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?

<table>
<thead>
<tr>
<th>Rationale:</th>
<th>Y</th>
<th>N</th>
</tr>
</thead>
</table>

### 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)

### 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
### 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.
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 of 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.

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):
### 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:**

### 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.

### 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
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:

<table>
<thead>
<tr>
<th>TAP/Workgroup: What are the strengths and weaknesses in relation to the subcriteria for Scientific Acceptability of Measure Properties?</th>
</tr>
</thead>
<tbody>
<tr>
<td>Steering Committee: Overall, to what extent was the criterion, Scientific Acceptability of Measure Properties, met?</td>
</tr>
<tr>
<td>Rationale:</td>
</tr>
</tbody>
</table>

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)

### 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):

### 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.2 Are the measure specifications harmonized? If not, why?

- **Population/setting/data source or different topic but same target population:**

  - **Rationale:**

### 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:**

  - **Rationale:**

This measure is based on the S-CAHPS which specifically evaluates patient satisfaction with surgical care.

### TAP/Workgroup: What are the strengths and weaknesses in relation to the subcriteria for Usability?

- **Rating:** 3

### Steering Committee: Overall, to what extent was the criterion, Usability, met?

- **Rationale:**

### 4. FEASIBILITY

Extent to which the required data are readily available, retrievable without undue burden, and can be implemented for performance measurement.  **(evaluation criteria)**

<table>
<thead>
<tr>
<th>4a. Data Generated as a Byproduct of Care Processes</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>4a.1-2 How are the data elements that are needed to compute measure scores generated?</strong></td>
</tr>
<tr>
<td>Survey</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>4b. Electronic Sources</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>4b.1 Are all the data elements available electronically?</strong> <em>(elements that are needed to compute measure scores are in defined, computer-readable fields, e.g., electronic health record, electronic claims)</em></td>
</tr>
<tr>
<td>No</td>
</tr>
</tbody>
</table>

| 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. |

<table>
<thead>
<tr>
<th>4c. Exclusions</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>4c.1 Do the specified exclusions require additional data sources beyond what is required for the numerator and denominator specifications?</strong></td>
</tr>
<tr>
<td>No</td>
</tr>
</tbody>
</table>

| 4c.2 If yes, provide justification. |

<table>
<thead>
<tr>
<th>4d. Susceptibility to Inaccuracies, Errors, or Unintended Consequences</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>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.</strong></td>
</tr>
<tr>
<td>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).</td>
</tr>
</tbody>
</table>
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:

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<thead>
<tr>
<th>TAP/Workgroup: What are the strengths and weaknesses in relation to the subcriteria for Feasibility?</th>
</tr>
</thead>
<tbody>
<tr>
<td>Steering Committee: Overall, to what extent was the criterion, Feasibility, met?</td>
</tr>
<tr>
<td>Rationale:</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>RECOMMENDATION</th>
</tr>
</thead>
<tbody>
<tr>
<td>(for NQF staff use) Check if measure is untested and only eligible for time-limited endorsement.</td>
</tr>
<tr>
<td>Steering Committee: Do you recommend for endorsement?</td>
</tr>
<tr>
<td>Comments:</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>CONTACT INFORMATION</th>
</tr>
</thead>
<tbody>
<tr>
<td>Co.1 Measure Steward (Intellectual Property Owner)</td>
</tr>
<tr>
<td>Co.1 Organization</td>
</tr>
<tr>
<td>American Academy of Ophthalmology and the Hoskins Center for Quality Eye Care, 655 Beach Street, San Francisco, California, 94109-1336</td>
</tr>
<tr>
<td>Co.2 Point of Contact</td>
</tr>
<tr>
<td>Flora, Lum, MD, <a href="mailto:flum@aao.org">flum@aao.org</a>, 415-561-8592</td>
</tr>
<tr>
<td>Co.3 Measure Developer If different from Measure Steward</td>
</tr>
<tr>
<td>Co.3 Organization</td>
</tr>
<tr>
<td>American Academy of Ophthalmology and the Hoskins Center for Quality Eye Care, 655 Beach Street, San Francisco, California, 94109-1336</td>
</tr>
</tbody>
</table>
| Co.4 **Point of Contact**  
| Flora, Lum, MD, flum@ao.org, 415-561-8592- |
| Co.5 **Submitter If different from Measure Steward POC**  
| Flora, Lum, MD, flum@ao.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

**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 function and patient satisfaction measure Nov 2010-634279328820242414.doc

**Date of Submission (MM/DD/YY):** 06/10/2011
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

<table>
<thead>
<tr>
<th>MEASURE DESCRIPTIVE INFORMATION</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>De.1 Measure Title:</strong> Timing of Antibiotic Prophylaxis for Cardiac Surgery Patients</td>
</tr>
<tr>
<td><strong>De.2 Brief description of measure:</strong> 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)</td>
</tr>
<tr>
<td><strong>1.1-2 Type of Measure:</strong> Process</td>
</tr>
<tr>
<td><strong>De.3 If included in a composite or paired with another measure, please identify composite or paired measure</strong></td>
</tr>
<tr>
<td><strong>De.4 National Priority Partners Priority Area:</strong> Safety</td>
</tr>
<tr>
<td><strong>De.5 IOM Quality Domain:</strong> Safety</td>
</tr>
<tr>
<td><strong>De.6 Consumer Care Need:</strong> Getting better</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>CONDITIONS FOR CONSIDERATION BY NQF</th>
</tr>
</thead>
<tbody>
<tr>
<td>Four conditions must be met before proposed measures may be considered and evaluated for suitability as voluntary consensus standards:</td>
</tr>
<tr>
<td><strong>A. The measure is in the public domain or an intellectual property (measure steward agreement) is signed.</strong> 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.</td>
</tr>
<tr>
<td><strong>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</strong></td>
</tr>
<tr>
<td><strong>A.2 Indicate if Proprietary Measure (as defined in measure steward agreement):</strong> Yes</td>
</tr>
<tr>
<td><strong>A.3 Measure Steward Agreement:</strong> Agreement will be signed and submitted prior to or at the time of measure submission</td>
</tr>
<tr>
<td><strong>A.4 Measure Steward Agreement attached:</strong> STS Measure Steward Agreement. Fully Executed-6342673230275757342.pdf</td>
</tr>
</tbody>
</table>

Rating: C=Completely; P=Partially; M=Minimally; N=Not at all; NA=Not applicable
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

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)

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

(For NQF staff use) Have all conditions for consideration been met?

Staff Notes to Steward (if submission returned):

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

(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.”

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

<table>
<thead>
<tr>
<th>Measurement</th>
<th>Timing of Antibiotic Administration for Cardiac Surgery Patients</th>
</tr>
</thead>
<tbody>
<tr>
<td>N</td>
<td>786</td>
</tr>
<tr>
<td>Mean</td>
<td>98.0%</td>
</tr>
<tr>
<td>1st</td>
<td>83.2%</td>
</tr>
<tr>
<td>5th</td>
<td>93.2%</td>
</tr>
<tr>
<td>10th</td>
<td>95.2%</td>
</tr>
<tr>
<td>25th</td>
<td>97.7%</td>
</tr>
<tr>
<td>Median</td>
<td>99.2%</td>
</tr>
<tr>
<td>75th</td>
<td>99.9%</td>
</tr>
<tr>
<td>90th</td>
<td>100.0%</td>
</tr>
<tr>
<td>95th</td>
<td>100.0%</td>
</tr>
<tr>
<td>99th</td>
<td>100.0%</td>
</tr>
</tbody>
</table>

| 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:
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.
47788 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:

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 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

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:

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
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:

“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:

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):

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)

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.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):*
### 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/STSAadultCVDataCollectionForm2_73_Annotated.pdf

### 2a.29-31 Data dictionary/code table web page URL or attachment:

URL
http://www.sts.org/sites/default/files/documents/STSAadultCVDataSpecificationsV2_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):


#### 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

#### 2c. Validity testing

Rating: C=Completely; P=Partially; M=Minimally; N=Not at all; NA=Not applicable
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):**

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):**

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:

#### 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

#### 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):**

#### 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:**

#### TAP/Workgroup: What are the strengths and weaknesses in relation to the subcriteria for Scientific Acceptability of Measure Properties?

**Steering Committee: Overall, to what extent was the criterion, Scientific Acceptability of Measure Properties, met?**

**Rationale:**

#### 3. USABILITY

**Extant 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)**

**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):**

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

<table>
<thead>
<tr>
<th>3b/3c. Relation to other NQF-endorsed measures</th>
</tr>
</thead>
<tbody>
<tr>
<td>3b.1 <strong>NQF # and Title of similar or related measures:</strong></td>
</tr>
<tr>
<td>...</td>
</tr>
</tbody>
</table>

(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
### 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

**TAP/Workgroup:** What are the strengths and weaknesses in relation to the subcriteria for *Usability*?

**Steering Committee:** Overall, to what extent was the criterion, *Usability*, met?

**Rationale:**

### Feasibility

**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)

**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.

**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.

**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).*

---

**Rating:** C=Completely; P=Partially; M=Minimally; N=Not at all; NA=Not applicable
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:

TAP/Workgroup: What are the strengths and weaknesses in relation to the subcriteria for Feasibility?

Steering Committee: Overall, to what extent was the criterion, Feasibility, met?
Rationale:

RECOMMENDATION

(for NQF staff use) Check if measure is untested and only eligible for time-limited endorsement.

Rating: C=Completely; P=Partially; M=Minimally; N=Not at all; NA=Not applicable
<table>
<thead>
<tr>
<th>CONTACT INFORMATION</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Co.1 Measure Steward (Intellectual Property Owner)</strong></td>
</tr>
<tr>
<td><strong>Co.1 Organization</strong></td>
</tr>
<tr>
<td>Society of Thoracic Surgeons, 633 North Saint Clair Street, Suite 2320, Chicago, Illinois, 60611</td>
</tr>
<tr>
<td><strong>Co.2 Point of Contact</strong></td>
</tr>
<tr>
<td>Jane, Han, MSW, <a href="mailto:jhan@sts.org">jhan@sts.org</a>, 312-202-5856-</td>
</tr>
<tr>
<td><strong>Measure Developer If different from Measure Steward</strong></td>
</tr>
<tr>
<td><strong>Co.3 Organization</strong></td>
</tr>
<tr>
<td>Society of Thoracic Surgeons, 633 North Saint Clair Street, Suite 2320, Chicago, Illinois, 60611</td>
</tr>
<tr>
<td><strong>Co.4 Point of Contact</strong></td>
</tr>
<tr>
<td>Jane, Han, MSW, <a href="mailto:jhan@sts.org">jhan@sts.org</a>, 312-202-5856-</td>
</tr>
<tr>
<td><strong>Co.5 Submitter If different from Measure Steward POC</strong></td>
</tr>
<tr>
<td>Jane, Han, MSW, <a href="mailto:jhan@sts.org">jhan@sts.org</a>, 312-202-5856-, Society of Thoracic Surgeons</td>
</tr>
<tr>
<td><strong>Co.6 Additional organizations that sponsored/participated in measure development</strong></td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>ADDITIONAL INFORMATION</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Workgroup/Expert Panel involved in measure development</strong></td>
</tr>
<tr>
<td>Ad.1 Provide a list of sponsoring organizations and workgroup/panel members’ names and organizations. Describe the members’ role in measure development.</td>
</tr>
<tr>
<td>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.</td>
</tr>
<tr>
<td><strong>Ad.2 If adapted, provide name of original measure:</strong></td>
</tr>
<tr>
<td><strong>Ad.3-5 If adapted, provide original specifications URL or attachment</strong></td>
</tr>
<tr>
<td><strong>Measure Developer/Steward Updates and Ongoing Maintenance</strong></td>
</tr>
<tr>
<td>Ad.6 Year the measure was first released: 2004</td>
</tr>
<tr>
<td>Ad.7 Month and Year of most recent revision: 12, 2010</td>
</tr>
<tr>
<td>Ad.8 What is your frequency for review/update of this measure? annually</td>
</tr>
<tr>
<td>Ad.9 When is the next scheduled review/update for this measure? 2011</td>
</tr>
<tr>
<td><strong>Ad.10 Copyright statement/disclaimers:</strong></td>
</tr>
<tr>
<td><strong>Ad.11 -13 Additional Information web page URL or attachment:</strong> Attachment 0125 Sections 1b.2, 1b.4, 2b.3, 2f.3, 3a.6.pdf</td>
</tr>
<tr>
<td><strong>Date of Submission (MM/DD/YY):</strong> 06/13/2011</td>
</tr>
</tbody>
</table>
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**

<table>
<thead>
<tr>
<th>De.1 Measure Title: Prophylactic Intravenous (IV) Antibiotic Timing</th>
</tr>
</thead>
<tbody>
<tr>
<td>De.2 Brief description of measure: Rate of ASC patients who received IV antibiotics ordered for surgical site infection prophylaxis on time</td>
</tr>
<tr>
<td>1.1-2 Type of Measure: Process</td>
</tr>
<tr>
<td>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</td>
</tr>
<tr>
<td>De.4 National Priority Partners Priority Area: Safety</td>
</tr>
<tr>
<td>De.5 IOM Quality Domain: Effectiveness</td>
</tr>
<tr>
<td>De.6 Consumer Care Need: Staying healthy</td>
</tr>
</tbody>
</table>

**CONDITIONS FOR CONSIDERATION BY NQF**

Four conditions must be met before proposed measures may be considered and evaluated for suitability as voluntary consensus standards:

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

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

<table>
<thead>
<tr>
<th>C</th>
<th>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)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Y</td>
<td>N</td>
</tr>
</tbody>
</table>

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

(for NQF staff use) Have all conditions for consideration been met?

Staff Notes to Steward (if submission returned):

Staff Notes to Reviewers (issues or questions regarding any criteria):

Staff Reviewer Name(s):

<table>
<thead>
<tr>
<th>TAP/Workgroup Reviewer Name:</th>
</tr>
</thead>
<tbody>
<tr>
<td>Steering Committee Reviewer Name:</td>
</tr>
</tbody>
</table>

1. IMPORTANCE TO MEASURE AND REPORT

Extant 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

(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

<table>
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<th>Eval Rating</th>
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<tr>
<td>C</td>
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</table>
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


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.

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):
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.


Dellinger EP. Prophylactic antibiotics: administration and timing before operation are more important than administration after operation. Clin Infect Dis 2007;44:928-930.


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.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?

<table>
<thead>
<tr>
<th>Rationale:</th>
<th>1</th>
</tr>
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</table>

Steering Committee: Was the threshold criterion, Importance to Measure and Report, met?

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)

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, levofoxacin, 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.4 Denominator Statement (Brief, text description of the denominator - target population being measured):

Rating: C=Completely; P=Partially; M=Minimally; N=Not at all; NA=Not applicable
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.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.

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 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

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.

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):
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

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.

2.3 Xcelerate/Workgroup: What are the strengths and weaknesses in relation to the subcriteria for Scientific Acceptability of Measure Properties?

2.3 Xcelerate/Workgroup: What are the strengths and weaknesses in relation to the subcriteria for Scientific Acceptability of Measure Properties?
### 3. USABILITY

**Rationale:** 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)

<table>
<thead>
<tr>
<th>3a. Meaningful, Understandable, and Useful Information</th>
<th>P</th>
<th>M</th>
<th>N</th>
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<tbody>
<tr>
<td><strong>3a.1 Current Use:</strong> In use</td>
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</table>
| **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://tasc.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_1 01129.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)* | | | |

<table>
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<tr>
<th>3b/3c. Relation to other NQF-endorsed measures</th>
<th>P</th>
<th>M</th>
<th>N</th>
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</table>
| **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 clinical documentation) and therefore inefficient and more expensive for the provider.

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.

TAP/Workgroup: What are the strengths and weaknesses in relation to the subcriteria for Usability?

Steering Committee: Overall, to what extent was the criterion, Usability, met?
Rationale:

4. FEASIBILITY
Extent to which the required data are readily available, retrievable without undue burden, and can be implemented for performance measurement. (evaluation criteria)

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)

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.

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.

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 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.

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

TAP/Workgroup: What are the strengths and weaknesses in relation to the subcriteria for Feasibility?

Steering Committee: Overall, to what extent was the criterion, Feasibility, met?
Rationale:

<table>
<thead>
<tr>
<th>RECOMMENDATION</th>
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<td>(for NQF staff use) Check if measure is untested and only eligible for time-limited endorsement.</td>
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</table>

| Steering Committee: Do you recommend for endorsement? |
| Comments: |

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
**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 Arnowe, 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**