



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 #: 3030

Corresponding Measures:

De.2. Measure Title: STS Individual Surgeon Composite Measure for Adult Cardiac Surgery

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

De.3. Brief Description of Measure: The STS Individual Surgeon Composite Measure for Adult Cardiac Surgery includes five major procedures (isolated CABG, isolated AVR, AVR+CABG, MVRR, MVRR+CABG) and comprises the following two domains:

Domain 1 – Risk-Adjusted Operative Mortality

Operative mortality is defined as death before hospital discharge or within 30 days of the operation.

Domain 2 – Risk-Adjusted Major Morbidity

Major morbidity is defined as the occurrence of any one or more of the following major complications:

1. Prolonged ventilation,
2. Deep sternal wound infection,
3. Permanent stroke,
4. Renal failure, and
5. Reoperations for bleeding, coronary graft occlusion, prosthetic or native valve dysfunction, and other cardiac reasons, but not for other non-cardiac reasons.

All measures are based on audited clinical data collected in the STS Adult Cardiac Surgery Database. Individual surgeons with at least 100 eligible cases during the 3-year measurement window will receive a score for each domain and an overall composite score. In addition to calculating composite score point estimates with credible intervals, surgeons will be assigned rating categories designated by the following:

- 1 star – lower-than-expected performance
- 2 stars – as-expected performance
- 3 stars – higher-than-expected performance

1b.1. Developer Rationale: N/A

S.4. Numerator Statement: Due to the complex methodology used to construct the composite measure, it is impractical to separately discuss the numerator and denominator. The following discussion describes in detail this multiprocedural, multidimensional composite measure.

The STS Individual Surgeon Composite Measure for Adult Cardiac Surgery includes five major procedures, i.e., isolated coronary artery bypass grafting (CABG), isolated aortic valve replacement (AVR), AVR+CABG, isolated mitral valve repair or replacement (MVRR), and MVRR+CABG, and comprises the following two domains:

Domain 1 – Risk-Adjusted Operative Mortality

Operative mortality is defined as death before hospital discharge or within 30 days of the operation.

Domain 2 – Risk-Adjusted Major Morbidity

Major morbidity is defined as the occurrence of any one or more of the following major complications:

1. Prolonged ventilation

2. Deep sternal wound infection
3. Permanent stroke
4. Renal failure and
5. Reoperations for bleeding, coronary graft occlusion, prosthetic or native valve dysfunction, and other cardiac reasons, but not for other non-cardiac reasons

Individual surgeons with at least 100 eligible cases during the 3-year measurement window will receive a score for each domain and an overall composite score. In addition to calculating composite score point estimates with credible intervals, surgeons will be assigned rating categories designated by the following:

- 1 star – lower-than-expected performance
- 2 stars – as-expected performance
- 3 stars – higher-than-expected performance

Patient Population: The analysis population consists of patients aged 18 years or older who undergo isolated CABG, isolated AVR, AVR+CABG, isolated MVRR, and MVRR+CABG.

Time Window: 3 years

By including composite performance scores for a portfolio of five procedures that account for nearly 80% of a typical STS Adult Cardiac Surgery Database participant surgeon's clinical activity, this metric provides a more balanced and comprehensive perspective than focusing on just one procedure or one end point. Recognizing that surgeons' practices vary, each surgeon's composite performance is implicitly "weighted" by the proportion of each type of procedure he or she performs. For instance, the results of surgeons who primarily perform mitral procedures are affected most by their mitral surgery results. This approach is especially relevant for surgeons with highly specialized practices who may do relatively few isolated CABG procedures and whose performance would thus be difficult to assess using a CABG measure only. Finally, performance on each of these procedures is estimated using risk models specific to those procedures, in most cases the exact or slightly modified versions of previously published models (references provided below).

Final Composite Score:

The overall composite score was calculated as a weighted sum of (1 minus risk-adjusted mortality rate) and (1 minus risk-adjusted major morbidity rate). Mortality and morbidity rates were weighted inversely by their respective standard deviations across surgeons. This procedure is equivalent to first rescaling mortality and morbidity rates by their respective standard deviations across surgeons and then assigning equal weighting to the rescaled mortality rate and rescaled morbidity rate. Standard deviations derived from the data were used to define the final composite measure as $0.81 \times (1 \text{ minus risk-standardized mortality rate}) + 0.19 \times (1 \text{ minus risk-standardized complication rate})$.

Details regarding the current STS adult cardiac surgery risk models can be found in the following manuscripts:

- Shahian DM, O'Brien SM, Filardo G, Ferraris VA, et al. The Society of Thoracic Surgeons 2008 cardiac surgery risk models: part 1--coronary artery bypass grafting surgery. *Ann Thorac Surg*. 2009 Jul;88(1 Suppl):S2-22.
- O'Brien SM, Shahian DM, Filardo G, et al. The Society of Thoracic Surgeons 2008 cardiac surgery risk models: part 2— isolated valve surgery. *Ann Thorac Surg* 2009;88(1 Suppl):S23-42.
- Shahian DM, O'Brien SM, Filardo G, Ferraris VA, et al. The Society of Thoracic Surgeons 2008 cardiac surgery risk models: part 3--valve plus coronary artery bypass grafting surgery. *Ann Thorac Surg* 2009 Jul;88(1 Suppl):S43-62.

Additional details regarding the Individual Surgeon Composite Measure for Adult Cardiac Surgery are provided in the attached manuscript:

Shahian DM, He X, Jacobs JP, Kurlansky PA, Badhwar V, Cleveland JC Jr, Fazzalari FL, Filardo G, Normand SL, Furnary AP, Magee MJ, Rankin JS, Welke KF, Han J, O'Brien SM. The Society of Thoracic Surgeons Composite Measure of Individual Surgeon Performance for Adult Cardiac Surgery: A Report of The Society of Thoracic Surgeons Quality Measurement Task Force. *Ann Thorac Surg*. 2015;100:1315-25.

S.6. Denominator Statement: See response in S.4. Numerator Statement

Patient Population: The analysis population consists of patients aged 18 years or older who undergo isolated CABG, isolated AVR, AVR+CABG, isolated MVRR, and MVRR+CABG. See response in S.4. Numerator Statement

Patient Population: The analysis population consists of patients aged 18 years or older who undergo isolated CABG, isolated AVR, AVR+CABG, isolated MVRR, and MVRR+CABG.

S.8. Denominator Exclusions: Measure exclusions: Individual surgeons who do not meet the minimum case requirement (i.e., at least 100 eligible cases during the 3-year measurement window) will not receive a score for each domain and an overall composite score.

De.1. Measure Type: Composite

S.17. Data Source: Registry Data

S.20. Level of Analysis: Clinician : Individual

IF Endorsement Maintenance – Original Endorsement Date: Jan 25, 2017 **Most Recent Endorsement Date:** Jan 25, 2017

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

[7.1-Evidence_Form-3030-Surg_Comp_Adult_Cardiac_Surg-Fall2020.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.

No

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.

N/A

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.

The measure was calculated using STS data for patients undergoing cardiac surgery during January 2017 - December 2019. Five major procedures were included: isolated CABG, isolated AVR, AVR + CABG, isolated mitral valve repair or replacement procedures, and mitral valve repair or replacement + CABG procedures. Initially, 2919 surgeons were identified using their National Provider Identifiers. Surgeons without a National Provider Identifier (e.g., from a foreign country) or with invalid National Provider Identifiers were excluded (49). Surgeons were also required to have reported at least one of any type of cardiac procedure during each of the three 12-month periods (i.e., January-December 2017, 2018 and 2019). This was to ensure that the included surgeons had not just finished training or, conversely, had retired, and that they had actively participated in the most recent STS harvest. This requirement excluded 495 surgeons. From the remaining 2,375 surgeons, we included 2095 surgeons who met the annual completeness threshold of 98% of the operative mortality fields to assure accuracy of the operative mortality endpoint and had performed at least

10 major procedures during the 3-year period, both to facilitate statistical computations and because results would not be calculated or reported for surgeons with lower volumes than this. In the table below, we provide the number of measured entities (# surgeons), the number of eligible patient records (# operations), and the distribution of composite score estimates by percentiles. Surgeons with at least 10 eligible records during the study period were included in the hierarchical model for estimating composite scores. While surgeons with 10 eligible cases are included in the hierarchical model procedure, composite scores will typically only be reported by the STS for surgeons with at least 100 cases during a 3-year time period. Thus, we tabulate results for all eligible surgeons and the subset with at least 100 eligible cases. Please see appendix for the histogram that summarizes the distribution of scores across surgeons.

Stat	Surgeons with ≥10 Eligible Cases	Surgeons with ≥100 Eligible Cases
# Participant	2098	1841
# Operations	600207	584571
Mean	0.951	0.952
STD	0.01547	0.01508
IQR	0.0198	0.0193
0%	0.869	0.886
10%	0.931	0.932
20%	0.939	0.940
30%	0.945	0.946
40%	0.949	0.950
50%	0.953	0.954
60%	0.957	0.958
70%	0.960	0.961
80%	0.964	0.965
90%	0.969	0.969
100%	0.984	0.984

If the above table is not clearly displayed, please refer to the version included in the appendix for this measure.

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.

This composite measure gauges the performance of STS surgeons and is not a patient or operation level measure. We do not have a simple way to generate data stratified by patient characteristics at the composite level.

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

N/A

1c. Composite Quality Construct and Rationale

1c.1. A composite performance measure is a combination of two or more component measures, each of which individually

reflects quality of care, into a single performance measure with a single score.

For purposes of NQF measure submission, evaluation, and endorsement, the following will be considered composites:

- Measures with two or more individual performance measure scores combined into one score for an accountable entity.
- Measures with two or more individual component measures assessed separately for each patient and then aggregated into one score for an accountable entity:
 - all-or-none measures (e.g., all essential care processes received, or outcomes experienced, by each patient);

1c.1. Please identify the composite measure construction: **two or more individual performance measure scores combined into one score**

1c.2. Describe the quality construct, including:

- the overall area of quality
- included component measures and
- the relationship of the component measures to the overall composite and to each other.

Suitable for evaluating surgical performance of individual adult cardiac surgeons, the STS Individual Surgeon Composite Measure for Adult Cardiac Surgery is based on aggregate risk-adjusted morbidity and mortality for five common procedures, i.e., isolated coronary artery bypass grafting (CABG), isolated aortic valve replacement (AVR), AVR+CABG, isolated mitral valve repair or replacement (MVRR), and MVRR+CABG. Similar to other STS composite measures, this measure is based on a combination of the NQF-endorsed risk-adjusted operative mortality outcome measure and the risk-adjusted occurrence of any of five major complications. To assess overall quality, the composite comprises the following two domains:

Domain 1 – Risk-Adjusted Operative Mortality

Operative mortality is defined as death before hospital discharge or within 30 days of the operation.

Domain 2 – Risk-Adjusted Major Morbidity

Major morbidity is defined as the occurrence of any one or more of the following major complications:

1. Prolonged ventilation,
2. Deep sternal wound infection,
3. Permanent stroke,
4. Renal failure, and
5. Reoperations for bleeding, coronary graft occlusion, prosthetic or native valve dysfunction, and other cardiac reasons, but not for other non-cardiac reasons.

This composite measure differs from the NQF-endorsed, program-level STS CABG Composite Score in that it does not include the two process measure domains (use of internal mammary artery in CABG and perioperative medications). This approach was necessary for computational reasons to efficiently combine the results from five procedures, most of which did not have comparable process measures available.

1c.3. Describe the rationale for constructing a composite measure, including how the composite provides a distinctive or additive value over the component measures individually.

Risk-adjusted mortality has historically been the dominant outcomes metric for cardiac surgery procedures, but in an era when the average mortality rates for these procedures have declined to very low levels, differentiating performance based on mortality alone is difficult. Specifically, it fails to take into account the fact that not all operative survivors received equal quality care, e.g., patients who survive surgery but have a debilitating complication that may substantially impact long-term freedom from cardiac events.

In addition, with the development of this composite measure, STS addresses a number of major concerns that have previously been raised regarding surgeon-level metrics. It combines results from five of the most frequently performed cardiac surgical procedures, encompassing most of a typical adult cardiac surgeon's practice, as opposed to basing performance on just one or a few separate procedures. Furthermore, it provides a more comprehensive quality assessment and additional endpoints, as it includes risk-adjusted mortality and the risk-adjusted occurrence of any of five major complications. This measure will be useful to surgeons in identifying potential areas for improvement, and it has numerous advantages compared with existing surgeon metrics if used for accountability purposes.

1c.4. Describe how the aggregation and weighting of the component measures are consistent with the stated quality construct and rationale.

The mortality domain corresponds to a single measure, while the study endpoint for the morbidity domain combines multiple measures and thus is a composite endpoint.

Mortality and morbidity rates were weighted inversely by their respective standard deviations across surgeons. This procedure is equivalent to first rescaling mortality and morbidity rates by their respective standard deviation across surgeons and then assigning equal weighting to the rescaled mortality rate and rescaled morbidity rate. Standard deviations derived from the data were used to define the final composite measure as $0.81 \times (1 \text{ minus risk-standardized mortality rate}) + 0.19 \times (1 \text{ minus risk-standardized complication rate})$.

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, Surgery, Surgery : Cardiac Surgery

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

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.)

https://www.sts.org/sites/default/files/STSAultCVDDataCollectionFormV4_20_2_GOLDEN006292020.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)

No data dictionary 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).

Due to the complex methodology used to construct the composite measure, it is impractical to separately discuss the numerator and denominator. The following discussion describes in detail this multiprocedural, multidimensional composite measure.

The STS Individual Surgeon Composite Measure for Adult Cardiac Surgery includes five major procedures, i.e., isolated coronary artery bypass grafting (CABG), isolated aortic valve replacement (AVR), AVR+CABG, isolated mitral valve repair or replacement (MVRR), and MVRR+CABG, and comprises the following two domains:

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4. Renal failure and
5. Reoperations for bleeding, coronary graft occlusion, prosthetic or native valve dysfunction, and other cardiac reasons, but not for other non-cardiac reasons

Individual surgeons with at least 100 eligible cases during the 3-year measurement window will receive a score for each domain and an overall composite score. In addition to calculating composite score point estimates with credible intervals, surgeons will be assigned rating categories designated by the following:

- 1 star – lower-than-expected performance
- 2 stars – as-expected performance
- 3 stars – higher-than-expected performance

Patient Population: The analysis population consists of patients aged 18 years or older who undergo isolated CABG, isolated AVR, AVR+CABG, isolated MVRR, and MVRR+CABG.

Time Window: 3 years

By including composite performance scores for a portfolio of five procedures that account for nearly 80% of a typical STS Adult Cardiac Surgery Database participant surgeon's clinical activity, this metric provides a more balanced and comprehensive perspective than focusing on just one procedure or one end point. Recognizing that surgeons' practices vary, each surgeon's composite performance is implicitly "weighted" by the proportion of each type of procedure he or she performs. For instance, the results of surgeons who primarily perform mitral procedures are affected most by their mitral surgery results. This approach is especially relevant for surgeons with highly specialized practices who may do relatively few isolated CABG procedures and whose performance would thus be difficult to assess using a CABG measure only. Finally, performance on each of these procedures is estimated using risk models specific to those procedures, in most cases the exact or slightly modified versions of previously published models (references provided below).

Final Composite Score:

The overall composite score was calculated as a weighted sum of (1 minus risk-adjusted mortality rate) and (1 minus risk-adjusted major morbidity rate). Mortality and morbidity rates were weighted inversely by their respective standard deviations across surgeons. This procedure is equivalent to first rescaling mortality and morbidity rates by their respective standard deviations across surgeons and then assigning equal weighting to the rescaled mortality rate and rescaled morbidity rate. Standard deviations derived from the data were used to define the final composite measure as $0.81 \times (1 \text{ minus risk-standardized mortality rate}) + 0.19 \times (1 \text{ minus risk-standardized major morbidity rate})$.

risk-standardized complication rate).

Details regarding the current STS adult cardiac surgery risk models can be found in the following manuscripts:

- Shahian DM, O'Brien SM, Filardo G, Ferraris VA, et al. The Society of Thoracic Surgeons 2008 cardiac surgery risk models: part 1--coronary artery bypass grafting surgery. Ann Thorac Surg. 2009 Jul;88(1 Suppl):S2-22.
- O'Brien SM, Shahian DM, Filardo G, et al. The Society of Thoracic Surgeons 2008 cardiac surgery risk models: part 2— isolated valve surgery. Ann Thorac Surg 2009;88(1 Suppl):S23–42.
- Shahian DM, O'Brien SM, Filardo G, Ferraris VA, et al. The Society of Thoracic Surgeons 2008 cardiac surgery risk models: part 3--valve plus coronary artery bypass grafting surgery. Ann Thorac Surg 2009 Jul;88(1 Suppl):S43-62.

Additional details regarding the Individual Surgeon Composite Measure for Adult Cardiac Surgery are provided in the attached manuscript:

Shahian DM, He X, Jacobs JP, Kurlansky PA, Badhwar V, Cleveland JC Jr, Fazzalari FL, Filardo G, Normand SL, Furnary AP, Magee MJ, Rankin JS, Welke KF, Han J, O'Brien SM. The Society of Thoracic Surgeons Composite Measure of Individual Surgeon Performance for Adult Cardiac Surgery: A Report of The Society of Thoracic Surgeons Quality Measurement Task Force. Ann Thorac Surg. 2015;100:1315-25.

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).

See response in S.4. Numerator Statement

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

See response in S.4. Numerator Statement

Patient Population: The analysis population consists of patients aged 18 years or older who undergo isolated CABG, isolated AVR, AVR+CABG, isolated MVRR, and MVRR+CABG. See response in S.4. Numerator Statement

Patient Population: The analysis population consists of patients aged 18 years or older who undergo isolated CABG, isolated AVR, AVR+CABG, isolated MVRR, and MVRR+CABG.

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).

See response in S.6. Denominator Statement

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

Measure exclusions: Individual surgeons who do not meet the minimum case requirement (i.e., at least 100 eligible cases during the 3-year measurement window) will not receive a score for each domain and an overall composite score.

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.)

See response in S.8. Denominator Exclusions

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

<p>S.11. Risk Adjustment Type (Select type. Provide specifications for risk stratification in measure testing attachment) Statistical risk model If other:</p>
<p>S.12. Type of score: Rate/proportion If other:</p> <p>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 = Higher score</p> <p>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 see discussion under section S.4 and attached manuscripts.</p>
<p>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</p> <p>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</p>
<p>S.17. Data Source (Check ONLY the sources for which the measure is SPECIFIED AND TESTED). If other, please describe in S.18. Registry Data</p> <p>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.) <u>IF instrument-based</u>, identify the specific instrument(s) and standard methods, modes, and languages of administration. STS Adult Cardiac Surgery Database – Version 2.73; STS Adult Cardiac Surgery Database Version 2.81 went live on July 1, 2014; STS Adult Cardiac Surgery Database – Version 2.9 went live on July 1st, 2017 and STS Adult Cardiac Surgery Database version 4.20 went live on June 30, 2020. The URL provided under S.1 is for the latest data collection form that is currently in use.</p> <p>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</p> <p>S.20. Level of Analysis (Check ONLY the levels of analysis for which the measure is SPECIFIED AND TESTED) Clinician : Individual</p> <p>S.21. Care Setting (Check ONLY the settings for which the measure is SPECIFIED AND TESTED) Inpatient/Hospital If other:</p>
<p>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.) Please see section S.4 and Appendix.</p>
<p>2. Validity – See attached Measure Testing Submission Form 3030_NQF_testing_v3.0-SurgeonComp-112320.docx</p>

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.

No

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.

No

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.

Yes - Updated information is included

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), Abstracted from a record by someone other than person obtaining original information (e.g., chart abstraction for quality measure or registry)

If other:

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).

The STS Adult Cardiac Surgery Database (ACSD) has more than 1,030 participants as of August 2020, and local availability of data elements in electronic format will vary across institutions. Some institutions may have full EHR capability while others may have partial, or no availability. However, all data elements from participating institutions are submitted to the STS ACSD 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 ACSD 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 6 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.

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 additional costs for data collection specific to this measure for those presently using and participating in the STS Adult Cardiac Surgery Database. Costs to develop and maintain the measure included volunteer cardiothoracic surgeon time, STS staff time, and Duke Clinical Research Institute statistician and project management time.

Other fees:

STS Adult Cardiac Surgery Database participants (generally a group of surgeons) pay annual participant fees of \$3,500 or \$4,750, depending on whether the majority of surgeons in a participant group are STS members. As a benefit of STS membership, the member-majority participants are charged the lesser of the two fees. Also, member-majority participants pay an additional fee of \$150 per surgeon; non-member-majority participants pay an additional fee of \$350 per surgeon.

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)
Public Reporting	Quality Improvement (Internal to the specific organization) STS Adult Cardiac Surgery Database https://www.sts.org/registries-research-center/sts-national-database/adult-cardiac-surgery-database

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

Confidential, surgeon-level performance results for this composite measure were first distributed to consenting surgeons participating in the STS Adult Cardiac Surgery Database in January 2020.

This measure is not yet publicly reported; see response under 4a1.2.

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?)

Although this composite was developed in 2014 and first endorsed by NQF in 2017, concerns related to the confidentiality and format of the surgeon-level results delayed the initial annual distribution of performance reports until Jan., 2020. STS requires our measured entities, whether individual surgeons or surgeon groups, to have multiple opportunities to receive and provide feedback on performance reports before adding new measures to our public reporting program. Public reporting for the individual surgeon composite will therefore not be under consideration until 2021 or 2022.

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 under 4a1.2

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.

Please see 1b.2 (Importance tab) for description of the identification of 2,098 surgeons who met the completeness and minimum procedure thresholds, 1,841 of whom performed at least 100 eligible cases within the three-year measurement period. Of this subset of surgeons, approximately 400 opted in for receipt of their confidential, surgeon-level performance results in January 2020.

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.

The annual performance reports include separate mortality and morbidity domain scores and an overall composite score. The surgeon's score is illustrated graphically in relation to the 10th, 50th and 90th percentiles of the distribution across all surgeons who were eligible for inclusion in the analysis for the specified three-year period, and is also accompanied by the 98% Bayesian credible interval. A detailed report overview, providing explanations of statistical calculations, endpoints, and report interpretation, is included in the report.

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. and Canada who comprise the STS Adult Cardiac Surgery Database and Quality Measurement Task Forces meet periodically to discuss the surgeon-level and participant reports and to consider potential enhancements to the ACSD. Additions/clarifications to the data collection form and to the content/format of the individual surgeon reports and participant reports are discussed and implemented as appropriate.

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

Please see response under 4a2.2.1

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

N/A (performance results for this measure are shared with consenting surgeons only)

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.

N/A

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.

Performance data for the Individual Surgeon Composite (3030) were first distributed to consenting surgeons in January 2020; overall performance trends for this measure are therefore not yet available. As noted elsewhere in these submission materials, measure 3030 aggregates individual surgeon performance on five surgical procedures (isolated CABG, isolated AVR, AVR+CABG, MVRR, MVRR+CABG) and provides each surgeon with mortality and morbidity domain scores and an overall composite score and star rating, based on their own case mix. Therefore, in the absence of multi-year performance trends for measure 3030, we are providing (below) the star rating trends for the five procedures aggregated within it.

The data demonstrate that the general trend since the introduction of each measure has been a decrease in the percentage of surgical programs with 1-star and 3-star ratings and a corresponding increase in 2-star programs. This trend is consistent with the performance improvement goals of the STS star rating program, which seek to reduce variation in performance and to drive all participants in the STS Adult Cardiac Surgery Database toward the 2-star (or "as expected") category.

(If table below does not display clearly, please see version in Appendix.)

	Stars	2019	2018	2017	2016	2015	2014	2013	2012	2011	2010	
CABG	*	3.77	4.37	4.55	5.29	5.82	4.59	9.19	9	9.6	11	
	**	88.57	88.27	89.21	84.65	84.4	86.64	75.86	76	76.5	75.5	
	***	7.66	7.36	6.24	10	9.74	8.77	14.95	15	14	13.5	
AVR	*	1.67	1.96	2.62	2.17	3.11	4.22	3.35	3	3.5	N/A	
	**	92.26	92.84	92.70	90.3	88.75	87.89	88.98	91	90.6	N/A	
	***	6.07	5.20	4.68	7.53	8.15	7.89	7.67	6	5.9	N/A	
AVR + CABG	*	1.84	2.16	2.73	2.06	2.49	2.51	3.14	N/A	N/A	N/A	
	**	93.5	93.03	92.76	92.26	90.72	90.42	90.7	N/A	N/A	N/A	
	***	4.66	4.81	4.51	5.68	6.79	7.07	6.17	N/A	N/A	N/A	
MVRR	*	1.85	2.41	3.64	N/A	N/A	N/A	N/A	N/A	N/A	N/A	
	**	91.81	87.06	85.65	N/A	N/A	N/A	N/A	N/A	N/A	N/A	
	***	6.34	10.53	10.71	N/A	N/A	N/A	N/A	N/A	N/A	N/A	
MVRR + CABG	*	2.55	2.08	2.74	N/A	N/A	N/A	N/A	N/A	N/A	N/A	
	**	88.0	89.97	91.78	N/A	N/A	N/A	N/A	N/A	N/A	N/A	
	***	9.45	7.96	5.48	N/A	N/A	N/A	N/A	N/A	N/A	N/A	

Performance data for the Individual Surgeon Composite (3030) were first distributed to consenting surgeons in January 2020; overall performance trends for this measure are therefore not yet available. As noted elsewhere in these submission materials, measure 3030 aggregates individual surgeon performance on five surgical procedures (isolated CABG, isolated AVR, AVR+CABG, MVRR, MVRR+CABG) and provides each surgeon with mortality and morbidity domain scores and an overall composite score and star rating, based on their own case mix. Therefore, in the absence of multi-year performance trends for measure 3030, we are providing (below) the star rating trends for the five procedures aggregated within it.

The data demonstrate that the general trend since the introduction of each measure has been a decrease in the percentage of surgical programs with 1-star and 3-star ratings and a corresponding increase in 2-star programs. This trend is consistent with the performance improvement goals of the STS star rating program, which seek to reduce variation in performance and to drive all participants in the STS Adult Cardiac Surgery Database toward the 2-star (or "as expected") category.

(If table below does not display clearly, please see version in Appendix.)

	Stars	2019	2018	2017	2016	2015	2014	2013	2012	2011	2010	
CABG	*	3.77	4.37	4.55	5.29	5.82	4.59	9.19	9	9.6	11	
	**	88.57	88.27	89.21	84.65	84.4	86.64	75.86	76	76.5	75.5	
	***	7.66	7.36	6.24	10	9.74	8.77	14.95	15	14	13.5	
AVR	*	1.67	1.96	2.62	2.17	3.11	4.22	3.35	3	3.5	N/A	
	**	92.26	92.84	92.70	90.3	88.75	87.89	88.98	91	90.6	N/A	
	***	6.07	5.20	4.68	7.53	8.15	7.89	7.67	6	5.9	N/A	
AVR + CABG	*	1.84	2.16	2.73	2.06	2.49	2.51	3.14	N/A	N/A	N/A	
	**	93.5	93.03	92.76	92.26	90.72	90.42	90.7	N/A	N/A	N/A	
	***	4.66	4.81	4.51	5.68	6.79	7.07	6.17	N/A	N/A	N/A	
MVRR	*	1.85	2.41	3.64	N/A	N/A	N/A	N/A	N/A	N/A	N/A	
	**	91.81	87.06	85.65	N/A	N/A	N/A	N/A	N/A	N/A	N/A	
	***	6.34	10.53	10.71	N/A	N/A	N/A	N/A	N/A	N/A	N/A	
MVRR + CABG	*	2.55	2.08	2.74	N/A	N/A	N/A	N/A	N/A	N/A	N/A	
	**	88.0	89.97	91.78	N/A	N/A	N/A	N/A	N/A	N/A	N/A	
	***	9.45	7.96	5.48	N/A	N/A	N/A	N/A	N/A	N/A	N/A	

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.

All public reporting initiatives have the potential for unintended consequences, including gaming and risk aversion. We attempt to control the former through a careful audit process; 10% of STS Adult Cardiac Surgery Database participants were audited in each year from 2014 through 2019. (Our audit plans for 2020 were canceled due to the coronavirus pandemic; we expect to resume with 10% audits in 2021.) We control for risk aversion by having a robust methodology that appropriately adjusts the expected risk for providers who care for sicker patients.

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

N/A

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)

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

Related measures (not listed in drop-down menu for 5.1a):

0696 - STS CABG Composite

2561 - Aortic Valve Replacement Composite Score

2563 - Aortic Valve Replacement + CABG Composite Score

3031 - Mitral Valve Repair/Replacement Composite Score

3032 - Mitral Valve Repair/Replacement + CABG Composite Score

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?

Yes

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:** [STS_Surgeon_Composite_Appendix_-_S.4-11-14-15_1b.2-_1b.4-_10262020-637408683591885628.pdf](#)

Contact Information

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

Co.2 Point of Contact: [Mark, Antman, mantman@sts.org, 312-202-5856-](#)

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

Co.4 Point of Contact: [Mark, Antman, mantman@sts.org, 312-202-5856-](#)

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.

The STS Quality Measurement Task Force (chaired by David Shahian, MD) is responsible for measure development. Members of the STS Task Force on Quality Initiatives provide clinical expertise as needed. The STS Workforce on Quality 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.

Quality Measurement Task Force

David M. Shahian, MD, Chair; Massachusetts General Hospital & Harvard Medical School, Boston, MA

Diane Alejo; Johns Hopkins Univ., Baltimore, MD

Vinay Badhwar, MD; West Virginia University Hospitals, Morgantown, WV

Jordan Bloom, MD; Massachusetts General Hospital, Boston, MA

Michael Bowdish, MD; Torrance Memorial Medical Center, Los Angeles, CA

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Nimesh Desai, MD; Hospital of the University of Pennsylvania, Philadelphia, PA

James Edgerton, MD; Cardiac Surgery Specialists, Plano, TX

Fred Edwards, MD; University of Florida College of Medicine, Jacksonville, FL

Melanie Edwards, MD; Saint Joseph Mercy Health System, Ypsilanti, MI

Vic Ferraris, MD; University of Kentucky Medical Center, Lexington, KY

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Karen Kim, MD; Univ. of Michigan Hospitals & Health Centers, Ann Arbor, MI

Benjamin Kozower, MD; Washington University School of Medicine, St. Louis, MO

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Kevin Lobdell, MD; Atrium Health, Charlotte, NC

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Christina Vassileva, MD; U Mass Memorial Medical Center, Worcester, MA

Moritz Wyler von Ballmoos, MD; Houston Methodist DeBakey Heart & Vascular Center, Houston, TX

Sean M. O'Brien, PhD; Duke Clinical Research Institute, Durham, NC

Measure Developer/Steward Updates and Ongoing Maintenance

Ad.2 Year the measure was first released: 2015

Ad.3 Month and Year of most recent revision: 06, 2016

Ad.4 What is your frequency for review/update of this measure? Annually

Ad.5 When is the next scheduled review/update for this measure? 01, 2021

Ad.6 Copyright statement: N/A

Ad.7 Disclaimers: N/A

Ad.8 Additional Information/Comments: N/A