



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 #: 3032

Corresponding Measures:

De.2. Measure Title: STS Mitral Valve Repair/Replacement (MVRR) + Coronary Artery Bypass Graft (CABG) Composite Score

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

De.3. Brief Description of Measure: The STS Mitral Valve Repair/Replacement (MVRR) + Coronary Artery Bypass Graft (CABG) Composite Score measures surgical performance for MVRR + CABG with or without concomitant Atrial Septal Defect (ASD) and Patient Foramen Ovale (PFO) closures, tricuspid valve repair (TVr), or surgical ablation for atrial fibrillation (AF). To assess overall quality, the STS MVRR +CABG Composite Score comprises two domains consisting of six measures:

Domain 1 – Absence of Operative Mortality

Proportion of patients (risk-adjusted) who do not experience operative mortality. Operative mortality is defined as death before hospital discharge or within 30 days of the operation.

Domain 2 – Absence of Major Morbidity

Proportion of patients (risk-adjusted) who do not experience any 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.

Outcome data are collected on all patients and from all participants. For optimal measure reliability, participants meeting a volume threshold of at least 25 cases over 3 years receive a score for each of the two domains, plus an overall composite score. The overall composite score is created by “rolling up” the domain scores into a single number. In addition to receiving a numeric score, participants are assigned to 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 how each domain score is calculated and how these are combined into an overall composite score.

The STS Mitral Valve Repair/Replacement (MVRR) Composite Score comprises two domains consisting of six measures:

Domain 1 – Absence of Operative Mortality

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Participants receive a score for each of the two domains, plus an overall composite score. The overall composite score was created by “rolling up” the domain scores into a single number. In addition to receiving a numeric score, participants are assigned to rating categories designated by the following:

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

Patient Population: The analysis population consists of patients aged 18 years or older who MVRR + CABG with or without concomitant Atrial Septal Defect (ASD) and Patent Foramen Ovale (PFO) closures, tricuspid valve repair (TVr), or surgical ablation for atrial fibrillation (AF).

Time Window: 3 years

Data Completeness Requirement: Participants are excluded from the analysis if they have fewer than 25 MVRR + CABG procedures in the patient population.

Estimation of Composite Scores and Star Ratings:

To be consistent with the conventions of previous composite measures, risk-adjusted event rates were first converted into risk-adjusted absence-of-event rates. To calculate the composite, participant-specific absence of mortality rates and absence of morbidity rates were weighted inversely by their respective standard deviations across participants. This procedure was equivalent to first rescaling the absence of mortality rates and absence of morbidity rates by their respective standard deviations across participants, and then assigning equal weighting to the rescaled rates. Finally, in order to draw statistical inferences about participant performance, a Bayesian credible interval surrounding each participant’s composite score was calculated. Unlike frequentist confidence intervals, Bayesian credible intervals have an intuitively direct interpretation as an interval containing the true value of the composite score with a specified probability (e.g., 95%). To determine star ratings for each participant, the credible interval of its composite score was compared with the STS average. Participants whose intervals were entirely above the STS average were classified as 3-star (higher than expected performance), and participants whose intervals were entirely below the STS average were classified as 1-star (lower than expected performance). Credible intervals based on different probability levels (90%, 95%, 98%) were explored, and the resulting percentages of 1, 2, and 3-star programs were calculated.

S.6. Denominator Statement: See response in S.4. Numerator Statement for complete description of measure specifications.

Patient Population: The analysis population consists of patients aged 18 years or older who MVRR + CABG with or without concomitant Atrial Septal Defect (ASD) and Patent Foramen Ovale (PFO) closures, tricuspid valve repair (TVr), or surgical ablation for atrial fibrillation (AF). See response in S.4. Numerator Statement for complete description of measure specifications.

Patient Population: The analysis population consists of patients aged 18 years or older who MVRR + CABG with or without concomitant Atrial Septal Defect (ASD) and Patent Foramen Ovale (PFO) closures, tricuspid valve repair (TVr), or surgical ablation for atrial fibrillation (AF).

S.8. Denominator Exclusions: Data Completeness Requirement: Participants are excluded from the analysis if they have fewer than 25 MVRR + CABG procedures in the patient population.

De.1. Measure Type: Composite

S.17. Data Source: Registry Data

S.20. Level of Analysis: Clinician : Group/Practice, Facility
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. <i>Measures must be judged to meet all sub criteria to pass this criterion and be evaluated against the remaining criteria.</i>																									
1a. Evidence to Support the Measure Focus – See attached Evidence Submission Form 7.1-Evidence_Form-3032-STs_MVRR-CABG_Comp_Score-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: <ul style="list-style-type: none"> 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) <i>If a COMPOSITE (e.g., combination of component measure scores, all-or-none, any-or-none), SKIP this question and answer the composite questions.</i> 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.) <i>This information also will be used to address the sub-criterion on improvement (4b1) under Usability and Use.</i> The measure was calculated using STS Adult Cardiac Surgery Database data for patients undergoing mitral valve repair/replacement (MVRR) +CABG in two consecutive overlapping 3-year time periods, January 2016 – December 2018 and January 2017 – December 2019. For each time period, we provide the number of measured entities (# participants), the number of eligible patient records (# operations), and the distribution of composite score estimates by percentiles and geographic region. Participants with at least 10 eligible records in a 3-year time period were included in the hierarchical model for estimating composite scores in that time period. While participants with 10 eligible cases are included in the hierarchical model procedure, composite scores will typically only be reported by STS for participants with at least 25 cases during a 3-year time period. Thus, we present results for the set of participants with at least 10 eligible cases and the subset with at least 25 eligible cases. <table border="1"> <thead> <tr> <th></th> <th colspan="2">January 2016-December 2018</th> <th colspan="2">January 2017-December 2019</th> </tr> </thead> <tbody> <tr> <td>Distribution</td> <td colspan="2">Participants with >=10 Eligible Cases</td> <td colspan="2">Participants with >=25 Eligible Cases</td> </tr> <tr> <td>Eligible Cases</td> <td colspan="2">Participants with >=25 Eligible Cases</td> <td colspan="2"></td> </tr> <tr> <td># Participant</td> <td>625</td> <td>289</td> <td>605</td> <td>272</td> </tr> <tr> <td># Operations</td> <td>21383</td> <td>16175</td> <td>20403</td> <td>15087</td> </tr> </tbody> </table>		January 2016-December 2018		January 2017-December 2019		Distribution	Participants with >=10 Eligible Cases		Participants with >=25 Eligible Cases		Eligible Cases	Participants with >=25 Eligible Cases				# Participant	625	289	605	272	# Operations	21383	16175	20403	15087
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#3032 STS Mitral Valve Repair/Replacement (MVRR) + Coronary Artery Bypass Graft (CABG) Composite Score, Last Updated: Nov 24, 2020

Mean	0.863	0.866	0.860	0.864
STD	0.02575	0.02745	0.02428	0.02595
IQR	0.0317	0.0352	0.0319	0.0328
0%	0.741	0.741	0.768	0.768
10%	0.830	0.831	0.829	0.831
20%	0.843	0.845	0.841	0.844
30%	0.852	0.854	0.849	0.854
40%	0.859	0.863	0.857	0.861
50%	0.865	0.869	0.862	0.866
60%	0.871	0.875	0.867	0.871
70%	0.877	0.882	0.872	0.878
80%	0.884	0.889	0.879	0.885
90%	0.892	0.897	0.887	0.894
100%	0.936	0.936	0.921	0.921
CANADA4	2	2	1	
MIDWEST	167	66	156	59
NORTHEAST	100	62	99	60
SOUTH	220	115	216	108
WEST	134	44	132	44

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.

In order to shed light on disparities, we used logistic regression to study the associations of race, ethnicity and insurance status with operative mortality and major morbidity while adjusting for covariates included in this measure's risk adjustment model (see other sections for details of covariate adjustment – we used the most recent 2017 valve + CABG models for mortality and major morbidity). Odds ratios with 95% confidence intervals (CI's) and p-values are summarized in the table below.

	Mortality		Major Morbidity	
	Adjusted OR (95% CI)	p-value	Adjusted OR (95% CI)	p-value
Insurance status among patients age ≥ 65				
Medicare without Medicaid/Commercial-HMO	(ref)		(ref)	
Medicare + Medicaid dual eligible	0.94(0.71, 1.24)	0.6578	0.81(0.68, 0.98)	0.0287
Medicare + Commercial-HMO without Medicaid	0.97(0.84, 1.13)	0.7131	0.98(0.90, 1.07)	0.6597
Commercial-HMO without Medicare	0.84(0.64, 1.09)	0.1880	1.04(0.88, 1.22)	0.6680
Insurance status among patients age < 65				
Commercial-HMO without Medicare/Medicaid	(ref)		(ref)	
Medicare or Medicaid	1.17(0.96, 1.42)	0.1265	1.09(0.98, 1.22)	0.1148
None/Self Paid	0.97(0.65, 1.45)	0.8796	1.02(0.83, 1.25)	0.8393
Other	1.23(0.77, 1.97)	0.3833	1.00(0.76, 1.31)	0.9743

Black Race 0.91(0.75, 1.11) 0.3471 1.28(1.15, 1.43) <.0001
Hispanic ethnicity 1.13(0.92, 1.39) 0.2510 1.10(0.97, 1.24) 0.1558

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

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.

The STS Mitral Valve Repair/Replacement (MVRR) + Coronary Artery Bypass Graft (CABG) Composite Score measures surgical performance for MVRR + CABG with or without concomitant Atrial Septal Defect (ASD) and Patent Foramen Ovale (PFO) closures, tricuspid valve repair (TVr), or surgical ablation for atrial fibrillation (AF). 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. An NQF-endorsed structure measure, database participation, is included de facto as only STS Adult Cardiac Surgery Database participants are eligible to receive composite scores. To assess overall quality, the composite comprises the following two domains:

Domain 1 – Absence of Operative Mortality

Proportion of patients (risk-adjusted) who do not experience operative mortality. Operative mortality is defined as death before hospital discharge or within 30 days of the operation.

Domain 2 – Absence of Major Morbidity

Proportion of patients (risk-adjusted) who do not experience any 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.

Participants receive a score for each of the two domains, plus an overall composite score. The overall composite score was created by “rolling up” the domain scores into a single number. In addition to receiving a numeric score, participants are assigned to rating categories designated by one to three stars.

Similar to the NQF-endorsed STS AVR and AVR+CABG measures, the MVRR+CABG Composite Score differs from the NQF-endorsed

STS CABG Composite Score in that it does not include process measures. This reflects the fact that for MVRR+CABG, in comparison with isolated CABG surgery, no widely accepted process measures meeting performance metric criteria currently exist.

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 surgical procedures. In an era when the average mortality rates for these procedures have declined to very low levels, however, differentiating performance based on mortality alone is inadequate. Specifically, mortality alone fails to account for the fact that not all operative survivors received equal quality care. Patients who survive surgery but have a debilitating complication that may substantially impact their long-term freedom from adverse cardiac events, for example, are not duly reflected in mortality rate measures. A composite score provides a more comprehensive measure of overall surgical quality, and is timely since MVRR+CABG comprises an increasing proportion of cardiac surgical practice, and their mortality risk is higher than for isolated MVRR.

References

- Rankin JS, Badhwar V, He X, Jacobs JP, Gammie JS, Furnary AP, Fazzalari FL, Han J, O'Brien SM, Shahian DM. The Society of Thoracic Surgeons mitral valve repair/replacement plus coronary artery bypass grafting composite score: a report of the Society of Thoracic Surgeons Quality Measurement Task Force. *Ann Thorac Surg* 2017;103:1475-81.
- Rankin JS, Feneley MP, Hickey M StJ, et al. A clinical comparison of mitral valve repair versus valve replacement in ischemic mitral regurgitation. *J Thorac Cardiovasc Surg* 1988;95:165-77.
- Glower DD, Tuttle RH, Shaw LK, et al: Patient survival characteristics after routine mitral valve repair for ischemic mitral regurgitation. *J Thorac Cardiovasc Surg* 2005;129:860-8.
- Milano CA, Daneshmand MA, Rankin JS, et al. Survival prognosis and surgical management of ischemic mitral regurgitation. *Ann Thorac Surg* 2008;86:735-44.
- Daneshmand MA, Milano CA, Rankin JS, et al. Mitral valve repair for degenerative disease: A 20-year experience. *Ann Thorac Surg* 2009;88:1828-37.
- Daneshmand MA, Milano CA, Rankin JS, et al. Influence of patient age on procedural selection in mitral valve surgery. *Ann Thorac Surg* 2010;90:1479-86.

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. To enhance interpretation, mortality rates were converted to survival rates (risk-standardized survival rate = 100 – risk-standardized mortality rate), and morbidity rates were converted to “absence of morbidity” rates (risk-standardized absence of morbidity rate = 100 – risk-standardized morbidity rate). Defining scores in this manner ensures that increasingly positive values reflect better performance. The overall composite score is created by “rolling up” the domain scores into a single number.

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):

Adults, 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/STSAAdultCVDDataCollectionFormV4_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 how each domain score is calculated and how these are combined into an overall composite score.

The STS Mitral Valve Repair/Replacement (MVRR) Composite Score comprises two domains consisting of six measures:

Domain 1 – Absence of Operative Mortality

Proportion of patients (risk-adjusted) who do not experience operative mortality. Operative mortality is defined as death before hospital discharge or within 30 days of the operation.

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Proportion of patients (risk-adjusted) who do not experience any major morbidity. Major morbidity is defined as the occurrence of any one or more of the following major complications:

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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.

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- 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 MVRR + CABG with or without concomitant Atrial Septal Defect (ASD) and Patent Foramen Ovale (PFO) closures, tricuspid valve repair (TVr), or surgical ablation for atrial fibrillation (AF).

Time Window: 3 years

Data Completeness Requirement: Participants are excluded from the analysis if they have fewer than 25 MVRR + CABG procedures in the patient population.

Estimation of Composite Scores and Star Ratings:

To be consistent with the conventions of previous composite measures, risk-adjusted event rates were first converted into risk-adjusted absence-of-event rates. To calculate the composite, participant-specific absence of mortality rates and absence of morbidity rates were weighted inversely by their respective standard deviations across participants. This procedure was equivalent to first rescaling the absence of mortality rates and absence of morbidity rates by their respective standard deviations across participants, and then assigning equal weighting to the rescaled rates. Finally, in order to draw statistical inferences about participant performance, a Bayesian credible interval surrounding each participant’s composite score was calculated. Unlike frequentist confidence intervals, Bayesian credible intervals have an intuitively direct interpretation as an interval containing the true value of the composite score with a specified probability (e.g., 95%). To determine star ratings for each participant, the credible interval of its composite score was compared with the STS average. Participants whose intervals were entirely above the STS average were classified as 3-star (higher than expected performance), and participants whose intervals were entirely below the STS average were classified as 1-star (lower than expected performance). Credible intervals based on different probability levels (90%, 95%, 98%) were explored, and the resulting percentages of 1, 2, and 3-star programs were calculated.

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 for complete description of measure specifications.

Patient Population: The analysis population consists of patients aged 18 years or older who MVRR + CABG with or without concomitant Atrial Septal Defect (ASD) and Patent Foramen Ovale (PFO) closures, tricuspid valve repair (TVr), or surgical ablation for atrial fibrillation (AF). See response in S.4. Numerator Statement for complete description of measure specifications.

Patient Population: The analysis population consists of patients aged 18 years or older who MVRR + CABG with or without concomitant Atrial Septal Defect (ASD) and Patent Foramen Ovale (PFO) closures, tricuspid valve repair (TVr), or surgical ablation for atrial fibrillation (AF).

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.7. Denominator Statement](#)

S.8. Denominator Exclusions (Brief narrative description of exclusions from the target population)
Data Completeness Requirement: Participants are excluded from the analysis if they have fewer than 25 MVRR + CABG procedures in the patient population.

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](#)

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 = Higher 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 see discussion under section S.4 and attached manuscripts.](#)

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](#)

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](#)

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](#)

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.
[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.

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)

Clinician : Group/Practice, 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.)

Please see section S.4

2. Validity – See attached Measure Testing Submission Form

3032_NQF_testing_v3.0-STs_MVRR-CABG_Comp-112320.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.

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. The STS Adult Cardiac Surgery Database (ACSD) has more than 1,100 participants, 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. 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 (single cardiothoracic surgeons or 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)
	<p>Public Reporting</p> <p>STS Public Reporting https://www.sts.org/registries/sts-public-reporting</p> <p>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</p>

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

Voluntary STS Public Reporting – approximately 79% of STS Adult Cardiac Surgery Database participants are enrolled as of October 2020.

This measure has been publicly reported since 2017.
 (<https://publicreporting.sts.org/acsd>)

STS Adult Cardiac Surgery Database Participant Feedback Reports provide performance results for this measure to participants. (see details in 4a2.1.1 below)

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?)

N/A

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.)

N/A

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 November 2020, there are 1,030 active U.S. and Canadian participants in the STS Adult Cardiac Surgery Database (ACSD). A "participant" is generally a group of cardiothoracic surgeons who agree to submit case records for analysis and comparison with benchmarking data for quality improvement initiatives. At the option of the surgical group, the ACSD participant can include a hospital and/or associated anesthesiologists. It is for this reason that we have indicated (on the Specifications tab, question #S.20) that this measure is specified/tested for both the "clinician: group/practice" and "facility" levels of analysis.

(For more information on STS "participants," see our response to 1.5 in the measure testing form.)

All ACSD participants receive quarterly data reports with their performance results, reported in an easy-to-understand format. The participant's score is illustrated graphically in relation to the 25th, 50th and 75th percentiles of the distribution across all participants who were eligible for inclusion in that quarter's analysis, and is also accompanied by the 95% Bayesian credible interval. Surgeons easily grasp this result and the visual display clearly illustrates how they perform compared to their peers on a quarterly basis. In addition, these risk-adjusted results allow surgeons to compare their patients' outcomes with national benchmarks and to initiate quality improvement efforts as needed.

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.

Please see response under 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. Developed by IQVIA, the Society's new data warehouse (<https://www.sts.org/registries-research-center/sts-national-database/database-transition-resources>), the new platform for the Adult Cardiac Surgery Database was released in early 2020. Surgeon members have access to near-real time data updates in the dashboard. Enhancements to dashboard functionality are ongoing.

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

Voluntary participation in ACSD public reporting has continually increased over the years that the initiative has been available, from 38% of ACSD participants in 2014, to 49% in 2016, to 67% in 2018, to approximately 79% in October 2020. This trend suggests that feedback from ACSD participants and others who access the performance data available on STS.org is sufficiently positive to

promote ever-increasing participation in public reporting.

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.

Please see table below displaying 2017-2019 star ratings for this measure, in percentages.

The data demonstrate that the trend for the MVRR+CABG measure since 2017 (the year the MVRR and MVRR+CABG composites were introduced) is not consistent with the general trend seen for other STS composite measures – a decrease over time in the percentage of surgical programs with 1-star and 3-star ratings and a corresponding increase in 2-star programs. With additional years of experience with this composite, we anticipate decreased variation in performance and a higher percentage of participants in the STS Adult Cardiac Surgery Database to be rated in the 2-star (or "as expected") category.

	Stars	2019	2018	2017
MVRR + CABG	*	2.55	2.08	2.74
**	88.0	89.97	91.78	
***	9.45	7.96	5.48	

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

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_MVRR_-_CABG_Composite_Score_Appendix_-_S.4-11-14-15_1b.2-_1b.4-_102020-637408793378385811.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
<p>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.</p> <p>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.</p> <p>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 Joseph Cleveland, Jr., MD; University of Colorado Anschutz Medical Campus, Aurora, Co 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 Anthony Furnary, MD; Providence Alaska Medical Center, Anchorage, AK Joshua Goldberg, MD; Westchester Medical Center, Valhalla, NY Jeffrey P. Jacobs, MD; University of Florida, Gainesville, FL Marshall Jacobs, MD; Johns Hopkins Cardiac Surgery, Baltimore, MD Karen Kim, MD; Univ. of Michigan Hospitals & Health Centers, Ann Arbor, MI Benjamin Kozower, MD; Washington University School of Medicine, St. Louis, MO Paul Kurlansky, MD; Columbia HeartSource/Columbia University Medical Center, New York, NY Kevin Lobdell, MD; Atrium Health, Charlotte, NC Mitchell Magee, MD; Southwest Cardiothoracic Surgeons, Dallas, TX Gaetano Paone, MD; Henry Ford Hospital, Detroit, MI J. Scott Rankin, MD; WVU Heart & Vascular Institute, West Virginia University, Morgantown, WV Charles Schwartz, MD; St. Joseph Mercy Hospital, Pontiac, MI Vinod Thourani, MD; MedStar Washington Hospital Center, Washington, DC 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</p>
<p>Measure Developer/Steward Updates and Ongoing Maintenance Ad.2 Year the measure was first released: 2016 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</p>
<p>Ad.6 Copyright statement: N/A Ad.7 Disclaimers: N/A</p>
<p>Ad.8 Additional Information/Comments: N/A</p>