



Measure Information

This document contains the information submitted by measure developers/stewards, but is organized according to NQF's measure evaluation criteria and process. The item numbers refer to those in the submission form but may be in a slightly different order here. In general, the item numbers also reference the related criteria (e.g., item 1b.1 relates to sub criterion 1b).

Brief Measure Information

NQF #: 2514

Corresponding Measures:

De.2. Measure Title: Risk-Adjusted Coronary Artery Bypass Graft (CABG) Readmission Rate

Co.1.1. Measure Steward: The Society of Thoracic Surgeons

De.3. Brief Description of Measure: Risk-adjusted percentage of Medicare fee-for-service beneficiaries aged 65 and older who undergo isolated coronary artery bypass grafting (CABG) and are discharged alive but have a subsequent acute care hospital inpatient admission within 30 days of the date of discharge from the CABG hospitalization.

1b.1. Developer Rationale: Compared with the three medical conditions whose readmission rates are currently provided on Hospital Compare, a much higher percentage of readmissions for CABG are due to specific surgical complications such as infections or arrhythmias. The nature of the common postoperative problems leading to post-CABG readmission suggest that optimal inpatient care (leading to fewer early and late complications) and more complete resolution of certain problems prior to discharge (e.g., arrhythmias, heart failure, wound issues, pleural effusions) may reduce readmissions, together with other more generic approaches such as better care transitions to the community environment and closer postoperative follow up.

Benefits

In the 2007 MEDPAC Report to Congress, of the seven conditions that accounted for 30% of all 2005 Medicare spending on readmissions within 15 days, CABG had the highest 15 day readmission rate (13.5%) and the second highest Medicare payment per readmission (\$8,136). The 2008 MEDPAC Report to Congress noted that in 2005, among these seven diagnoses, the 30-day potentially preventable readmission rate for CABG was 18.1% (although this represented the lowest absolute number of patients given the smaller number of initial CABG admissions), which accounted for \$215 million of a total \$12 billion dollars (1.8%) of Medicare spending on readmission in 2005. In aggregate, these data suggest that CABG is one of the conditions and procedures most commonly associated with Medicare readmissions, and that measures to reduce their frequency are warranted. This measure could potentially lead to a reduction in the cost of readmissions by decreasing the number of preventable readmissions.

Potential Harms

Studies suggest that non-clinical patient, social, and environmental factors play a substantial role in readmission risk, and by convention these factors are not included in risk models used for profiling. Since patients from vulnerable populations often have less community and family support after hospital discharge, they are at higher risk for readmission. Thus, tying readmission to reimbursement penalties could lead some providers to avoid or delay treating such patients because they are regarded as being at higher risk of readmission. It is also possible that reimbursement to hospitals caring for such vulnerable populations could be disproportionately penalized. Finally, penalties for higher than expected readmission rates could discourage or delay appropriate readmissions.

Unexplained Variation

Hannan and colleagues¹ studied New York CABG readmissions using 2005-2007 data from 33,936 New York isolated CABG procedures. After excluding patients who died during the index hospitalization or who were from out-of-state, the study cohort consisted of 30,953 procedures. To obtain complete follow up, the authors linked the CSRS to their SPARCS state administrative database. The overall 30-day all-cause readmission rate was 16.5%, of which 87.3% of cases were directly related to CABG (i.e., 14.4% of the total). Notably, there was in excess of two-fold (8.3% to 21.1%) variation in risk-adjusted readmission rates for hospitals even within this one state. This suggests that measured patient characteristics only partially explain variation in outcomes², and also that there is probably an opportunity for high readmission rate programs to improve³.

Please also see data in section 1b.2.

Citations:

2007 and 2008 MEDPAC Reports to Congress

1. Hannan EL, Zhong Y, Lahey SJ et al. 30-day readmissions after coronary artery bypass graft surgery in New York State. JACC Cardiovasc Interv 2011; 4(5):569-576.
2. Hammill BG, Curtis LH, Fonarow GC et al. Incremental value of clinical data beyond claims data in predicting 30-day outcomes after heart failure hospitalization. Circ Cardiovasc Qual Outcomes 2011; 4(1):60-67.
3. Rumsfeld JS, Allen LA. Reducing readmission rates: Does coronary artery bypass graft surgery provide clarity? JACC Cardiovasc Interv 2011; 4(5):577-578.

S.4. Numerator Statement: Number of Medicare fee-for-service beneficiaries aged 65 and older who undergo isolated coronary artery bypass grafting (CABG) and are discharged alive but have a subsequent acute care hospital inpatient admission within 30 days of the date of discharge from the CABG hospitalization.

S.6. Denominator Statement: Number of Medicare fee-for-service beneficiaries aged 65 and older who undergo isolated coronary artery bypass grafting (CABG) during the designated 3-year measurement period and are discharged alive.

S.8. Denominator Exclusions: Exclusion – Rationale

- The patient is age <65 years on date of discharge according to CMS or STS data – Patients younger than 65 in the Medicare dataset represent a distinct population that qualifies for Medicare due to disability. The characteristics and outcomes of these patients may be less representative of the larger population of CABG patients.
- There is a CMS record but no matching STS record – STS data elements are required for identifying the cohort and for risk adjustment.
- There is an STS record but not matching CMS record – Medicare data are required for ascertaining 30-day readmission status, especially readmissions to a hospital other than the CABG hospital
- CABG is not a stand-alone procedure – Inclusion of combination procedures complicates risk adjustment by adding multiple relatively rare cohorts with potentially distinct characteristics and outcomes.
- The patient died prior to discharge from acute care setting – Patient is not at risk of subsequent readmission.
- The patient leaves against medical advice (AMA). – Physicians and hospitals do not have the opportunity to deliver the highest quality care.
- The patient does not retain Medicare fee-for-service (FFS) A and B for at least two months after discharge – Beneficiaries who switch to a Medicare advantage plan are unlikely to file inpatient claims which are required for ascertaining 30-day readmission status.
- The index CABG episode is >365 days. – These patients were excluded for consistency with previous CMS readmission measures. These records may inaccurate admission and discharge dates. If not, including them would complicate risk adjustment by adding a relatively rare cohort with potentially distinct characteristics and outcomes.
- Not the first eligible CABG admission per patient per measurement period. – Simplifies statistical analysis. Also, repeat CABG procedures are very rare and so loss of information is minimal.

De.1. Measure Type: Outcome

S.17. Data Source: Claims, Registry Data

S.20. Level of Analysis: Facility

IF Endorsement Maintenance – Original Endorsement Date: Dec 23, 2014 **Most Recent Endorsement Date:** Dec 08, 2016

IF this measure is included in a composite, NQF Composite#/title:

IF this measure is paired/grouped, NQF#/title:

De.4. IF PAIRED/GROUPED, what is the reason this measure must be reported with other measures to appropriately interpret results? N/A

1. Evidence, Performance Gap, Priority – Importance to Measure and Report

Extent to which the specific measure focus is evidence-based, important to making significant gains in healthcare quality, and

improving health outcomes for a specific high-priority (high-impact) aspect of healthcare where there is variation in or overall less-than-optimal performance. **Measures must be judged to meet all sub criteria to pass this criterion and be evaluated against the remaining criteria.**

1a. Evidence to Support the Measure Focus – See attached Evidence Submission Form

[1a._Evidence_-_Risk-Adjusted_CABG_Readmission_Rate.FINAL.doc.docx](#)

1a.1 For Maintenance of Endorsement: Is there new evidence about the measure since the last update/submission?

Do not remove any existing information. If there have been any changes to evidence, the Committee will consider the new evidence. Please use the most current version of the evidence attachment (v7.1). Please use red font to indicate updated evidence.

1b. Performance Gap

Demonstration of quality problems and opportunity for improvement, i.e., data demonstrating:

- considerable variation, or overall less-than-optimal performance, in the quality of care across providers; and/or
- Disparities in care across population groups.

1b.1. Briefly explain the rationale for this measure (e.g., how the measure will improve the quality of care, the benefits or improvements in quality envisioned by use of this measure)

If a COMPOSITE (e.g., combination of component measure scores, all-or-none, any-or-none), SKIP this question and answer the composite questions.

Compared with the three medical conditions whose readmission rates are currently provided on Hospital Compare, a much higher percentage of readmissions for CABG are due to specific surgical complications such as infections or arrhythmias. The nature of the common postoperative problems leading to post-CABG readmission suggest that optimal inpatient care (leading to fewer early and late complications) and more complete resolution of certain problems prior to discharge (e.g., arrhythmias, heart failure, wound issues, pleural effusions) may reduce readmissions, together with other more generic approaches such as better care transitions to the community environment and closer postoperative follow up.

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3. Rumsfeld JS, Allen LA. Reducing readmission rates: Does coronary artery bypass graft surgery provide clarity? JACC Cardiovasc Interv 2011; 4(5):577-578.

1b.2. Provide performance scores on the measure as specified (current and over time) at the specified level of analysis. (This is required for maintenance of endorsement. Include mean, std dev, min, max, interquartile range, scores by decile. Describe the data source including number of measured entities; number of patients; dates of data; if a sample, characteristics of the entities include.) This information also will be used to address the sub-criterion on improvement (4b1) under Usability and Use. See supplemental materials attached.

Distribution Statistic		Risk Standardized Readmission Rate
Number of Hospitals		844
Minimum	12.5%	
10%	14.5%	
25%	15.6%	
50%	16.9%	
75%	18.3%	
90%	19.8%	
Maximum	34.2%	
Mean	17.0%	

1b.3. If no or limited performance data on the measure as specified is reported in 1b2, then provide a summary of data from the literature that indicates opportunity for improvement or overall less than optimal performance on the specific focus of measurement.

N/A

1b.4. Provide disparities data from the measure as specified (current and over time) by population group, e.g., by race/ethnicity, gender, age, insurance status, socioeconomic status, and/or disability. (This is required for maintenance of endorsement. Describe the data source including number of measured entities; number of patients; dates of data; if a sample, characteristics of the entities included.) For measures that show high levels of performance, i.e., "topped out", disparities data may demonstrate an opportunity for improvement/gap in care for certain sub-populations. This information also will be used to address the sub-criterion on improvement (4b1) under Usability and Use.

We used data from 2008-2010 to examine unadjusted all-cause 30-day readmission rates as a function of race/ethnicity and gender. The unadjusted all-cause 30-day readmission rate is higher for female patients than male patients (20.4% vs. 15.5%) and higher for black patients than white patients (20.7% vs. 16.7%).

By sex

- Male: 15.5%
- Female: 20.4%

By race/ethnicity

- Caucasian: 16.7%
- Black: 20.7%
- Hispanic: 19.1%
- Asian: 18.0%
- Other race: 18.8%

Per CMS and NQF's policies, race is not included in the profiling risk model so as not to adjust out racial disparities.

1b.5. If no or limited data on disparities from the measure as specified is reported in 1b.4, then provide a summary of data from the literature that addresses disparities in care on the specific focus of measurement. Include citations. Not necessary if performance data provided in 1b.4

Additional Information on Disparities -

In a large study by Jencks and colleagues 1 of 11,855,702 Medicare beneficiaries admitted during 2003-4, overall 30-day rehospitalization rate was 19.6%. The hazard ratio for readmission was increased for blacks (HR 1.057, 95% CI 1.053 – 1.061), patients with disabilities (HR 1.130, 95% CI 1.119 – 1.141), and patients receiving Supplemental Security Income (HR 1.117, 95% CI 1.113 – 1.122). In a study of 3 million elderly Medicare beneficiaries who received care for heart failure, myocardial infarction, or pneumonia between 2006 and 2008, Joynt and colleagues 2, 3 found that the highest 30-day readmission rates were for black patients from minority-serving hospitals (OR 1.23, 95% CI 1.18-1.29)

Citations:

1. Jencks SF, Williams MV, Coleman EA. Rehospitalizations among patients in the Medicare fee-for-service program. *N Engl J Med* 2009 April 2;360(14):1418-28.
2. Joynt KE, Orav EJ, Jha AK. Thirty-day readmission rates for Medicare beneficiaries by race and site of care. *JAMA* 2011 February 16;305(7):675-81.
3. Hernandez AF, Curtis LH. Minding the gap between efforts to reduce readmissions and disparities. *Jama* 2011 February 16;305(7):715-6.

2. Reliability and Validity—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. **Measures must be judged to meet the sub criteria for both reliability and validity to pass this criterion and be evaluated against the remaining criteria.**

2a.1. Specifications The measure is well defined and precisely specified so it can be implemented consistently within and across organizations and allows for comparability. eMeasures should be specified in the Health Quality Measures Format (HQMF) and the Quality Data Model (QDM).

De.5. Subject/Topic Area (check all the areas that apply):

Cardiovascular, Cardiovascular : Coronary Artery Disease, Surgery, Surgery : Cardiac Surgery

De.6. Non-Condition Specific(check all the areas that apply):

Care Coordination, Care Coordination : Readmissions, Care Coordination : Transitions of Care, Person-and Family-Centered Care, Safety, Safety : Complications, Safety : Healthcare Associated Infections

De.7. Target Population Category (Check all the populations for which the measure is specified and tested if any):

Elderly

S.1. Measure-specific Web Page (Provide a URL link to a web page specific for this measure that contains current detailed specifications including code lists, risk model details, and supplemental materials. Do not enter a URL linking to a home page or to general information.)

<http://www.sts.org/sites/default/files/documents/pdf/AdultCVDDataSpecifications2.61.pdf>; STS Data Collection Form – http://www.sts.org/sites/default/files/documents/pdf/AdultCV2.61DCF_Annotated.pdf

S.2a. If this is an eMeasure, HQMF specifications must be attached. Attach the zipped output from the eMeasure authoring tool (MAT) - if the MAT was not used, contact staff. (Use the specification fields in this online form for the plain-language description of the specifications)

This is not an eMeasure Attachment:

S.2b. Data Dictionary, Code Table, or Value Sets (and risk model codes and coefficients when applicable) must be attached. (Excel or csv file in the suggested format preferred - if not, contact staff)

Attachment:

S.2c. Is this an instrument-based measure (i.e., data collected via instruments, surveys, tools, questionnaires, scales, etc.)? Attach copy of instrument if available.

No, this is not an instrument-based measure Attachment:

S.2d. Is this an instrument-based measure (i.e., data collected via instruments, surveys, tools, questionnaires, scales, etc.)? Attach copy of instrument if available.

Not an instrument-based measure

S.3.1. For maintenance of endorsement: Are there changes to the specifications since the last updates/submission. If yes, update the specifications for S1-2 and S4-22 and explain reasons for the changes in S3.2.

No

S.3.2. For maintenance of endorsement, please briefly describe any important changes to the measure specifications since last measure update and explain the reasons.

N/A

S.4. Numerator Statement (Brief, narrative description of the measure focus or what is being measured about the target population, i.e., cases from the target population with the target process, condition, event, or outcome) DO NOT include the rationale for the measure.

IF an OUTCOME MEASURE, state the outcome being measured. Calculation of the risk-adjusted outcome should be described in the calculation algorithm (S.14).

Number of Medicare fee-for-service beneficiaries aged 65 and older who undergo isolated coronary artery bypass grafting (CABG) and are discharged alive but have a subsequent acute care hospital inpatient admission within 30 days of the date of discharge from the CABG hospitalization.

S.5. Numerator Details (All information required to identify and calculate the cases from the target population with the target process, condition, event, or outcome such as definitions, time period for data collection, specific data collection items/responses, code/value sets – Note: lists of individual codes with descriptors that exceed 1 page should be provided in an Excel or csv file in required format at S.2b)

IF an OUTCOME MEASURE, describe how the observed outcome is identified/counted. Calculation of the risk-adjusted outcome should be described in the calculation algorithm (S.14).

Readmission is defined as a subsequent acute care hospital inpatient admission on or before the 30th day since the date of discharge from the index CABG episode (discharge day regarded as day 0). Transfers from the index CABG hospitalization to another acute care facility are not considered readmissions. In the case of transfer, the 30-day timeframe begins on the discharge date from the last acute care facility of the transfer chain. Regardless of transfers, events are attributed to the hospital that performed the CABG operation. If a patient has more than one admission within 30 days after discharge from the index CABG episode, only one is counted as a readmission.

S.6. Denominator Statement (Brief, narrative description of the target population being measured)

Number of Medicare fee-for-service beneficiaries aged 65 and older who undergo isolated coronary artery bypass grafting (CABG) during the designated 3-year measurement period and are discharged alive.

S.7. Denominator Details (All information required to identify and calculate the target population/denominator such as definitions, time period for data collection, specific data collection items/responses, code/value sets – Note: lists of individual codes with descriptors that exceed 1 page should be provided in an Excel or csv file in required format at S.2b.)

IF an OUTCOME MEASURE, describe how the target population is identified. Calculation of the risk-adjusted outcome should be described in the calculation algorithm (S.14).

Candidate CABG admissions are identified by selecting Medicare Part A claims with an ICD-9-CM procedural code for CABG (36.1x) in any position. Records are retained for analysis if they meet the following additional criteria:

- (1) Linked to an STS record for isolated CABG (see below for record linkage criteria and definition of isolated CABG);
- (2) Eligible for Medicare fee-for-service (FFS) A and B for at least two months after discharge or until month of death, whichever is first;
- (3) Discharged from acute care setting within 1 year of index CABG admission;
- (4) Did not leave against medical advice;

- (5) No logically inconsistent claims data (e.g. claims with overlapping admission and discharge dates);
- (6) Is the first eligible operation per patient during the measurement period.

Criteria for linking CMS and STS records

STS and CMS records were linked using combinations of indirect identifiers (hospital, age, sex, date of admission, date of discharge). Before linking the CMS and STS databases, we applied the following inclusion criteria. From the CMS database, we selected all inpatient claims for patients 65 years or older at discharge with an ICD-9-CM procedural code for CABG (36.1x) in any position. From the STS database, we selected all records for patients 65 years or older on the date of discharge who underwent CABG (STS v2.61 "Coronary Artery Bypass" in section I "operative"). Eligible STS and CMS records were considered to link if they satisfied one or more of the following 3 criteria:

1. Agree on hospital, age, sex, date of admission, and date of discharge
2. Agree on hospital, sex, date of admission, date of discharge, with ages differ by 1 year
3. Agree on hospital, sex and age, and one of the two dates, with the other date differ by 1 day.

NOTE: The record linkage strategy described above was used for exploratory analyses for developing the measure and may not be required when the measure is implemented by CMS. For implementation by CMS, it is anticipated that CMS will mandate collection of direct identifiers (e.g. name and social security number) which may obviate the need to link records based on combinations of indirect identifiers.

Definition of Isolated CABG

Isolated CABG is defined as a stand-alone CABG operation without a concomitant valve or other major cardiac or non-cardiac procedure with the following exceptions:

- CABG + ventricular assist device (VAD) implantation is counted as isolated CABG.

Rationale: VAD implantation is often unplanned and may be impacted by the quality of the CABG operation and peri-operative care. Performance measures should adjust for patient factors present at the beginning of the episode of care and should not adjust for discretionary care practices that may reflect lower or higher quality of care.

- CABG + transmyocardial laser revascularization (TMR) is counted as isolated CABG.

Rationale: The decision to perform TMR is discretionary and susceptible to gaming.

- CABG + insertion of pacemaker or automatic implantable cardioverter defibrillator is counted as isolated CABG

Rationale: In the version of the Database used to develop this model, it is impossible to distinguish which such combined CABG plus pacemaker or ICD patients required these additional procedures because of a pre-existing condition versus as a result of a complication of surgery (e.g., heart block or a large perioperative MI with decrease EF and VT)

Algorithm for identifying eligible isolated CABG admissions in the linked STS + CMS database

Eligible isolated CABG admissions are identified by selecting linked STS-CMS records that meet the following criteria:

- ICD-9-CM procedural code 36.1x in any position
- STS field #1280 "coronary artery bypass grafting" = "yes"
- Each of the following STS fields is "no" or "missing":
 - Valve surgery (1290)
 - Aortic valve operation (1630)
 - Mitral valve operation (1640)
 - Tricuspid valve operation (1650)
 - Pulmonic valve operation (1660)
 - Other non-cardiac procedure (1320)
 - Left ventricular aneurysm repair (2360)
 - Ventricular septal defect repair (2370)
 - Atrial septal defect repair (2380)
 - Batista (2390)
 - Surgical ventricular restoration (2400)
 - Congenital Defect Repair (2410)
 - Cardiac trauma (2430)
 - Cardiac transplant (2440)
 - Atrial fibrillation correction surgery (2470)
 - Aortic aneurysm (2510)

- Other cardiac operation (1310)

S.8. Denominator Exclusions *(Brief narrative description of exclusions from the target population)*

Exclusion – Rationale

- The patient is age <65 years on date of discharge according to CMS or STS data – Patients younger than 65 in the Medicare dataset represent a distinct population that qualifies for Medicare due to disability. The characteristics and outcomes of these patients may be less representative of the larger population of CABG patients.
- There is a CMS record but no matching STS record – STS data elements are required for identifying the cohort and for risk adjustment.
- There is an STS record but not matching CMS record – Medicare data are required for ascertaining 30-day readmission status, especially readmissions to a hospital other than the CABG hospital
- CABG is not a stand-alone procedure – Inclusion of combination procedures complicates risk adjustment by adding multiple relatively rare cohorts with potentially distinct characteristics and outcomes.
- The patient died prior to discharge from acute care setting – Patient is not at risk of subsequent readmission.
- The patient leaves against medical advice (AMA). – Physicians and hospitals do not have the opportunity to deliver the highest quality care.
- The patient does not retain Medicare fee-for-service (FFS) A and B for at least two months after discharge – Beneficiaries who switch to a Medicare advantage plan are unlikely to file inpatient claims which are required for ascertaining 30-day readmission status.
- The index CABG episode is >365 days. – These patients were excluded for consistency with previous CMS readmission measures. These records may inaccurate admission and discharge dates. If not, including them would complicate risk adjustment by adding a relatively rare cohort with potentially distinct characteristics and outcomes.
- Not the first eligible CABG admission per patient per measurement period. – Simplifies statistical analysis. Also, repeat CABG procedures are very rare and so loss of information is minimal.

S.9. Denominator Exclusion Details *(All information required to identify and calculate exclusions from the denominator such as definitions, time period for data collection, specific data collection items/responses, code/value sets – Note: lists of individual codes with descriptors that exceed 1 page should be provided in an Excel or csv file in required format at S.2b.)*

Please see previous section

S.10. Stratification Information *(Provide all information required to stratify the measure results, if necessary, including the stratification variables, definitions, specific data collection items/responses, code/value sets, and the risk-model covariates and coefficients for the clinically-adjusted version of the measure when appropriate – Note: lists of individual codes with descriptors that exceed 1 page should be provided in an Excel or csv file in required format with at S.2b.)*

N/A

S.11. Risk Adjustment Type (Select type. Provide specifications for risk stratification in measure testing attachment)

Statistical risk model

If other:

S.12. Type of score:

Rate/proportion

If other:

S.13. Interpretation of Score *(Classifies interpretation of score according to whether better quality is associated with a higher score, a lower score, a score falling within a defined interval, or a passing score)*

Better quality = Lower score

S.14. Calculation Algorithm/Measure Logic *(Diagram or describe the calculation of the measure score as an ordered sequence of steps including identifying the target population; exclusions; cases meeting the target process, condition, event, or outcome; time period for data, aggregating data; risk adjustment; etc.)*

Please refer to numerator and denominator sections for detailed information.

S.15. Sampling *(If measure is based on a sample, provide instructions for obtaining the sample and guidance on minimum sample size.)*

If an instrument-based performance measure (e.g., PRO-PM), identify whether (and how) proxy responses are allowed.

N/A. This measure is not based on a sample or survey.

S.16. Survey/Patient-reported data (If measure is based on a survey or instrument, provide instructions for data collection and guidance on minimum response rate.)

Specify calculation of response rates to be reported with performance measure results.

N/A. This measure is not based on a sample or survey.

S.17. Data Source (Check ONLY the sources for which the measure is SPECIFIED AND TESTED).

If other, please describe in S.18.

Claims, Registry Data

S.18. Data Source or Collection Instrument (Identify the specific data source/data collection instrument (e.g. name of database, clinical registry, collection instrument, etc., and describe how data are collected.)

If instrument-based, identify the specific instrument(s) and standard methods, modes, and languages of administration.

Medicare claims data, STS Adult Cardiac Surgery Database Version 2.61

S.19. Data Source or Collection Instrument (available at measure-specific Web page URL identified in S.1 OR in attached appendix at A.1)

Available at measure-specific web page URL identified in S.1

S.20. Level of Analysis (Check ONLY the levels of analysis for which the measure is SPECIFIED AND TESTED)

Facility

S.21. Care Setting (Check ONLY the settings for which the measure is SPECIFIED AND TESTED)

Inpatient/Hospital

If other:

S.22. COMPOSITE Performance Measure - Additional Specifications (Use this section as needed for aggregation and weighting rules, or calculation of individual performance measures if not individually endorsed.)

N/A

2. Validity – See attached Measure Testing Submission Form

2.1_Testing_-_Risk-Adjusted_CABG_Readmission_Rate.FINAL.doc.docx

2.1 For maintenance of endorsement

Reliability testing: If testing of reliability of the measure score was not presented in prior submission(s), has reliability testing of the measure score been conducted? If yes, please provide results in the Testing attachment. Please use the most current version of the testing attachment (v7.1). Include information on all testing conducted (prior testing as well as any new testing); use red font to indicate updated testing.

2.2 For maintenance of endorsement

Has additional empirical validity testing of the measure score been conducted? If yes, please provide results in the Testing attachment. Please use the most current version of the testing attachment (v7.1). Include information on all testing conducted (prior testing as well as any new testing); use red font to indicate updated testing.

2.3 For maintenance of endorsement

Risk adjustment: For outcome, resource use, cost, and some process measures, risk-adjustment that includes social risk factors is not prohibited at present. Please update sections 1.8, 2a2, 2b1,2b4.3 and 2b5 in the Testing attachment and S.140 and S.11 in the online submission form. NOTE: These sections must be updated even if social risk factors are not included in the risk-adjustment strategy. You MUST use the most current version of the Testing Attachment (v7.1) -- older versions of the form will not have all required questions.

3. Feasibility

Extent to which the specifications including measure logic, require data that are readily available or could be captured without undue burden and can be implemented for performance measurement.

3a. Byproduct of Care Processes

For clinical measures, the required data elements are routinely generated and used during care delivery (e.g., blood pressure, lab test, diagnosis, medication order).

3a.1. Data Elements Generated as Byproduct of Care Processes.

Generated or collected by and used by healthcare personnel during the provision of care (e.g., blood pressure, lab value, diagnosis, depression score), Coded by someone other than person obtaining original information (e.g., DRG, ICD-9 codes on claims), Abstracted from a record by someone other than person obtaining original information (e.g., chart abstraction for quality measure or registry), Other

If other: Additional information: Most data elements used to compute measure scores are variables included in the Society of Thoracic Surgeons (STS) Adult Cardiac Surgery Database. Depending upon how data collection is performed at each site, data elements may be entered into the database directly during processes of care or may be abstracted from medical record following the procedure. All of the data elements are designed to be information that is already known and documented during provision of care. Identification of 30-day readmission was done using administrative claims data originally collected by CMS and further processed by Mathematica.

3b. Electronic Sources

The required data elements are available in electronic health records or other electronic sources. If the required data are not in electronic health records or existing electronic sources, a credible, near-term path to electronic collection is specified.

3b.1. To what extent are the specified data elements available electronically in defined fields (i.e., data elements that are needed to compute the performance measure score are in defined, computer-readable fields) Update this field for **maintenance of endorsement**.

Some data elements are in defined fields in electronic sources

3b.2. If ALL the data elements needed to compute the performance measure score are not from electronic sources, specify a credible, near-term path to electronic capture, OR provide a rationale for using other than electronic sources. For **maintenance of endorsement**, if this measure is not an eMeasure (eCQM), please describe any efforts to develop an eMeasure (eCQM).

Because the STS Adult Cardiac Surgery Database has more than 900 actively participating institutions, local availability of data elements in electronic format will vary by institutions. Some institutions may have full EHR capability while others may have partial, or no availability. However, all data elements from all participating institutions are submitted to the STS Adult Cardiac Surgery Database in electronic format following a standard set of data specifications. The majority of participating institutions obtain data-entry software products that are certified for the purposes of collecting STS Adult Cardiac Surgery Database data elements.

3b.3. If this is an eMeasure, provide a summary of the feasibility assessment in an attached file or make available at a measure-specific URL. Please also complete and attach the NQF Feasibility Score Card.

Attachment:

3c. Data Collection Strategy

Demonstration that the data collection strategy (e.g., source, timing, frequency, sampling, patient confidentiality, costs associated with fees/licensing of proprietary measures) can be implemented (e.g., already in operational use, or testing demonstrates that it is ready to put into operational use). For eMeasures, a feasibility assessment addresses the data elements and measure logic and demonstrates the eMeasure can be implemented or feasibility concerns can be adequately addressed.

3c.1. Required for maintenance of endorsement. Describe difficulties (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, sampling, patient confidentiality, time and cost of data collection, other feasibility/implementation issues.

IF instrument-based, consider implications for both individuals providing data (patients, service recipients, respondents) and those whose performance is being measured.

The data elements included in this measure have been standard in the STS Adult Cardiac Surgery Database for at least 3 years and some of them have been part of the database for more than 20 years. The variables are considered to be data elements that are readily available and already collected as part of the process of providing care. As outlined in the table below, the level of accuracy

for these variables, upon audit is high. Levels of missing data values for all of these variables are currently less than 0.5% across all records in the Adult Cardiac Surgery Database.

In 2006, STS initiated an independent audit program to evaluate the accuracy and completeness of the STS-ACSD and to improve data collection protocols and processes. 2011 audit results for the variables included in the measure are as follows:

Variable - Audit Accuracy

1. Ejection Fraction - 96.96%
2. Preoperative Atrial Fibrillation - NA
3. Unstable Angina (no MI = 7 days) - NA
4. Myocardial Infarction - 93.78%
5. Age - 99.71%
6. Congestive Heart Failure - 96.95%
7. Renal Function (Dialysis, Creatinine function) - 99.51%, 90.1%
8. Status - 93.73%
9. Gender - 99.8%
10. Reoperation - 99.61% (from previous audit)
11. Chronic Lung Disease - 85.69%*
12. Diabetes - 97.55%
13. Preoperative IAPB or Inotrope - 99.2%, 95.2%
14. Immunosuppressive Treatment - 97.35%
15. PVD - 94.61%
16. Body Surface Area - 95.69% (wt), 98.04% (ht)
17. CVD - 93.78%
18. Hypertension - 93.63%
19. PCI = 6 hours - 100%
20. Left Main Disease - 94.13%

* Following audit clinical definitions were clarified and distributed to data collectors to address existing confusion.

3c.2. Describe any fees, licensing, or other requirements to use any aspect of the measure as specified (e.g., value/code set, risk model, programming code, algorithm).

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 \$3,200 or \$4,000, 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.

4. Usability and Use

Extent to which potential audiences (e.g., consumers, purchasers, providers, policy makers) are using or could use performance results for both accountability and performance improvement to achieve the goal of high-quality, efficient healthcare for individuals or populations.

4a. Accountability and Transparency

Performance results are used in at least one accountability application within three years after initial endorsement and are publicly reported within six years after initial endorsement (or the data on performance results are available). If not in use at the time of initial endorsement, then a credible plan for implementation within the specified timeframes is provided.

4.1. Current and Planned Use

NQF-endorsed measures are expected to be used in at least one accountability application within 3 years and publicly reported within 6 years of initial endorsement in addition to performance improvement.

Specific Plan for Use	Current Use (for current use provide URL)

4a1.1 For each CURRENT use, checked above (update for maintenance of endorsement), provide:

- Name of program and sponsor
- Purpose
- Geographic area and number and percentage of accountable entities and patients included
- Level of measurement and setting

The measure was developed under contract with CMS; they will determine how the measure will be used for planned purposes marked above in 4.1.

4a1.2. If not currently publicly reported OR used in at least one other accountability application (e.g., payment program, certification, licensing) what are the reasons? (e.g., Do policies or actions of the developer/steward or accountable entities restrict access to performance results or impede implementation?)

Please see response in 4a.1.

4a1.3. If not currently publicly reported OR used in at least one other accountability application, provide a credible plan for implementation within the expected timeframes -- any accountability application within 3 years and publicly reported within 6 years of initial endorsement. (Credible plan includes the specific program, purpose, intended audience, and timeline for implementing the measure within the specified timeframes. A plan for accountability applications addresses mechanisms for data aggregation and reporting.)

Please see response in 4a.1.

4a2.1.1. Describe how performance results, data, and assistance with interpretation have been provided to those being measured or other users during development or implementation.

How many and which types of measured entities and/or others were included? If only a sample of measured entities were included, describe the full population and how the sample was selected.

As of December 2017, nearly 1,100 surgical participant groups in the U.S. and Canada (plus other international participants) submit surgical quality data to the STS Adult Cardiac Surgery Database (ACSD), the world's premier clinical outcomes registry for adult cardiac surgery. Launched in 1989, the ACSD contains more than 6.3 million cardiac surgery procedure records and currently has more than 3,100 participating physicians (surgeons and anesthesiologists).

ACSD participants submit their data to the STS data warehouse during four submission periods ("harvests") each year, through a secure website. Participants receive an initial report on their data quality within a few days of data submission; after review and resubmission of the data file, participants are provided with secure access to their final performance report within two months of the harvest close date. Performance results for each measure include a summary of the results of all participants who were included in the analysis. The participant's score is illustrated graphically in relation to the 25th, 50th and 75th percentiles of the distribution across participants, and is accompanied by the 95% Bayesian credible interval. In addition, these risk-adjusted results allow surgeons to compare their patients' outcomes with national benchmarks and to initiate QI efforts as needed. Resources are available on the STS website and through contact with STS Database staff to assist participants with interpretation of their performance results.

Additionally, all U.S. and Canadian participants in the ACSD have the opportunity to consent to the public reporting of a subset of their performance results on the STS website, making "star ratings" available to consenting participants as well as the public.

4a2.1.2. Describe the process(es) involved, including when/how often results were provided, what data were provided, what educational/explanatory efforts were made, etc.

See 4a2.1.1

4a2.2.1. Summarize the feedback on measure performance and implementation from the measured entities and others described in 4d.1.

Describe how feedback was obtained.

The adult cardiac surgeons from across the U.S. who comprise the STS Adult Cardiac Surgery Task Force meet periodically to discuss

the participant reports and to consider potential enhancements to the ACSD. Additions/clarifications to the data collection form and to the content/format of the participant reports are discussed and implemented as appropriate.

Most recently, STS surgeon members have expressed interest in real-time, online data updates, which has led to the development of dashboard-type reporting on STS.org. The adult cardiac surgery dashboard is scheduled for launch in 2018.

The STS also convenes a Public Reporting Task Force to review feedback on STS public reporting, to promote greater participation among STS members, and to review and enhance the usability of the format of public reporting on the STS website.

4a2.2.2. Summarize the feedback obtained from those being measured.

Feedback from ACSD participant groups is positive, as evidenced by the fact that 90% of all hospitals performing adult heart surgery in the U.S. and Canada participate in the ACSD, and by the continual expansion of ACSD public reporting – from under 50% of participants in mid-2016 to greater than 60% as of December 2017. The STS also receives and, to a limited extent, accommodates requests from third parties (e.g., Consumer Reports) for access to STS public reporting data and “star ratings” for independent public reporting initiatives.

4a2.2.3. Summarize the feedback obtained from other users

See 4a2.2.2

4a2.3. Describe how the feedback described in 4a2.2.1 has been considered when developing or revising the measure specifications or implementation, including whether the measure was modified and why or why not.

The STS Adult Cardiac Surgery Task Force did not identify a need to modify this measure in 2017.

Improvement

Progress toward achieving the goal of high-quality, efficient healthcare for individuals or populations is demonstrated. If not in use for performance improvement at the time of initial endorsement, then a credible rationale describes how the performance results could be used to further the goal of high-quality, efficient healthcare for individuals or populations.

4b1. Refer to data provided in 1b but do not repeat here. Discuss any progress on improvement (trends in performance results, number and percentage of people receiving high-quality healthcare; Geographic area and number and percentage of accountable entities and patients included.)

If no improvement was demonstrated, what are the reasons? If not in use for performance improvement at the time of initial endorsement, provide a credible rationale that describes how the performance results could be used to further the goal of high-quality, efficient healthcare for individuals or populations.

Addressed in previous sections.

4b2. Unintended Consequences

The benefits of the performance measure in facilitating progress toward achieving high-quality, efficient healthcare for individuals or populations outweigh evidence of unintended negative consequences to individuals or populations (if such evidence exists).

4b2.1. Please explain any unexpected findings (positive or negative) during implementation of this measure including unintended impacts on patients.

Addressed in previous sections.

4b2.2. Please explain any unexpected benefits from implementation of this measure.

5. Comparison to Related or Competing Measures

If a measure meets the above 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.

5. Relation to Other NQF-endorsed Measures

Are there related measures (conceptually, either same measure focus or target population) or competing measures (conceptually

both the same measure focus and same target population)? If yes, list the NQF # and title of all related and/or competing measures.

Yes

5.1a. List of related or competing measures (selected from NQF-endorsed measures)

0114 : Risk-Adjusted Postoperative Renal Failure

0115 : Risk-Adjusted Surgical Re-exploration

0129 : Risk-Adjusted Postoperative Prolonged Intubation (Ventilation)

0130 : Risk-Adjusted Deep Sternal Wound Infection

0131 : Risk-Adjusted Stroke/Cerebrovascular Accident

5.1b. If related or competing measures are not NQF endorsed please indicate measure title and steward.

There are no existing NQF-endorsed measure(s) or other measure(s) in current use that have the same measure focus and the same target population as this measure, as stated in the guidelines.

There are several NQF-endorsed measures developed by STS that have similar target populations as this measure, however none have a similar measure focus:

- Risk-adjusted deep sternal wound infection rate (NQF # 0130)
- Risk-adjusted prolonged intubation (ventilation) (NQF # 0129)
- Risk-adjusted stroke/cerebrovascular accident (NQF # 0131)
- Risk-adjusted post-operative renal failure (NQF # 0114)
- Risk-adjusted surgical re-exploration (NQF # 0115)
- Risk-adjusted operative mortality for CABG (NQF #0119)

The proposed STS CABG readmission measure has a target population (i.e., isolated CABG patients) that is harmonized with the above measures. The age ranges for the proposed CABG readmission measure cohort and the above STS measures cohorts differ; STS measures above are specified for age 18 and over, and the proposed STS CABG readmission measure for age 65 and over. The proposed STS CABG readmission measure is limited to 65 and above because Medicare claims data is used to reliably identify the readmission endpoint.

There are a group of related, non-NQF-endorsed measures with a similar target population and measure focus to the proposed STS CABG readmission measure. The Pennsylvania Health Care Cost Containment Council (PHC4) currently reports hospital- and surgeon-level seven-day and 30-day readmission for a heart-related condition, infection, or complication following isolated CABG. The PHC4 measure uses both administrative and clinical data abstracted by hospitals for risk adjustment. The PHC4 measure cohort only excludes concomitant valve procedures and organ transplants, while the proposed STS CABG readmission measure excludes additional common concomitant procedures noted by clinical experts to significantly alter patient mortality risk after CABG. The PHC4 measure includes CABG patients over 30 years of age while the proposed STS CABG readmission measure includes CABG patients 65 years of age and older. The measure focus of the PHC4 measure includes 30-day readmission for a heart-related condition, infection, or complication whereas the proposed STS CABG readmission measure assesses all-cause readmission.

5a. Harmonization of Related Measures

The measure specifications are harmonized with related measures;

OR

The differences in specifications are justified

5a.1. If this measure conceptually addresses EITHER the same measure focus OR the same target population as NQF-endorsed measure(s):

Are the measure specifications harmonized to the extent possible?

5a.2. If the measure specifications are not completely harmonized, identify the differences, rationale, and impact on interpretability and data collection burden.

N/A

5b. Competing Measures

The measure is superior to competing measures (e.g., is a more valid or efficient way to measure);

OR

Multiple measures are justified.

5b.1. If this measure conceptually addresses both the same measure focus and the same target population as NQF-endorsed measure(s):

Describe why this measure is superior to competing measures (e.g., a more valid or efficient way to measure quality); OR provide a rationale for the additive value of endorsing an additional measure. (Provide analyses when possible.)

N/A

Appendix

A.1 Supplemental materials may be provided in an appendix. All supplemental materials (such as data collection instrument or methodology reports) should be organized in one file with a table of contents or bookmarks. If material pertains to a specific submission form number, that should be indicated. Requested information should be provided in the submission form and required attachments. There is no guarantee that supplemental materials will be reviewed.

Attachment Attachment: [1b.2_Risk-Adjusted_CABG_Readmission_Rate..docx](#)

Contact Information

Co.1 Measure Steward (Intellectual Property Owner): [The Society of Thoracic Surgeons](#)

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Co.3 Measure Developer if different from Measure Steward: [The Society of Thoracic Surgeons](#)

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Additional Information

Ad.1 Workgroup/Expert Panel involved in measure development

Provide a list of sponsoring organizations and workgroup/panel members' names and organizations. Describe the members' role in measure development.

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<p>Measure Developer/Steward Updates and Ongoing Maintenance</p> <p>Ad.2 Year the measure was first released: 2013</p> <p>Ad.3 Month and Year of most recent revision: 10, 2012</p> <p>Ad.4 What is your frequency for review/update of this measure? every 3 years or as necessary</p> <p>Ad.5 When is the next scheduled review/update for this measure?</p>
<p>Ad.6 Copyright statement:</p> <p>Ad.7 Disclaimers:</p>
<p>Ad.8 Additional Information/Comments:</p>