

# Surgery, Fall 2018 Cycle: CDP Report

TECHNICAL REPORT

August 16, 2019

This report is funded by the Department of Health  
and Human Services under contract HHSM-500-  
2017-00060I Task Order HHSM-500-T0001.



NATIONAL  
QUALITY FORUM

## Contents

<b>Executive Summary .....</b>	<b>4</b>
<b>Introduction.....</b>	<b>5</b>
<b>NQF Portfolio of Performance Measures for Surgery.....</b>	<b>5</b>
Table 1. NQF Surgery Portfolio of Measures.....	5
<b>Surgery Measure Evaluation .....</b>	<b>6</b>
Table 2. Surgery Measure Evaluation Summary .....	6
Comments Received Prior to Committee Evaluation .....	7
Comments Received After Committee Evaluation .....	7
Overarching Issues .....	7
Summary of Measure Evaluation .....	9
<b>Appendix A: Details of Measure Evaluation.....</b>	<b>19</b>
Measures Endorsed.....	19
2561 STS Aortic Valve Replacement (AVR) Composite Score .....	19
2563 STS Aortic Valve Replacement (AVR) + Coronary Artery Bypass Graft (CABG) Composite Score .....	26
0114 Risk-Adjusted Postoperative Renal Failure.....	32
0122 Risk-Adjusted Operative Mortality for Mitral Valve (MV) Replacement + CABG Surgery .....	35
0118 Anti-Lipid Treatment Discharge .....	38
0115 Risk-Adjusted Surgical Re-exploration .....	41
0119 Risk-Adjusted Operative Mortality for CABG .....	44
0120 Risk-Adjusted Operative Mortality for Aortic Valve Replacement (AVR).....	47
0121 Risk-Adjusted Operative Mortality for Mitral Valve (MV) Replacement.....	50
0123 Risk-Adjusted Operative Mortality for Aortic Valve Replacement (AVR) + CABG Surgery ....	53
0129 Risk-Adjusted Postoperative Prolonged Intubation (Ventilation) .....	56
0130 Risk-Adjusted Deep Sternal Wound Infection .....	59
0131 Risk-Adjusted Stroke/Cerebrovascular Accident.....	62
1501 Risk-Adjusted Operative Mortality for Mitral Valve (MV) Repair .....	65
1502 Risk-Adjusted Operative Mortality for Mitral Valve (MV) Repair + CABG Surgery .....	68
Comments Received from the Measure Steward, Standing Committee, and NQF Responses .....	71
<b>Appendix B: Surgery Portfolio—Use in Federal Programs .....</b>	<b>74</b>
<b>Appendix C: Surgery Standing Committee and NQF Staff.....</b>	<b>78</b>
<b>Appendix D: Measure Specifications .....</b>	<b>81</b>
0114 Risk-Adjusted Postoperative Renal Failure.....	81
0115 Risk-Adjusted Surgical Re-exploration .....	83
0118 Anti-Lipid Treatment Discharge .....	85

0119 Risk-Adjusted Operative Mortality for CABG .....	87
0120 Risk-Adjusted Operative Mortality for Aortic Valve Replacement (AVR) .....	89
0121 Risk-Adjusted Operative Mortality for Mitral Valve (MV) Replacement .....	91
0122 Risk-Adjusted Operative Mortality for Mitral Valve (MV) Replacement + CABG Surgery .....	93
0123 Risk-Adjusted Operative Mortality for Aortic Valve Replacement (AVR) + CABG Surgery .....	95
0129 Risk-Adjusted Postoperative Prolonged Intubation (Ventilation) .....	97
0130 Risk-Adjusted Deep Sternal Wound Infection .....	99
0131 Risk-Adjusted Stroke/Cerebrovascular Accident .....	102
1501 Risk-Adjusted Operative Mortality for Mitral Valve (MV) Repair .....	104
1502 Risk-Adjusted Operative Mortality for Mitral Valve (MV) Repair + CABG Surgery .....	106
2561 STS Aortic Valve Replacement (AVR) Composite Score .....	108
2563 STS Aortic Valve Replacement (AVR) + Coronary Artery Bypass Graft (CABG) Composite Score .....	113
<b>Appendix E1: Related and Competing Measures (tabular format) .....</b>	<b>118</b>
<b>Appendix E2: Related and Competing Measures (narrative format) .....</b>	<b>124</b>

# Surgery, Fall 2018 Cycle

## TECHNICAL REPORT

### Executive Summary

Quality measurement in surgery is essential to improve outcomes for the millions of individuals undergoing surgery and surgical procedures each year. In the fall 2018 cycle of the Surgery project, measures undergoing maintenance review focused on operative mortality for cardiac procedures, including coronary artery bypass graft (CABG), mitral and aortic valve replacement and repair, and complications from these procedures.

Committee members discussed methods and mechanisms for public reporting of maintenance measures and considered the appropriateness of risk adjustment within risk models for several variables like race and ethnicity.

For this project, the Standing Committee evaluated 15 measures undergoing maintenance review against NQF's standard evaluation criteria and recommended all 15 measures for endorsement. The Consensus Standards Approval Committee (CSAC) upheld the Committee's decision to recommend the measures for endorsement. The 15 endorsed measures are:

- 0114 Risk-Adjusted Postoperative Renal Failure
- 0115 Risk-Adjusted Surgical Re-exploration
- 0118 Anti-Lipid Treatment Discharge
- 0119 Risk-Adjusted Operative Mortality for CABG
- 0120 Risk-Adjusted Operative Mortality for Aortic Valve Replacement (AVR)
- 0121 Risk-Adjusted Operative Mortality for Mitral Valve (MV) Replacement
- 0122 Risk-Adjusted Operative Mortality for Mitral Valve (MV) Replacement + CABG Surgery
- 0123 Risk-Adjusted Operative Mortality for Aortic Valve Replacement (AVR) + CABG Surgery
- 0129 Risk-Adjusted Postoperative Prolonged Intubation (Ventilation)
- 0130 Risk-Adjusted Deep Sternal Wound Infection
- 0131 Risk-Adjusted Stroke/Cerebrovascular Accident
- 1501 Risk-Adjusted Operative Mortality for Mitral Valve (MV) Repair
- 1502 Risk-Adjusted Operative Mortality for Mitral Valve (MV) Repair + CABG Surgery
- 2561 Aortic Valve Replacement (AVR) Composite Score
- 2563 Aortic Valve Replacement (AVR) + Coronary Artery Bypass Graft (CABG) Composite Score

The body of this report briefly summarizes the measures currently under review; [Appendix A](#) offers detailed summaries of the Committee's discussion and ratings of the criteria for each measure.

## Introduction

Given the increasing rates and costs associated with inpatient and outpatient surgeries in the United States, performance measurement and reporting provide an opportunity to improve the safety and quality of care received by Americans undergoing surgery and surgical procedures. In 2010, 28.6 million ambulatory surgery visits to hospitals and ambulatory surgical centers occurred, representing 48.3 million surgical and nonsurgical procedures.<sup>1</sup> In 2014, there were 17.2 million hospital visits that included at least one surgery.<sup>2</sup> Of these surgeries, over half occurred in a hospital-owned ambulatory surgical center.<sup>2</sup>

Ambulatory surgeries have increased over time as a result of less invasive surgical techniques, patient conveniences, such as less time spent undergoing a procedure, and lower costs.<sup>3,4</sup> By payer, private insurance accounted for 48.6 percent of ambulatory surgery visits, with Medicare and Medicaid covering 30.8 percent and 14.0 percent of visits, respectively.<sup>2</sup> However, there are risks associated with ambulatory surgeries including increased pain and longer time than anticipated to return to daily activities, and unplanned subsequent hospital visits following surgery.<sup>5,6</sup>

With the continued growth in the outpatient surgery market, monitoring and assessing the quality of the services provided holds great importance.

## NQF Portfolio of Performance Measures for Surgery

The Surgery Standing Committee ([Appendix C](#)) oversees NQF's portfolio of Surgery measures ([Appendix B](#)) which includes measures for perioperative safety, general surgery and a range of specialties like cardiac, cardiothoracic, colorectal, ocular, orthopedic, urogynecologic, and vascular surgery. This portfolio contains 65 measures: 12 process measures, 42 outcome and resource use measures, four structural measures, and seven composite measures (see table below).

**Table 1. NQF Surgery Portfolio of Measures**

	Process	Outcome/Resource Use	Structure	Composite
<b>Abdominal and Colorectal Surgery</b>	1	1	—	—
<b>Anesthesia</b>	—	1	—	—
<b>Cardiac Surgery</b>	5	16	3	7
<b>General Surgery</b>	—	3	—	—
<b>Cross-cutting (Inpatient &amp; Outpatient Surgery)</b>	—	2	—	—
<b>Cross-Cutting (Inpatient Surgery)</b>	—	2	—	—
<b>Cross-Cutting (Outpatient Surgery)</b>	—	2	—	—
<b>Orthopedic Surgery</b>	—	3	—	—
<b>Ophthalmology</b>	—	5	—	—
<b>Thoracic Surgery</b>	—	1	1	—
<b>Urogynecology/Gynecology</b>	4	—	—	—
<b>Vascular Surgery</b>	2	6	—	—
<b>Total</b>	12	42	4	7

Additional measures related to surgery have been assigned to other portfolios. These include healthcare-associated infection measures (Patient Safety), care coordination measures (Geriatrics and Palliative Care), patient experience measures (Patient Experience and Function), imaging efficiency measures (Cost and Resource Use), and a variety of condition- or procedure-specific outcome measures (Cardiovascular, Cancer, Renal, etc.).

## Surgery Measure Evaluation

The Surgery Standing Committee evaluated 15 maintenance measures for endorsement consideration against [NQF's standard evaluation criteria](#). During the in-person meeting on February 13, 2019, the Committee evaluated five measures. The Committee recommended two composite measures, 2561 *Aortic Valve Replacement (AVR) Composite Score* and 2563 *Aortic Valve Replacement (AVR) + Coronary Artery Bypass Graft (CABG) Composite Score*, for continued endorsement.

The Committee did not reach consensus on Use (must-pass criterion for maintenance measures) on two measures: 0122 *Risk-Adjusted Operative Mortality for Mitral Valve (MV) Replacement + CABG Surgery* and 0114 *Risk-Adjusted Postoperative Renal Failure*. The Committee also voted on Importance to Measure and Report, Scientific Acceptability, and Feasibility for 0118 *Anti-Lipid Treatment Discharge*. A quorum was lost during the meeting; therefore, the Committee continued discussing 0118 but did not vote on the remaining criteria (including Use and Usability) and did not vote on a recommendation for endorsement.

The Committee reconvened on February 20, 2019 via a web meeting to resume its discussion and voting for 0118 and the remaining 10 measures, which the Committee did not evaluate during the in-person meeting. However, a quorum of the Committee was not present at the start of the meeting, so the Committee discussed the remaining measures but did not vote during the web meeting. Because a quorum was not present at any time during the web meeting, NQF staff provided the Committee a copy of the transcript from the in-person meeting, a recording of the web meeting, and an online survey tool to submit their votes within 48 hours. During the post-comment web meeting on May 8, 2019, the Committee re-voted on Usability and Use criteria and Overall Suitability of the two measures (0122 *Risk-Adjusted Operative Mortality for Mitral Valve (MV) Replacement + CABG Surgery* and 0114 *Risk-Adjusted Postoperative Renal Failure*) for which consensus was not reached during the in-person meeting. The Committee ultimately recommended both measures for continued endorsement.

**Table 2. Surgery Measure Evaluation Summary**

	Maintenance	New	Total
Measures under consideration	15	0	15
Measures endorsed	15	0	15

## Comments Received Prior to Committee Evaluation

NQF solicits comments on endorsed measures on an ongoing basis through the [Quality Positioning System \(QPS\)](#). In addition, NQF solicits comments for a continuous 16-week period during each evaluation cycle via an online tool located on the project webpage. For this evaluation cycle, the commenting period opened on December 11, 2018 and closed on April 19, 2019.

## Comments Received After Committee Evaluation

The continuous 16-week public commenting period with NQF member support closed on April 19, 2019. Following the Committee's evaluation of the measures under consideration, NQF received comments from the measure developer/measure steward (a member organization) on the overarching issues described in the draft report. Appendix A presents these overarching comments, as well as the Committee and NQF responses, immediately following the details of the 15 measure evaluations.

Throughout the 16-week continuous public commenting period, NQF members had the opportunity to express their support ("support" or "do not support") for each measure submitted for endorsement consideration to inform the Committee's recommendations. No NQF members provided their expression of support.

## Overarching Issues

During the Standing Committee's discussion of the measures, several overarching issues emerged that were factored into the Committee's ratings and recommendations for multiple measures and are not repeated in detail with each individual measure.

### *Mortality After Discharge from the Hospital*

The risk-adjusted operative mortality measures include both in and out of hospital deaths. The measures are specified to capture patients that die in the hospital postoperatively, including patients that die 30 days after a surgical procedure. The measures also include postoperative deaths that occur after discharge from the hospital but only if they occur within 30 days of a surgical procedure. The mortality measures do not capture postoperative deaths that happen after discharge from the hospital if the death occurs more than 30 days after a surgical procedure. The Committee suggested that the measures are missing mortalities because deaths that occur after discharge and more than 30 days after surgery are likely related to complications following surgery but are not captured in the STS Adult Cardiac Surgery Database (ACSD).

The developer responded that the number of mortalities that the measures miss is quite small. The developers believe that missing a small number of mortalities does not significantly change the measure outcomes. The Committee disagreed with the developer about the impact of these data on the measured outcomes. The numerators for the mortality measures are small; therefore, adding one or two mortalities to a participant might impact their rating significantly. The Committee recommended that the developer expand the measures in the future to capture deaths after discharge that occur more than 30 days after surgery.

## *Scientific Acceptability Criterion – Levels of Analysis, Race and Risk Adjustment, and Score-Level Validity Testing Methodology*

### **Levels of Analysis**

The measures submitted for evaluation are specified for clinician groups and hospital/facilities; therefore, two sets of testing are expected. Group practice or individual cardiothoracic surgeons participating in the STS Adult Cardiac Surgery Database (ACSD) are the measured entities included in the testing and analysis provided by the developer; however, it was not clear if the testing and analysis also included hospital/facilities. In the measure submission forms, the developer noted that, “At the option of the surgeon or 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.” The developer confirmed that physicians are the accountable entity for these measures rather than hospital/facilities. However, NQF guidance states that the level of analysis must align with testing; therefore, “hospital/facilities” will be removed from the specifications. Testing at the facility level is required for endorsement at the facility level of analysis.

### **Race and Risk Adjustment**

The Scientific Methods Panel and Committee members questioned the developer’s approach for including race and ethnicity in the risk-adjustment model. Per the developer, race was included as a “genetic factor” as it relates to effects of medication efficacy and prevalence of certain diseases like diabetes and hypertension, rather than being considered a social factor. The Committee agreed that race and ethnicity should not be included in the risk-adjustment model and requested that performance results be stratified by race, gender, and other nonmodifiable factors. The Committee also cautioned that race is often an unreliable data element in medical records.

### **Score-Level Validity Testing Methodology**

The Scientific Methods Panel and Committee members expressed concern about the score-level testing methodology, noting that the star-ratings consistency over time is expected and is not an appropriate approach to demonstrating validity for NQF endorsement. They also questioned the utility of the content validation approach for these measures. Committee members also questioned if being a low volume provider could impact the performance of the measures.

## *Use Criterion – Public Reporting and Transparency and Patient and Consumer Perspective*

### **Public Reporting and Transparency**

Public reporting and transparency were a reoccurring issue discussed as the Committee attempted to apply the must-pass Use criterion for maintenance measures. NQF criteria require that performance results are publicly reported within six years after initial endorsement. NQF further defines public reporting as transparency in the performance results about the identifiable, accountable entities that are *disclosed and available* outside of the organizations or practices whose performance is measured. The capability to verify the performance results adds to transparency. Of specific concern, performance rates from the two composite measures 2561 and 2563 are published on the Society for Thoracic Surgeons (STS) website and meet NQF’s Use criteria for public reporting. The components that are part



of the two composite measures were each submitted independently for maintenance of endorsement and were initially endorsed more than six years ago and to date have not been publicly reported. The developer took issue with applying NQF's criteria for public reporting to individual component measures, since the composites in their entirety are publicly reported on the STS website.

During the measure evaluation meetings, the Committee struggled with NQF's definition of public reporting and transparency. The Committee had a lengthy debate about public reporting, transparency, and NQF's must-pass Use criterion for maintenance measures. The Committee discussed whether individual measures that are part of publicly reported composite measure scores, though not independently publicly reported and therefore not transparent, meet NQF's Use criterion.

### Patient and Consumer Perspective

The patient representative on the Committee stressed that patients value transparency in quality reporting and use information about performance and quality to make important decisions about their care. The patient and consumer representatives also emphasized the importance of providing comprehensive, easy-to-access, transparent, and meaningful information about a provider's performance.

### Summary of Measure Evaluation

The following brief summaries of the measure evaluation highlight the major issues that the Committee considered. Details of the Committee's discussion and ratings of the criteria for each measure are included in [Appendix A](#).

#### 2561 STS Aortic Valve Replacement (AVR) Composite Score (The Society of Thoracic Surgeons): Endorsed

**Description:** STS AVR 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 during the same hospitalization as surgery or after discharge but within 30 days of the procedure; and Domain 2) Absence of Major Morbidity – Proportion of patients (risk-adjusted) who do not experience any major morbidity. Major morbidity is defined as having at least one of the following adverse outcomes: 1. reoperations for any cardiac reason, 2. renal failure, 3. deep sternal wound infection, 4. prolonged ventilation/intubation, and 5. cerebrovascular accident/permanent stroke. All measures are based on audited clinical data collected in a prospective registry and are risk-adjusted. 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 star (below average performance), two stars (average performance), or three stars (above average performance). Star ratings are publicly reported on the STS website and are also currently reported on the Consumer Reports website. **Measure Type:** Composite; **Level of Analysis:** Facility, Clinician : Group/Practice; **Setting of Care:** Inpatient/Hospital; **Data Source:** Registry Data

This maintenance measure is a composite outcome measure of the absence of mortality and five complications—wound infection, stroke, kidney failure, respiratory failure, and re-operation—after surgery to replace the aortic valve. The Committee agreed that several factors can have significant

impact on operative mortality and that evidence-based guidelines, processes, and protocols can reduce post-operative complications and major morbidity for patients undergoing cardiac surgery. Therefore, the Committee agreed that in the absence of empirical evidence it is beneficial to hold providers accountable for performance on this measure. The Committee generally agreed that a performance gap exists. The Committee had a lengthy discussion about levels of analysis, race and risk adjustment, and score-level validity testing methodology, but generally agreed that the reliability and validity testing results met NQF criteria. The data are routinely collected, and the measure is feasible. This composite measure is one of the three ASCD composite measures publicly reported on STS Public Reporting Online. The Standing Committee recommended the measure for continued endorsement and requested that the developer provide data stratified by race during the annual update.

### **2563 STS Aortic Valve Replacement (AVR) + Coronary Artery Bypass Graft (CABG) Composite Score (The Society of Thoracic Surgeons): Endorsed**

**Description:** The STS AVR+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 during the same hospitalization as surgery or after discharge but within 30 days of the procedure; and Domain 2) Absence of Major Morbidity – Proportion of patients (risk-adjusted) who do not experience any major morbidity. Major morbidity is defined as having at least one of the following adverse outcomes: 1. reoperations for any cardiac reason, 2. renal failure, 3. deep sternal wound infection, 4. prolonged ventilation/intubation, and 5. cerebrovascular accident/permanent stroke. All measures are based on audited clinical data collected in a prospective registry and are risk-adjusted. 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 star (below average performance), two stars (average performance), or three stars (above average performance). Star ratings are publicly reported on the STS website. **Measure Type:** Composite; **Level of Analysis:** Facility, Clinician : Group/Practice; **Setting of Care:** Inpatient/Hospital; **Data Source:** Registry Data

Like measure 2561, this maintenance composite outcome measure assesses the absence of mortality and five complications—wound infection, stroke, kidney failure, respiratory failure, and re-operation—after combined surgery for CABG and replacement of the aortic valve. Complications like deep sternal wound infection, prolonged intubation, stroke, renal failure, and re-exploration for bleeding directly impact operative mortality. The Committee agreed that evidence-based guidelines, processes, and protocols can reduce postoperative complications and major morbidity for patients undergoing cardiac surgery; therefore, the Committee agreed that in the absence of empirical evidence it is beneficial to hold providers accountable for performance on this measure. The Committee generally agreed that a performance gap exists. The Committee noted that the discussion regarding levels of analysis, race, and risk adjustment, and score-level validity testing methodology also applies to this measure, but generally agreed that the reliability and validity testing results met NQF criteria. The data are routinely collected, and the measure is feasible. This composite measure is one of the three ASCD composite measures publicly reported on STS Public Reporting Online. The Standing Committee recommended the measure

for continued endorsement and requested that the developer provide data stratified by race during the annual update.

#### **0114 Risk-Adjusted Postoperative Renal Failure (The Society of Thoracic Surgeons): Endorsed**

**Description:** Percent of patients aged 18 years and older undergoing isolated CABG (without pre-existing renal failure) who develop postoperative renal failure or require dialysis; **Measure Type:** Outcome; **Level of Analysis:** Facility, Clinician : Group/Practice; **Setting of Care:** Inpatient/Hospital; **Data Source:** Registry Data

This outcome measure was last endorsed in 2014. The Committee agreed that postoperative renal failure can be reduced through improved recognition and implementation of evidence-based peri-operative interventions and approaches. The Committee generally agreed that a performance gap exists. The Committee noted that the discussion regarding levels of analysis, race and risk adjustment, and score-level validity testing methodology also applies to this measure, but generally agreed that the reliability and validity testing results met NQF criteria. The data are routinely collected, and the measure is feasible. The Standing Committee did not vote on the recommendation for endorsement because the Committee did not reach consensus on Use—a must-pass criterion. This measure is a component of a composite measure. While the composite measure is reported on the STS website, performance on this individual measure is not reported. The Committee could not agree whether reporting the composite met NQF's criteria for use of this component measure. The Committee re-voted on Usability and Use criteria at the post-comment web meeting on May 8, 2019. The Committee passed the measure on the Usability and Use criteria, and next voted on overall suitability of the measure, and recommended the measure for continued endorsement.

#### **0122 Risk-Adjusted Operative Mortality for Mitral Valve (MV) Replacement + CABG Surgery (The Society of Thoracic Surgeons): Endorsed**

**Description:** Percent of patients aged 18 years and older undergoing combined MV Replacement and CABG who die, including both 1) all deaths occurring during the hospitalization in which the procedure was performed, even if after 30 days, and 2) those deaths occurring after discharge from the hospital, but within 30 days of the procedure; **Measure Type:** Outcome; **Level of Analysis:** Facility, Clinician : Group/Practice; **Setting of Care:** Inpatient/Hospital; **Data Source:** Registry Data

This outcome measure was last endorsed in 2015. The Committee agreed that patients undergoing combined CABG and MV replacement have one of the highest mortality rates of all surgical procedures and that evaluation of operative mortality allows risk evaluation and the search to minimize the risks. The Committee generally agreed that a performance gap exists. The Committee noted that the discussion regarding levels of analysis and score-level validity testing methodology also applies to this measure, but generally agreed that the reliability and validity testing results met NQF criteria. The data are routinely collected, and the measure is feasible. The Standing Committee did not vote on the recommendation for endorsement because the Committee did not reach consensus on Use—a must-pass criterion. This measure is a component of a composite measure. While the composite measure is reported on the STS website, performance of this individual measure is not reported. The Committee could not agree whether reporting the composite met NQF's criteria for use of this component measure.

The Committee re-voted on Usability and Use criteria at the post-comment web meeting on May 8, 2019. The Committee passed the measure on the Usability and Use criteria, and next voted on overall suitability of the measure, and recommended the measure for continued endorsement.

#### **0118 Anti-Lipid Treatment Discharge (The Society of Thoracic Surgeons): Endorsed**

**Description:** Percent of patients aged 18 years and older undergoing isolated CABG who were discharged on a lipid lowering statin; **Measure Type:** Process; **Level of Analysis:** Facility, Clinician : Group/Practice; **Setting of Care:** Inpatient/Hospital; **Data Source:** Registry Data

This process measure was last endorsed in 2014. It addresses the percent of adult patients who were discharged on a lipid lowering statin following isolated CABG. The Committee accepted that the evidence had not changed since its previous evaluation for this measure and believed there was enough of a gap to meet this criterion. The Committee noted that the discussion regarding levels of analysis, race and risk adjustment, and score-level validity testing methodology also applies to this measure, but generally agreed that the reliability and validity testing results met NQF criteria. The data are routinely collected, and the measure is feasible. This measure is a component of a composite measure. While the composite measure is reported on the STS website, performance of this individual measure is not reported. Committee members believed that this measure and subsequent measures meet the public reporting requirement when reported as part of a composite. Committee members expressed concern that not endorsing the measure would cause harm to the public and that there are so few existing meaningful measures and that STS should not be held to a “perfect” standard. Overall, the Committee agreed that the measure met NQF evaluation criteria and recommended it for endorsement.

#### **0115 Risk-Adjusted Surgical Re-exploration (The Society of Thoracic Surgeons): Endorsed**

**Description:** Percent of patients aged 18 years and older undergoing isolated CABG who require a re-intervention during the current hospitalization for mediastinal bleeding with or without tamponade, graft occlusion, valve dysfunction, or other cardiac reason; **Measure Type:** Outcome; **Level of Analysis:** Facility, Clinician : Group/Practice; **Setting of Care:** Inpatient/Hospital; **Data Source:** Registry Data

This outcome measure was last endorsed in 2014. It looks at the percent of adult patients undergoing isolated CABG who require a re-intervention during the current hospitalization for mediastinal bleeding. The Committee accepted that the evidence had not changed since its previous evaluation for this measure and believed there was enough of a gap to meet this criterion. The Committee noted that the discussion regarding levels of analysis, race and risk adjustment, and score-level validity testing methodology also applies to this measure, but generally agreed that the reliability and validity testing results met NQF criteria. The data are routinely collected, and the measure is feasible. This measure is a component of a composite measure. While the composite measure is reported on the STS website, performance of this individual measure is not reported. Overall, the Committee agreed that the measure met NQF evaluation criteria and recommended it for endorsement.

#### 0119 Risk-Adjusted Operative Mortality for CABG (The Society of Thoracic Surgeons): Endorsed

**Description:** Percent of patients aged 18 years and older undergoing isolated CABG who die, including both 1) all deaths occurring during the hospitalization in which the CABG was performed, even if after 30 days, and 2) those deaths occurring after discharge from the hospital, but within 30 days of the procedure; **Measure Type:** Outcome; **Level of Analysis:** Facility, Clinician : Group/Practice; **Setting of Care:** Inpatient/Hospital; **Data Source:** Registry Data

This outcome measure was last endorsed in 2014. It looks at the percent of adult patients who die after CABG even after 30 days, and after discharge from the hospital but within 30 days. The Committee accepted that the evidence had not changed since its previous evaluation for this measure and believed there was enough of a gap to meet this criterion. The Committee noted that the discussion regarding levels of analysis, race and risk adjustment, and score-level validity testing methodology also applies to this measure, but generally agreed that the reliability and validity testing results met NQF criteria. The data are routinely collected, and the measure is feasible. This measure is a component of a composite measure. While the composite measure is reported on the STS website, performance of this individual measure is not reported. Overall, the Committee agreed that the measure met NQF evaluation criteria and recommended it for endorsement.

#### 0120 Risk-Adjusted Operative Mortality for Aortic Valve Replacement (AVR) (The Society of Thoracic Surgeons): Endorsed

**Description:** Percent of patients aged 18 years and older undergoing Aortic Valve Replacement (AVR) who die, including both 1) all deaths occurring during the hospitalization in which the procedure was performed, even if after 30 days, and 2) those deaths occurring after discharge from the hospital, but within 30 days of the procedure; **Measure Type:** Outcome; **Level of Analysis:** Facility, Clinician : Group/Practice; **Setting of Care:** Inpatient/Hospital; **Data Source:** Registry Data

This outcome measure was last endorsed in 2014. It assesses the percent of adult patients who die after aortic valve replacement including deaths that occur within 30 days of the procedure, or after 30 days if the death occurs during the hospitalization in which the procedure was performed. The Committee accepted that the evidence had not changed since its previous evaluation for this measure and believed there was enough of a gap to meet this criterion. The Committee noted that the discussion regarding levels of analysis and score-level validity testing methodology also applies to this measure, but generally agreed that the reliability and validity testing results met NQF criteria. The data are routinely collected, and the measure is feasible. This measure is a component of a composite measure. While the composite measure is reported on the STS website, performance of this individual measure is not reported. Overall, the Committee agreed that the measure met NQF evaluation criteria and recommended it for endorsement.

### 0121 Risk-Adjusted Operative Mortality for Mitral Valve (MV) Replacement (The Society of Thoracic Surgeons): Endorsed

**Description:** Percent of patients aged 18 years and older undergoing MV Replacement who die, including both 1) all deaths occurring during the hospitalization in which the procedure was performed, even if after 30 days, and 2) those deaths occurring after discharge from the hospital, but within 30 days of the procedure; **Measure Type:** Outcome; **Level of Analysis:** Facility, Clinician : Group/Practice; **Setting of Care:** Inpatient/Hospital; **Data Source:** Registry Data

This outcome measure was last endorsed in 2014. It assesses the percent of adult patients who die after mitral valve replacement including deaths that occur within 30 days of the procedure or, after 30 days if the death occurs during the hospitalization in which the procedure was performed. The Committee accepted that the evidence had not changed since its previous evaluation for this measure and believed there was enough of a gap to meet this criterion. The Committee noted that the discussion regarding levels of analysis and score-level validity testing methodology also applies to this measure, but generally agreed that the reliability and validity testing results met NQF criteria. The data are routinely collected, and the measure is feasible. This measure is a component of a composite measure. While the composite measure is reported on the STS website, performance of this individual measure is not reported. Overall, the Committee agreed that the measure met NQF evaluation criteria and recommended it for endorsement.

### 0123 Risk-Adjusted Operative Mortality for Aortic Valve Replacement (AVR) + CABG Surgery (The Society of Thoracic Surgeons): Endorsed

**Description:** Percent of patients aged 18 years and older undergoing combined AVR and CABG who die, including both 1) all deaths occurring during the hospitalization in which the procedure was performed, even if after 30 days, and 2) those deaths occurring after discharge from the hospital, but within 30 days of the procedure; **Measure Type:** Outcome; **Level of Analysis:** Facility, Clinician : Group/Practice; **Setting of Care:** Inpatient/Hospital; **Data Source:** Registry Data

This outcome measure was last endorsed in 2014. It assesses the percent of adult patients who die after combined CABG and aortic valve (AR) replacement surgery including deaths that occur within 30 days of the procedure or after 30 days if the death occurs during the hospitalization in which the procedure was performed. The Committee accepted that the evidence had not changed since its previous evaluation for this measure and believed there was enough of a gap to meet this criterion. The Committee noted that the discussion regarding levels of analysis and score-level validity testing methodology also applies to this measure, but generally agreed that the reliability and validity testing results met NQF criteria. The data are routinely collected, and the measure is feasible. This measure is a component of a composite measure. While the composite measure is reported on the STS website, performance of this individual measure is not reported. Overall, the Committee agreed that the measure met NQF evaluation criteria and recommended it for endorsement.



### 0129 Risk-Adjusted Postoperative Prolonged Intubation (Ventilation) (The Society of Thoracic Surgeons): Endorsed

**Description:** Percent of patients aged 18 years and older undergoing isolated CABG who require intubation for more than 24 hours postoperatively; **Measure Type:** Outcome; **Level of Analysis:** Facility, Clinician : Group/Practice; **Setting of Care:** Inpatient/Hospital; **Data Source:** Registry Data

This outcome measure was last endorsed in 2014. It looks at the percent of adult patients undergoing isolated CABG who require intubation for more than 24 hours postoperatively. The Committee accepted that the evidence had not changed since its previous evaluation for this measure and believed there was enough of a gap to meet this criterion. The Committee noted that the discussion regarding levels of analysis, race and risk adjustment, and score-level validity testing methodology also applies to this measure, but generally agreed that the reliability and validity testing results met NQF criteria. The data are routinely collected, and the measure is feasible. This measure is a component of a composite measure. While the composite measure is reported on the STS website, performance of this individual measure is not reported. Overall, the Committee agreed that the measure met NQF evaluation criteria and recommended it for endorsement.

### 0130 Risk-Adjusted Deep Sternal Wound Infection (The Society of Thoracic Surgeons): Endorsed

**Description:** Percent of patients aged 18 years and older undergoing isolated CABG for whom mediastinitis or deep sternal wound infection is diagnosed within 30 days postoperatively or at any time during the hospitalization for surgery; **Measure Type:** Outcome; **Level of Analysis:** Facility, Clinician : Group/Practice; **Setting of Care:** Inpatient/Hospital; **Data Source:** Registry Data

This outcome measure was last endorsed in 2014. Deep sternal wound infections lead to longer hospital stays, increased healthcare costs, and increased morbidity and mortality. Studies have shown that implementing multidisciplinary team processes in the preoperative, intraoperative, and postoperative phase can eliminate this cardiac surgery complication. The Committee accepted that the evidence had not changed since its previous evaluation for this measure and believed there was enough of a gap to meet this criterion. The Committee noted that the discussion regarding levels of analysis, race and risk adjustment, and score-level validity testing methodology also applies to this measure, but generally agreed that the reliability and validity testing results met NQF criteria. The data are routinely collected, and the measure is feasible. This measure is a component of a composite measure. While the composite measure is reported on the STS website, performance of this individual measure is not reported. Overall, the Committee agreed that the measure met NQF evaluation criteria and recommended it for endorsement. Overall, the Committee agreed that the measure met NQF evaluation criteria and recommended it for endorsement.

### 0131 Risk-Adjusted Stroke/Cerebrovascular Accident (The Society of Thoracic Surgeons): Endorsed

**Description:** Percent of patients aged 18 years and older undergoing isolated CABG who have a postoperative stroke (i.e., any confirmed neurological deficit of abrupt onset caused by a disturbance in blood supply to the brain) that did not resolve within 24 hours; **Measure Type:** Outcome; **Level of Analysis:** Facility, Clinician : Group/Practice; **Setting of Care:** Inpatient/Hospital; **Data Source:** Registry Data

This outcome measure was last endorsed in 2015. It looks at the percent of adult patients undergoing isolated CABG who have a postoperative stroke that did not resolve within 24 hours. The Committee accepted that the evidence had not changed since its previous evaluation for this measure and believed there was enough of a gap to meet this criterion. The Committee noted that the discussion regarding levels of analysis, race and risk adjustment, and score-level validity testing methodology also applies to this measure, but generally agreed that the reliability and validity testing results met NQF criteria. The data are routinely collected, and the measure is feasible. This measure is a component of a composite measure. While the composite measure is reported on the STS website, performance of this individual measure is not reported. Overall, the Committee agreed that the measure met NQF evaluation criteria and recommended it for endorsement.

#### **1501 Risk-Adjusted Operative Mortality for Mitral Valve (MV) Repair (The Society of Thoracic Surgeons): Endorsed**

**Description:** Percent of patients aged 18 years and older undergoing MV Repair who die, including both 1) all deaths occurring during the hospitalization in which the procedure was performed, even if after 30 days, and 2) those deaths occurring after discharge from the hospital, but within 30 days of the procedure. (This measure applies to the procedure of MV repair, regardless of approach); **Measure Type:** Outcome; **Level of Analysis:** Facility, Clinician : Group/Practice; **Setting of Care:** Inpatient/Hospital; **Data Source:** Registry Data

This outcome measure was last endorsed in 2014. Decreasing the risk associated with surgical procedures and various patient characteristics leads to decreased operative mortality and increased survival for patients undergoing isolated mitral valve (MV) repair. The Committee noted that the discussion regarding levels of analysis and score-level validity testing methodology also applies to this measure, but generally agreed that the reliability and validity testing results met NQF criteria. The data are routinely collected, and the measure is feasible. This measure is a component of a composite measure. While the composite measure is reported on the STS website, performance of this individual measure is not reported. Overall, the Committee agreed that the measure met NQF evaluation criteria and recommended it for endorsement.

#### **1502 Risk-Adjusted Operative Mortality for Mitral Valve (MV) Repair + CABG Surgery (The Society of Thoracic Surgeons): Endorsed**

**Description:** Percent of patients aged 18 years and older undergoing combined MV Repair and CABG who die, including both 1) all deaths occurring during the hospitalization in which the procedure was performed, even if after 30 days, and 2) those deaths occurring after discharge from the hospital, but within 30 days of the procedure; **Measure Type:** Outcome; **Level of Analysis:** Facility, Clinician : Group/Practice; **Setting of Care:** Inpatient/Hospital; **Data Source:** Registry Data

This outcome measure was last endorsed in 2014. Patients undergoing combined mitral valve (MV) repair and coronary artery bypass grafting (CABG) have one of the highest surgical mortality rates due to the number and severity of co-morbidity risk factors. The Committee agreed that reducing the risk associated with surgical procedures and various patient characteristics leads to decreased operative mortality and increased survival. The Committee accepted that the evidence had not changed since its previous evaluation for this measure and believed there was enough of a gap to meet this criterion. The



Committee noted that the discussion regarding levels of analysis and score-level validity testing methodology also applies to this measure, but generally agreed that the reliability and validity testing results met NQF criteria. The data are routinely collected, and the measure is feasible. This measure is a component of a composite measure. While the composite measure is reported on the STS website, performance of this individual measure is not reported. Overall, the Committee agreed that the measure met NQF evaluation criteria and recommended it for endorsement.

## References

- 1 Hall M, Schwartzman A, Zhang J, et al. *Ambulatory Surgery Data From Hospitals and Ambulatory Surgery Centers: United States, 2010*. Atlanta, GA: Centers for Disease Control and Prevention; 2017. <https://www.cdc.gov/nchs/data/nhsr/nhsr102.pdf>.
- 2 Steiner CA, Karaca Z, Moore BJ, et al. Surgeries in Hospital-Based Ambulatory Surgery and Hospital Inpatient Settings, 2014: Statistical Brief #223. In: *Healthcare Cost and Utilization Project (HCUP) Statistical Briefs*. Rockville, MD: Agency for Healthcare Research and Quality; 2006. <http://www.ncbi.nlm.nih.gov/books/NBK442035/>. Last accessed February 2018.
- 3 Munnich EL, Parente ST. Procedures take less time at ambulatory surgery centers, keeping costs down and ability to meet demand up. *Health Aff*. 2014;33(5):764-769.
- 4 Farrell D, Jensen E, Kochner B, et al. *Accounting for the Cost of US Health Care: A New Look at Why Americans Spend More*. Washington, DC: McKinsey Global Institute; 2008. <https://www.mckinsey.com/industries/healthcare-systems-and-services/our-insights/accounting-for-the-cost-of-us-health-care>. Last accessed February 2018.
- 5 Manohar A, Cheung K, Wu CL, et al. Burden incurred by patients and their caregivers after outpatient surgery: a prospective observational study. *Clin Orthop*. 2014;472(5):1416-1426.
- 6 Fox JP, Vashi AA, Ross JS, et al. Hospital-based, acute care after ambulatory surgery center discharge. *Surgery*. 2014;155(5):743-753.

## Appendix A: Details of Measure Evaluation

**Rating Scale:** H=High; M=Moderate; L=Low; I=Insufficient; NA=Not Applicable

### Measures Endorsed

---

#### 2561 STS Aortic Valve Replacement (AVR) Composite Score

[Submission](#) | [Specifications](#)

**Description:** STS AVR 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 during the same hospitalization as surgery or after discharge but within 30 days of the procedure; and Domain 2) Absence of Major Morbidity – Proportion of patients (risk-adjusted) who do not experience any major morbidity. Major morbidity is defined as having at least one of the following adverse outcomes: 1. reoperations for any cardiac reason, 2. renal failure, 3. deep sternal wound infection, 4. prolonged ventilation/intubation, and 5. cerebrovascular accident/permanent stroke. All measures are based on audited clinical data collected in a prospective registry and are risk-adjusted.

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 star (below average performance), two stars (average performance), or three stars (above average performance). Star ratings are publicly reported on the STS website and are also currently reported on the Consumer Reports website.

**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 AVR Composite Score comprises two domains consisting of six individual measures:

1. Absence of Operative Mortality

NQF # 0120 Risk-Adjusted Operative Mortality for AVR

2. Absence of Major Morbidity, scored any-or-none. The measures used are the same morbidity outcomes included in NQF #0696 STS CABG Composite Score.

Risk-Adjusted Postoperative Stroke/Cerebrovascular Accident

Risk-Adjusted Postoperative Surgical Re-exploration

Risk-Adjusted Postoperative Deep Sternal Wound Infection Rate

Risk-Adjusted Postoperative Renal Failure

Risk-Adjusted Postoperative Prolonged Intubation (Ventilation)

Participants 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 one star (below average performance), two stars (average performance), or three stars (above average performance).

**Patient Population:** The analysis population consists of adult patients aged 18 years or older who undergo isolated AVR surgery

**Time Period:** 3 years

Data Completeness Requirement: Participants are excluded from the analysis if they have fewer than 10 isolated AVR procedures in the patient population.

#### Technical Details

The unit of measurement for the STS AVR Composite Score can be either a participant (most often a cardiac surgical practice but occasionally an individual surgeon) or a hospital.

For the Absence of Operative Mortality domain, the NUMERATOR is:

Number of patients undergoing isolated AVR who survived until after discharge and >30 days post-surgery

For the Absence of Major Morbidity domain, the NUMERATOR is:

Number of patients undergoing isolated AVR who did not experience any of the five specified major morbidity endpoints\*

\*Morbidity endpoints consist of postoperative stroke/cerebrovascular accident, surgical re-exploration, deep sternal wound infection, renal failure, prolonged intubation (ventilation). Patients with documented history of renal failure (i.e., dialysis or baseline serum creatinine of 4.0 or higher) are excluded when counting renal failure outcomes.

STS AVR risk models are used to estimate expected rates of mortality and any-or-none morbidity (Reference: 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). To enhance interpretation, mortality rates are converted to survival rates (risk-standardized survival rate =  $100 - \text{risk-standardized mortality rate}$ ), and morbidity rates are converted to “absence of morbidity” rates (risk-standardized absence of morbidity rate =  $100 - \text{risk-standardized morbidity rate}$ ). Defining scores in this manner ensures that increasingly positive values reflect better performance, which is easier for consumers to interpret.

(Please see the appendix for the formula used to calculate the overall composite score.)

The method is equivalent to calculating a weighted average, with weights proportional to the inverse of the SD. In the most recent production of the STS AVR Composite Score based on data from July 2010 – June 2013,  $w_{\text{mort}}=0.79$  and  $w_{\text{morb}} = 0.21$ .

Star Rating: Star ratings are derived by testing whether the participant's composite or domain score is significantly different from the overall STS average. For instance, if for each of the 2 composite score domains, a participant's estimated score is lower than the overall STS average, but the difference between the participant and STS is not statistically significant, the ratings would each be 2 stars. If however, for the overall composite, the point estimate is lower than the STS average, AND this difference is statistically significant, the overall participant star rating is 1 star. The fact that statistical significance was achieved for the composite score but not the individual domains reflects the greater precision of the composite score compared to

individual endpoints. This precision is achieved by aggregating information across multiple endpoints instead of a single endpoint.

Additional details regarding the AVR Composite Score are provided in the attached manuscript:

Shahian DM, He X, Jacobs JP, et al. The Society of Thoracic Surgeons Isolated Aortic Valve Replacement (AVR) Composite Score: a report of the STS Quality Measurement Task Force. *Ann Thorac Surg* 2012;94:2166-71.

**Denominator 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 AVR Composite Score comprises two domains consisting of six individual measures:

1. Absence of Operative Mortality

NQF # 0120 Risk-Adjusted Operative Mortality for AVR

2. Absence of Major Morbidity, scored any-or-none. The measures used are the same morbidity outcomes included in NQF #0696 STS CABG Composite Score.

Risk-Adjusted Postoperative Stroke/Cerebrovascular Accident

Risk-Adjusted Postoperative Surgical Re-exploration

Risk-Adjusted Postoperative Deep Sternal Wound Infection Rate

Risk-Adjusted Postoperative Renal Failure

Risk-Adjusted Postoperative Prolonged Intubation (Ventilation)

Participants 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 one star (below average performance), two stars (average performance), or three stars (above average performance).

Patient Population: The analysis population consists of adult patients aged 18 years or older who undergo isolated AVR surgery

Time Period: 3 years

Data Completeness Requirement: Participants are excluded from the analysis if they have fewer than 10 isolated AVR procedures in the patient population.

Technical Details

The unit of measurement for the STS AVR Composite Score can be either a participant (most often a cardiac surgical practice but occasionally an individual surgeon) or a hospital.

For the Absence of Operative Mortality domain AND the Absence of Major Morbidity domain, the DENOMINATOR is:

Number of patients undergoing isolated AVR during the measurement period

STS AVR risk models are used to estimate expected rates of mortality and any-or-none morbidity (Reference: 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). To enhance interpretation, mortality rates are converted to survival rates (risk-standardized survival rate =  $100 - \text{risk-standardized}$

mortality rate), and morbidity rates are converted to “absence of morbidity” rates (risk-standardized absence of morbidity rate =  $100 - \text{risk-standardized morbidity rate}$ ). Defining scores in this manner ensures that increasingly positive values reflect better performance, which is easier for consumers to interpret.

(Please see the appendix for the formula used to calculate the overall composite score.)

The method is equivalent to calculating a weighted average, with weights proportional to the inverse of the SD. In the most recent production of the STS AVR Composite Score based on data from July 2010 – June 2013,  $\text{wtmort} = 0.79$  and  $\text{wtmorb} = 0.21$ .

Star Rating: Star ratings are derived by testing whether the participant's composite or domain score is significantly different from the overall STS average. For instance, if for each of the 2 composite score domains, a participant's estimated score is lower than the overall STS average, but the difference between the participant and STS is not statistically significant, the ratings would each be 2 stars. If however, for the overall composite, the point estimate is lower than the STS average, AND this

difference is statistically significant, the overall participant star rating is 1 star. The fact that statistical significance was achieved for the composite score but not the individual domains reflects the greater precision of the composite score compared to

individual endpoints. This precision is achieved by aggregating information across multiple endpoints instead of a single endpoint.

Additional details regarding the AVR Composite Score are provided in the attached manuscript:

Shahian DM, He X, Jacobs JP, et al. The Society of Thoracic Surgeons Isolated Aortic Valve Replacement (AVR) Composite Score: a report of the STS Quality Measurement Task Force. Ann Thorac Surg 2012;94:2166-71.

**Exclusions:** Please see S.6 above

**Adjustment/Stratification:** Statistical risk model

Rate/proportion

better quality = higher score

Please see S.4 and S.6 above

**Level of Analysis:** Facility, Clinician : Group/Practice

**Setting of Care:** Inpatient/Hospital

**Type of Measure:** Composite

**Data Source:** Registry Data

**Measure Steward:** The Society of Thoracic Surgeons

---

## STANDING COMMITTEE MEETING 02/13/2019

### 1. Importance to Measure and Report: The measure meets the Importance criteria

(1a. Evidence, 1b. Performance Gap)

1a. Evidence: **Pass – 14; No Pass – 0**; 1b. Performance Gap: **H-1; M-14; L-0; I-0**; 1c. Composite - Quality Construct and Rationale: **H-8; M-6; L-0; I-0**

#### Rationale:

- For the 2014 endorsement evaluation, the relationship between operative mortality and major morbidity included preoperative patient selection, surgical timing, intraoperative conduct of the procedure, and many aspects to postoperative care. The developer suggested evidence-based guidelines, processes, and protocols can reduce post-operative complications and major morbidity for patients undergoing cardiac surgery. For the current evaluation, the Committee agreed the evidence has not changed and did not repeat the discussion.
- The Committee agreed there is a performance gap based on the isolated aortic valve replacement (AVR) composite rates from the most recent four STS harvests in 2016-2017 (each harvest includes three years of data) that indicate a performance rate of 94.8 percent to 95.5 percent, for approximately 800-1000 participants and over 89,000 operations.
- The quality construct of the measure is based on a combination of two NQF endorsed risk adjusted outcome measures, Absence of Operative Mortality (NQF #0210) and Absence of Major Morbidity (NQF #0696). The overall composite performance score is calculated as a weighted average of the domain-specific estimates. The weight that is applied to a given domain is inversely proportional to the standard deviation of the domain-specific scores.

- A Committee member questioned whether the composite measure is as meaningful as two separate measures looking at mortality and major morbidity rates and noted that as a consumer, prefers two distinct measures rather than one that requires more manipulation of the data. Other Committee members noted that the composite measure provides a comprehensive measure of cardiac surgical care because, in addition to mortality, it includes complications that can impact a patient's long-term quality of life. The Committee did not raise any additional concerns about the quality construct and rationale for constructing the measure.

---

## **2. Scientific Acceptability of Measure Properties: The measure meets the Scientific Acceptability criteria**

(2a. Reliability - precise specifications, testing; 2b. Validity - testing, threats to validity)

2a. Reliability: **H-5; M-10; L-0; I-0**; 2b. Validity: **H-0; M-9; L-5; I-0**; 2c. Composite Construction: **H-6; M-8; L-0; I-0**

### Rationale:

- NQF's Scientific Methods Panel evaluated reliability and validity, rating reliability as "Moderate" and validity as "Consensus Not Reached."
- The measure is specified for clinician groups and hospital/facilities; therefore, two sets of testing are expected. The developer confirmed that physicians are the accountable entity for these measures rather than hospital/facilities. However, NQF guidance states that the level of analysis must align with testing; therefore, "hospital/facilities" will be removed from the specifications. Additional testing at the facility level is required for endorsement at both levels of analysis.
- The developer tested reliability using a beta-binomial model to calculate the computed measure score as the ratio of signal to noise. The Committee agreed a mean reliability of 0.49 demonstrates adequate reliability.
- To demonstrate validity, the developers submitted a predictive validity analysis that examined stability of star ratings over a 3-year period. The greatest stability was found among those with 2-star ratings. STS participants were labeled as "better than average outliers" (3 Stars) if it was at least 95% certain that the participant's true measure score was better than the overall STS average measure score. Participants were labeled as "worse than average outliers" (1 Star) if it was at least 95% certain the participant's true measure score was worse than the overall STS average measure score. In addition, the developer sought to demonstrate content validity by indicating that the components of the composite represent quality aortic valve replacement. Their approach assessed morbidity and mortality results for those providers classified as 1-star, 2-star, and 3-star based on the composite measure results.
- The Scientific Methods Panel and some of the Committee members expressed concern about the score-level testing methodology, noting that the star-rating consistency over time is expected and is not an appropriate approach to demonstrating validity. They also questioned the utility of the content validation approach for this measure.
- The developers reported completion of a face validity assessment; however, the face validity assessment submitted does not meet NQF criteria.
- The Scientific Methods Panel and Committee members questioned the developer's approach for including race and ethnicity in the risk-adjustment model. Per the developer, race was included as a "genetic factor" as it relates to effects of medication efficacy and prevalence of certain diseases like diabetes and hypertension, rather than being considered a social factor. The Committee agreed that race and ethnicity should not be included in the risk adjustment model

and requested performance results to be stratified by race, gender, and other non-modifiable factors and submitted to the Standing Committee within one year.

- Per the developer, the statistical results from the empirical analysis completed to support the composite construction risk-adjusted morbidity explains much of the variation in the overall comprehensive score, though risk-adjusted mortality also contributes statistical information. The Committee accepted the validity testing results and the composite construction measure analysis.

---

### **3. Feasibility: H-7; M-7; L-0; I-0**

*(3a. Clinical data generated during care delivery; 3b. Electronic sources; 3c. Susceptibility to inaccuracies/unintended consequences identified 3d. Data collection strategy can be implemented)*

#### Rationale:

- EHR capability may differ among institutions; therefore, availability of data elements in electronically defined fields may vary. All data elements from participating institutions are submitted to the STS Adult Cardiac Surgery Database in electronic format following a standard set of data specifications.
- The developer reports that although there are no direct costs to collect data for this measure, STS Adult Cardiac Surgery Database participants pay an annual participant fee ranging from \$3,500 to \$4,750. STS member-majority participants pay an additional \$150 fee per surgeon and non-member majority participants pay \$350 per surgeon.
- One of the Committee members commented that the costs data is a bit deceptive for all the STS measures. While the upfront costs are trivial, participating hospitals invest hundreds of thousands of dollars per year in data abstraction resources to support STS participation.

---

### **4. Use and Usability: This maintenance measure meets the Use subcriterion**

*4a. Use; 4a1. Accountability and transparency; 4a2. Feedback on the measure by those being measured and others; 4b. Usability; 4b1. Improvement; 4b2. The benefits to patients outweigh evidence of unintended negative consequences to patients)*

**4a. Use: Pass-12; No Pass-2; 4b. Usability: H-2; M-10; L-2; I-0**

#### Rationale:

- This composite measure is one of the three Adult Cardiac Surgery Database composite measures publicly reported on STS Public Reporting Online.
- The developer reported that as of November 2018, approximately 67.0% of STS Adult Cardiac Surgery Database participants were enrolled in voluntary public reporting. One of the Committee members commented that this information about provider performance may be misleading to the public if the 67.0% of participants also represents the highest performing participants.
- The percentage distribution of star ratings for the measure among all participants in the Adult Cardiac Surgery Database from 2011 to 2016 show more participants in the 2-star category (not statistically different from the STS average) and fewer in the 1-star category (significantly lower than the STS average).

---

### **5. Related and Competing Measures**

- This measure is related to:



- 0120 Risk-Adjusted Operative Mortality for Aortic Valve Replacement (AVR)
    - 2563 STS Aortic Valve Replacement (AVR) + CABG Composite Score
    - 0696 CABG Composite Score
    - 3031 Mitral Valve Repair/Replacement (MVVR) Composite
    - 3032 Mitral Valve Repair/Replacement (MVRR) + CABG Composite
  - The Committee agreed the related measures add value that outweigh any concern regarding interpretability or burden of data collection.
- 

## **6. Standing Committee Recommendation for Endorsement: Y-14; N-0**

---

### **7. Public and Member Comment**

Following the Committee's evaluation of the measure, NQF did not receive any additional comments besides the overarching comments submitted by the measure steward. These overarching comments, the Committee and NQF responses are captured below, following the details of the 15 measure evaluations.

---

### **8. Consensus Standards Approval Committee (CSAC) Vote: Y-14; N-0 (June 5, 2019: Approved for endorsement)**

- CSAC upheld the Committee's decision to recommend the measure for endorsement.
- 

### **9. Appeals**

No appeals were received.

---

## 2563 STS Aortic Valve Replacement (AVR) + Coronary Artery Bypass Graft (CABG) Composite Score

[Submission](#) | [Specifications](#)

**Description:** The STS AVR+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 during the same hospitalization as surgery or after discharge but within 30 days of the procedure; and Domain 2) Absence of Major Morbidity – Proportion of patients (risk-adjusted) who do not experience any major morbidity. Major morbidity is defined as having at least one of the following adverse outcomes: 1. reoperations for any cardiac reason, 2. renal failure, 3. deep sternal wound infection, 4. prolonged ventilation/intubation, and 5. cerebrovascular accident/permanent stroke. All measures are based on audited clinical data collected in a prospective registry and are risk-adjusted.

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 star (below average performance), two stars (average performance), or three stars (above average performance). Star ratings are publicly reported on the STS website.

**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 AVR+CABG Composite Score comprises two domains consisting of six individual measures:

1. Absence of Operative Mortality

NQF # 0123 Risk-Adjusted Operative Mortality for AVR+CABG Surgery

2. Absence of Major Morbidity, scored any-or-none. The measures used are the same morbidity outcomes included in NQF #0696 STS CABG Composite Score.

Risk-Adjusted Postoperative Stroke/Cerebrovascular Accident

Risk-Adjusted Postoperative Surgical Re-exploration

Risk-Adjusted Postoperative Deep Sternal Wound Infection Rate

Risk-Adjusted Postoperative Renal Failure

Risk-Adjusted Postoperative Prolonged Intubation (Ventilation)

Participants 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 one star (below average performance), two stars (average performance), or three stars (above average performance).

**Patient Population:** The analysis population consists of adult patients aged 18 years or older who undergo AVR+CABG surgery

**Time Period:** 3 years

**Data Completeness Requirement:** Participants are excluded from the analysis if they have fewer than 10 AVR+CABG procedures in the patient population.

**Technical Details**

The unit of measurement for the STS AVR+CABG Composite Score can be either a participant (most often a cardiac surgical practice but occasionally an individual surgeon) or a hospital.

For the Absence of Operative Mortality domain, the NUMERATOR is:

Number of patients undergoing AVR+CABG who survived until after discharge and >30 days post-surgery

For the Absence of Major Morbidity domain, the NUMERATOR is:

Number of patients undergoing AVR+CABG who did not experience any of the five specified major morbidity endpoints\*

\*Morbidity endpoints consist of postoperative stroke/cerebrovascular accident, surgical re-exploration, deep sternal wound infection, renal failure, prolonged intubation (ventilation). Patients with documented history of renal failure (i.e., dialysis or baseline serum creatinine of 4.0 or higher) are excluded when counting renal failure outcomes.

STS AVR+CABG risk models are used to estimate expected rates of mortality and any-or-none morbidity (Reference: 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.) To enhance interpretation, mortality rates are converted to survival rates (risk-standardized survival rate = 100 – risk-standardized mortality rate), and morbidity rates are 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, which is easier for consumers to interpret.

(Please see the appendix for the formula used to calculate the overall composite score.)

The method is equivalent to calculating a weighted average, with weights proportional to the inverse of the SD. In the most recent production of the STS AVR+CABG Composite Score based on data from July 2010 – June 2013, wtmort=0.77 and wtmorb = 0.23.

Star Rating: Star ratings are derived by testing whether the participant's composite or domain score is significantly different from the overall STS average. For instance, if for each of the 2 composite score domains, a participant's estimated score is lower than the overall STS average, but the difference between the participant and STS is not statistically significant, the ratings would each be 2 stars. If however, for the overall composite, the point estimate is lower than the STS average, AND this difference is statistically significant, the overall participant star rating is 1 star. The fact that statistical significance was achieved for the composite score but not the individual domains reflects the greater precision of the composite score compared to

individual endpoints. This precision is achieved by aggregating information across multiple endpoints instead of a single endpoint.

Additional details regarding the AVR+CABG Composite Score are provided in the manuscript:

Shahian DM, He X, Jacobs JP, et al. The STS AVR + CABG Composite Score: A Report of the STS Quality Measurement Task Force. Ann Thorac Surg 2014;97(5),1604-9.

**Denominator 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 AVR+CABG Composite Score comprises two domains consisting of six individual measures:

1. Absence of Operative Mortality

NQF # 0123 Risk-Adjusted Operative Mortality for AVR+CABG Surgery

2. Absence of Major Morbidity, scored any-or-none. The measures used are the same morbidity outcomes included in NQF #0696 STS CABG Composite Score.

Risk-Adjusted Postoperative Stroke/Cerebrovascular Accident

Risk-Adjusted Postoperative Surgical Re-exploration

Risk-Adjusted Postoperative Deep Sternal Wound Infection Rate

Risk-Adjusted Postoperative Renal Failure

Risk-Adjusted Postoperative Prolonged Intubation (Ventilation)

Participants 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 one star (below average performance), two stars (average performance), or three stars (above average performance).

**Patient Population:** The analysis population consists of adult patients aged 18 years or older who undergo AVR+CABG surgery

**Time Period:** 3 years

**Data Completeness Requirement:** Participants are excluded from the analysis if they have fewer than 10 AVR+CABG procedures in the patient population.

**Technical Details**

The unit of measurement for the STS AVR+CABG Composite Score can be either a participant (most often a cardiac surgical practice but occasionally an individual surgeon) or a hospital.

For the Absence of Operative Mortality domain AND the Absence of Major Morbidity domain, the DENOMINATOR is:

Number of patients undergoing isolated AVR+CABG during the measurement period

STS AVR+CABG risk models are used to estimate expected rates of mortality and any-or-none morbidity (Reference: 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.) To enhance interpretation, mortality rates are converted to survival rates (risk-standardized survival rate =  $100 - \text{risk-standardized mortality rate}$ ), and morbidity rates are converted to “absence of morbidity” rates (risk-standardized absence of morbidity rate =  $100 - \text{risk-standardized morbidity rate}$ ). Defining scores in this manner ensures that increasingly positive values reflect better performance, which is easier for consumers to interpret.

(Please see the appendix for the formula used to calculate the overall composite score.)

The method is equivalent to calculating a weighted average, with weights proportional to the inverse of the SD. In the most recent production of the STS AVR+CABG Composite Score based on data from July 2010 – June 2013,  $\text{wtmort}=0.77$  and  $\text{wtmorb} = 0.23$ .

**Star Rating:** Star ratings are derived by testing whether the participant's composite or domain score is significantly different from the overall STS average. For instance, if for each of the 2 composite score domains, a participant's estimated score is lower than the overall STS average, but the difference between the participant and STS is not statistically significant, the ratings would each be 2 stars. If however, for the overall composite, the point estimate is lower than the STS average, AND this difference is statistically significant, the overall participant star rating is 1 star. The fact that statistical significance was achieved for the composite score but not the individual domains reflects the greater precision of the composite score compared to

individual endpoints. This precision is achieved by aggregating information across multiple endpoints instead of a single endpoint.

Additional details regarding the AVR+CABG Composite Score are provided in the manuscript:

Shahian DM, He X, Jacobs JP, et al. The STS AVR + CABG Composite Score: A Report of the STS Quality Measurement Task Force. *Ann Thorac Surg* 2014;97(5),1604-9.

**Exclusions:** Please see S.6 above

**Adjustment/Stratification:** Statistical risk model

Rate/proportion

better quality = higher score

Please see S.4 and S.6 above

**Level of Analysis:** Facility, Clinician : Group/Practice

**Setting of Care:** Inpatient/Hospital

**Type of Measure:** Composite

**Data Source:** Registry Data

**Measure Steward:** The Society of Thoracic Surgeons

---

## STANDING COMMITTEE MEETING 02/13/2019

### 1. Importance to Measure and Report: The measure meets the Importance criteria

(1a. Evidence, 1b. Performance Gap)

1a. Evidence: **Pass-14; No Pass-0** 1b. Performance Gap: **H-1; M-14; L-0; I-0**; 1c. Composite - Quality Construct and Rationale: **H-8; M-6; L-0; I-0**

#### Rationale:

- For the 2014 endorsement evaluation, the developer reported that evidence-based guidelines, processes, and protocols can reduce post-operative complications like deep sternal wound infection, prolonged intubation, stroke, renal failure, and re-exploration for bleeding for patients undergoing cardiac surgery. For the current evaluation, the Committee agreed the evidence has not changed and did not repeat the discussion.
- The Committee agreed there is a performance gap based on the isolated aortic valve replacement (AVR) composite rates from the most recent four STS harvests in 2016-2017 (each harvest includes three years of data) that indicate a performance rate of 91.6 to 92.5, for approximately 770 - 930 participants and over 48,000 operations.
- The quality construct of the measure is based on a combination of two NQF endorsed risk adjusted outcome measures, Absence of Operative Mortality (NQF 0123) and Absence of Major Morbidity (NQF 0696). The overall composite performance score is calculated as a weighted average of the domain-specific estimates. The weight that is applied to a given domain is inversely proportional to the standard deviation of the domain-specific scores.
- The Committee agreed that due to low mortality rates, the composite measure score, which includes major morbidity, provides additive value over the component measures individually. On the other hand, one of the Committee members noted the importance to measure and report this measure is limited because combined AVR repair and CABG surgery is a relatively rare surgical procedure.

---

### 2. Scientific Acceptability of Measure Properties: The measure meets the Scientific Acceptability criteria

(2a. Reliability - precise specifications, testing; 2b. Validity - testing, threats to validity)

2a. Reliability: **H-5; M-10; L-0; I-0**; 2b. Validity: **H-0; M-9; L-5; I-0**; 2c. Composite Construction: **H-6; M-8; L-0; I-0**

#### Rationale:

- The discussion for [#2561](#) applies to this measure due to the similarities in the specifications, validity testing and risk-adjustment methodology, and issues expressed and/or addressed by the Scientific Methods Panel and the Committee. The Committee did not raise any new issues about the reliability or validity of the composite measure.

---

### **3. Feasibility: H-7; M-7; L-0; I-0**

*(3a. Clinical data generated during care delivery; 3b. Electronic sources; 3c. Susceptibility to inaccuracies/unintended consequences identified 3d. Data collection strategy can be implemented)*

#### Rationale:

- The discussion about Feasibility for [#2561](#) applies to this measure. The Committee did not raise additional concerns.

---

### **4. Use and Usability: This maintenance measure meets the Use subcriterion**

*4a. Use; 4a1. Accountability and transparency; 4a2. Feedback on the measure by those being measured and others; 4b. Usability; 4b1. Improvement; 4b2. The benefits to patients outweigh evidence of unintended negative consequences to patients)*

4a. Use: **Pass-12; No Pass-2** 4b. Usability: **H-2; M-10; L-2; I-0**

#### Rationale:

- The discussion about Use and Usability for [#2561](#) applies to this measure. The Committee did not raise additional concerns.

---

### **5. Related and Competing Measures**

- This measure is related to:
  - 0123 Risk-Adjusted Operative Mortality for Aortic Valve Replacement (AVR) + CABG
  - 2561 STS Aortic Valve Replacement (AVR) Composite Score
  - 0696 CABG Composite Score
  - 3031 Mitral Valve Repair/Replacement (MVVR) Composite
  - 3032 Mitral Valve Repair/Replacement (MVRR) + CABG Composite
- The Committee agreed the related measures add value that outweigh any concern regarding interpretability or burden of data collection.

---

### **6. Standing Committee Recommendation for Endorsement: Y-14; N-0**

---

### **7. Public and Member Comment**

Following the Committee's evaluation of the measure, NQF did not receive any additional comments besides the overarching comments submitted by the measure steward. These overarching comments, the Committee and NQF responses are captured below, following the details of the 15 measure evaluations.

**8. Consensus Standards Approval Committee (CSAC) Vote: Y-14; N-0 (June 5, 2019: Approved for endorsement)**

- CSAC upheld the Committee's decision to recommend the measure for endorsement.

---

**9. Appeals**

No appeals were received.

---

## 0114 Risk-Adjusted Postoperative Renal Failure

[Submission](#) | [Specifications](#)

**Description:** Percent of patients aged 18 years and older undergoing isolated CABG (without pre-existing renal failure) who develop postoperative renal failure or require dialysis

**Numerator Statement:** Number of patients undergoing isolated CABG who develop postoperative renal failure or require dialysis

**Denominator Statement:** All patients undergoing isolated CABG

**Exclusions:** Patients with documented history of renal failure, baseline serum creatinine of 4.0 or higher; prior renal transplants are not considered preoperative renal failure unless since transplantation their Cr has been or is 4.0 or higher

**Adjustment/Stratification:** Statistical risk model

Rate/proportion

better quality = lower score

Please refer to numerator and denominator sections for detailed information.

**Level of Analysis:** Facility, Clinician : Group/Practice

**Setting of Care:** Inpatient/Hospital

**Type of Measure:** Outcome

**Data Source:** Registry Data

**Measure Steward:** The Society of Thoracic Surgeons

---

### STANDING COMMITTEE MEETING 02/13/2019

#### 1. Importance to Measure and Report: The measure meets the Importance criteria

(1a. Evidence, 1b. Performance Gap)

1a. Evidence: **Pass-14; No Pass-0**; 1b. Performance Gap: **H-2; M-10; L-2; I-0**

Rationale:

- For the 2014 endorsement evaluation, the developer noted that postoperative renal failure can be reduced through improved recognition and implementation of evidence-based peri-operative interventions and approaches. For the current evaluation, the Committee agreed the evidence has not changed and did not repeat the discussion.
- The developer provided Society of Thoracic Surgeons (STS) data on participant-specific risk adjusted odds ratio (OR) and event rates from July 2015 – June 2016 and July 2016 – June 2017. In July 2015 – June 2016, the OR ranged from 0.71 to 3.53 (median 0.98) and the risk adjusted event rate ranged from 1.55 to 5.80 (median 2.07). From July 2016 – June 2017, the OR ranged from 0.35 to 5.63 (median 0.96) and the risk adjusted event rate ranged from 0.81 to 9.94 (median 2.05).
- The developer provided disparities data by sex, race and ethnicity from July 2015 – June 2016 and July 2016 – June 2017. The median odds ratio was generally lower among females (OR 0.96) than males; higher among black patients (OR 0.99) than in whites and other races. When looking at ethnicity, the median OR for non-Hispanic patients (OR 0.97) was lower than in the Hispanic population.



- Due to the wide variation in performance one of the Committee members was concerned that the measure has not spurred new research in improvements to care to prevent the occurrence of postoperative renal failure in patients undergoing CABG.
- Other Committee members commented that the performance and disparities data provided included a summary of statistics and odds ratios for various years, but the developer did not provide an explanation of the data. The developer explained that the data demonstrates a distribution rather than a statistical comparison of providers. The Committee members concluded the information was unclear and insufficient to determine if there are gaps in care or disparities. These issues apply to all the measures reviewed by the Committee because the data is presented the same way.

---

## **2. Scientific Acceptability of Measure Properties: The measure meets the Scientific Acceptability criteria**

(2a. Reliability - precise specifications, testing; 2b. Validity - testing, threats to validity)

2a. Reliability: **M-14; L-0; I-0**; 2b. Validity: **H-2; M-9; L-3; I-0**

### Rationale:

- Empirical validity testing of patient-level data was presented to demonstrate both reliability and validity. The developer provided agreement rates from a 2014 audit of 108 STS Adult Cardiac Surgery Database (ASCD) participants. The developer assessed percent agreement rates for 72 data elements related to demographics, hospitalization, patient risk factors, and postoperative events. The percent agreement for last creatinine level prior to surgery and renal failure were 91.3 and 98.5, respectively.
- The Committee questioned the measure's validity because of the number of participants that reported a high percentage rate of postoperative renal failure. The Committee asked the developer if the audit process included validating outliers to determine if the data represents their performance accurately. The developer responded that they do an internal process of review but do not have a set criterion for assessing outliers related to renal failure and other outcome rates.
- The discussion from #2561 about the [level of analysis](#), [predicative validity analysis](#), [face validity](#), and [risk-adjustment](#) applies to this measure. The Committee did not raise additional concerns about reliability and validity.

---

## **3. Feasibility: H-6; M-8; L-0; I-0**

(3a. Clinical data generated during care delivery; 3b. Electronic sources; 3c. Susceptibility to inaccuracies/unintended consequences identified 3d. Data collection strategy can be implemented)

### Rationale:

- The discussion about Feasibility for [#2561](#) applies to this measure. The Committee did not raise additional concerns.

---

## **4. Use and Usability: This maintenance measure meets the Use subcriterion**

4a. Use; 4a1. Accountability and transparency; 4a2. Feedback on the measure by those being measured and others; 4b. Usability; 4b1. Improvement; 4b2. The benefits to patients outweigh evidence of unintended negative consequences to patients)

4a. Use: **Pass-14; No Pass-3** 4b. Usability: **H-3; M-14; L-0; I-0**

#### Rationale:

- This measure is a component of the *Absence of Major Morbidity* domain within the composite measure, *0696 STS CABG Composite Score*, that is publicly reported on the STS website. The developer confirmed that the calculated performance score for this measure is not publicly reported.
- The Committee's discussion about the Use criterion from [#0122](#) applies to this measure.
- The Committee re-voted on this criterion at the post-comment web meeting on May 8, 2019, and ultimately, the measure passed this criteria.

---

#### **5. Related and Competing Measures**

- This measure is related to:
  - 0131 Risk-Adjusted Stroke/Cerebrovascular Accident
  - 0115 Risk-Adjusted Surgical Re-exploration
  - 0130 Risk-Adjusted Deep Sternal Wound Infection
  - 0129 Risk-Adjusted Postoperative Prolonged Intubation (Ventilation)
  - 0118 Anti-Lipid Treatment Discharge
  - 0119 Risk-Adjusted Operative Mortality for CABG
  - 0696 CABG Composite Score
- The Committee agreed the related measures add value that outweigh any concern regarding interpretability or burden of data collection.

---

#### **6. Standing Committee Recommendation for Endorsement: Y-15; N-2**

---

#### **7. Public and Member Comment**

Following the Committee's evaluation of the measure, NQF did not receive any additional comments besides the overarching comments submitted by the measure steward. These overarching comments, the Committee and NQF responses are captured below, following the details of the 15 measure evaluations.

---

#### **8. Consensus Standards Approval Committee (CSAC) Vote: Y-14; N-0 (June 5, 2019: Approved for endorsement)**

- CSAC upheld the Committee's decision to recommend the measure for endorsement.

---

#### **9. Appeals**

No appeals were received.

---

## 0122 Risk-Adjusted Operative Mortality for Mitral Valve (MV) Replacement + CABG Surgery

[Submission](#) | [Specifications](#)

**Description:** Percent of patients aged 18 years and older undergoing combined MV Replacement and CABG who die, including both 1) all deaths occurring during the hospitalization in which the procedure was performed, even if after 30 days, and 2) those deaths occurring after discharge from the hospital, but within 30 days of the procedure

**Numerator Statement:** Number of patients aged 18 years and older undergoing combined MV Replacement and CABG who die, including both 1) all deaths occurring during the hospitalization in which the operation was performed, even if after 30 days, and 2) those deaths occurring after discharge from the hospital, but within 30 days of the procedure

**Denominator Statement:** All patients undergoing combined MV Replacement + CABG

**Exclusions:** N/A

**Adjustment/Stratification:** Statistical risk model

Rate/proportion

better quality = lower score

Please refer to numerator and denominator sections for detailed information.

**Level of Analysis:** Facility, Clinician : Group/Practice

**Setting of Care:** Inpatient/Hospital

**Type of Measure:** Outcome

**Data Source:** Registry Data

**Measure Steward:** The Society of Thoracic Surgeons

---

### STANDING COMMITTEE MEETING 02/13/2019

#### 1. Importance to Measure and Report: The measure meets the Importance criteria

(1a. Evidence, 1b. Performance Gap)

1a. Evidence: **H-14; M-0; L-0; I-0**; 1b. Performance Gap: **H-11; M-4; L-0; I-0**

#### Rationale:

- For the 2014 endorsement evaluation, the developer noted patients undergoing combined CABG and MV replacement have one of the highest mortality rates of all surgical procedures and evaluation of operative mortality allows risk evaluation and the ability to minimize risk. For the current evaluation, the Committee agreed the evidence has not changed and did not repeat the discussion.
- The developer provided Society of Thoracic Surgeons (STS) data on participant-specific risk adjusted odds ratio (OR) and event rates from July 2011 – June 2014 and July 2014 – June 2017. The OR ranged from 0.98 to 1.5 (median 0.98) and the risk adjusted event rate ranged from 8.48 to 13.25 (median 9.15) from July 2011 – June 2014. From July 2014 – June 2017 the OR ranged from 0.85 to 2.14 (median 0.98) and the risk adjusted event rate ranged from 8.19 to 18.0 (median 9.18).
- The developer provided disparities data by sex and age in July 2011 – June 2014 and July 2014 – June 2017. The median odds ratio was the generally higher among males (0.99). The median OR among age groups was generally higher for patients >75. The risk adjusted odds ratios between

race groups were estimated from a model with race and other covariates from the 2008 validated valve risk models. The risk adjusted OR for black versus white patients was 0.82 (0.61-1.09). The risk adjusted OR for Asian versus white patients was 1.19 (0.79-1.79).

- A member of the Committee noted the importance to measure and report this measure is limited because CABG + MV replacement is a relatively rare surgical procedure. The Committee member also noted that small case volume decreases variation making it difficult to detect real differences in performance among providers. Overall, the Committee agreed the data presented demonstrated a gap in performance and disparities related to sex, age, and race.

---

## **2. Scientific Acceptability of Measure Properties: The measure meets the Scientific Acceptability criteria**

(2a. Reliability - precise specifications, testing; 2b. Validity - testing, threats to validity)

2a. Reliability: **M-15; L-0; I-0**; 2b. Validity: **H-2; M-13; L-0; I-0**

### Rationale:

- Empirical validity testing of patient-level data was presented to demonstrate both reliability and validity. The developer provided agreement rates from a 2014 audit of 108 STS Adult Cardiac Surgery Database (ASCD) participants. The developer assessed percent agreement rates for 74 data elements related to demographics, hospitalization, patient risk factors, coronary bypass, valve surgery, and mortality. The percent agreement for mortality, discharge status, status at 30 day after surgery and operative death were 99.4, 99.4, 100.0, 94.2, and 97.4, respectively.
- The discussion from #2561 about the [level of analysis](#), [predicative validity analysis](#), and [face validity](#), applies to this measure. A member of the Committee commented that small numbers limit validity of the measure; otherwise, the Committee did not raise additional concerns about reliability and validity.

---

## **3. Feasibility: H-4; M-11; L-0; I-0**

(3a. Clinical data generated during care delivery; 3b. Electronic sources; 3c. Susceptibility to inaccuracies/unintended consequences identified 3d. Data collection strategy can be implemented)

### Rationale:

- The discussion about Feasibility for [#2561](#) applies to this measure. The Committee did not raise additional concerns.

---

## **4. Use and Usability: This maintenance measure meets the Use subcriterion**

4a. Use; 4a1. Accountability and transparency; 4a2. Feedback on the measure by those being measured and others; 4b. Usability; 4b1. Improvement; 4b2. The benefits to patients outweigh evidence of unintended negative consequences to patients)

4a. Use: **Pass-11; No Pass-3** 4b. Usability: **H-3; M-11; L-0; I-0**

### Rationale:

- A Committee member commented that physician groups or hospitals may become increasingly risk adverse, especially if they do not have a 'good' star rating – this may lead to facilities turning patients away for surgery. On the other hand, the pressure for regionalization to higher performing centers and the value of measuring mortality for these procedures, likely outweighs the risk of any unintended consequences.

- This measure is a component of the *Absence of Operative Mortality* domain within the composite measure, *3032 Mitral Valve Repair/Replacement (MVRR) + CABG Composite*, scheduled to be publicly reported on the STS website beginning January 2019. The developer confirmed that the calculated performance score for this measure is not publicly reported though the measure was initially endorsed in 2007.
- The Committee had a lengthy discussion about NQF's must-pass Use criterion for maintenance measures and defining public reporting and transparency. The discussion included whether individual measures that are components of publicly reported composite measures, though the calculated performance scores are not independently publicly reported, meet the Use criterion.
- The Committee re-voted on this criterion at the post-comment web meeting on May 8, 2019, and ultimately, the measure passed this criteria.

---

## 5. Related and Competing Measures

- This measure is related to:
  - 0119 Risk-Adjusted Operative Mortality for CABG
  - 0120 Risk-Adjusted Operative Mortality for Aortic Valve Replacement (AVR)
  - 0121 Risk-Adjusted Operative Mortality for Mitral Valve (MV) Replacement
  - 0123 Risk-Adjusted Operative Mortality for Aortic Valve Replacement (AVR) + CABG Surgery
  - 1501 Risk-Adjusted Operative Mortality for Mitral Valve (MV) Repair
  - 1502 Risk-Adjusted Operative Mortality for Mitral Valve (MV) Repair + CABG Surgery
  - 3032 Mitral Valve Repair/Replacement (MVRR) + CABG Composite
- The Committee agreed the related measures add value that outweigh any concern regarding interpretability or burden of data collection.

---

## 6. Standing Committee Recommendation for Endorsement: Y-11; N-3

---

## 7. Public and Member Comment

Following the Committee's evaluation of the measure, NQF did not receive any additional comments besides the overarching comments submitted by the measure steward. These overarching comments, the Committee and NQF responses are captured below, following the details of the 15 measure evaluations.

---

## 8. Consensus Standards Approval Committee (CSAC) Vote: Y-14; N-0 (June 5, 2019: Approved for endorsement)

- CSAC upheld the Committee's decision to recommend the measure for endorsement.

---

## 9. Appeals

No appeals were received.

---

## 0118 Anti-Lipid Treatment Discharge

[Submission](#) | [Specifications](#)

**Description:** Percent of patients aged 18 years and older undergoing isolated CABG who were discharged on a lipid lowering statin

**Numerator Statement:** Number of patients undergoing isolated CABG who were discharged on a lipid lowering statin

**Denominator Statement:** All patients undergoing isolated CABG

**Exclusions:** Cases are removed from the denominator if there was an in-hospital mortality or if discharge anti-lipid treatment was contraindicated.

**Adjustment/Stratification:** No risk adjustment or risk stratification

Rate/proportion

better quality = higher score

Please refer to numerator and denominator sections for detailed information.

**Level of Analysis:** Facility, Clinician : Group/Practice

**Setting of Care:** Inpatient/Hospital

**Type of Measure:** Process

**Data Source:** Registry Data

**Measure Steward:** The Society of Thoracic Surgeons

---

### STANDING COMMITTEE MEETING 02/13/2019

#### 1. Importance to Measure and Report: The measure meets the Importance criteria

(1a. Evidence, 1b. Performance Gap)

1a. Evidence: **H-0; M-14; L-0; I-0**; 1b. Performance Gap: **H-0; M-12; L-2; I-0**

#### Rationale:

- For the 2014 endorsement evaluation, the developer provided the 2013 ACC/AHA clinical practice guideline that recommended as secondary prevention (including for coronary revascularization), high-intensity statin therapy be initiated or continued as first-line therapy in women and men <75 years of age who have clinical atherosclerotic cardiovascular disease, unless contraindicated (Class 1 Recommendation; Level of Evidence: A). For the current evaluation, the Committee agreed the evidence basis for the measure has not changed and did not repeat the discussion.
- To demonstrate a performance gap, the developer presented data on participant-specific observed rates for the periods July 2016 – June 2017 and July 2015 – June 2016. The median value for 1,071 participants and 149,649 operations (July 2015 – 2016) was 0.99; for 1,059 participants and 148,858 operations (July 2016 – June 2017) it was 0.99. Patient specific observed rates ranged from 0.93 to 1.00 and 0.94 to 1.00 for the first and second time periods, respectively.
- The developer provided disparities data by sex, race and ethnicity in July 2015 – June 2016 and July 2016 – June 2017. The median odds ratio was generally lower among males (OR 0.99) than females (OR 1.0). The median OR was generally lower among patients age <75 (OR 0.99) than patients >75 (OR 1.0). The median OR was generally higher among black and other race patients

(OR 1.0) than in whites (OR 0.99). When looking at ethnicity, the median OR for non-Hispanic patients (OR 0.99) was lower than in the Hispanic population (1.0).

- The Committee noted that the measure was nearly topped out with performance rates at 99.0. Additionally, the data provided by sex, race, and ethnicity showed little, if any, disparities. Due to the strong direct evidence of a link to a desired health outcome, the Committee considered assigning this measure inactive endorsement with reserve status. The measure did not meet the criteria for inactive endorsement with reserve status because reliability and validity has not been demonstrated for the measure score. The Committee then determined that providers with performance scores in the low 90.0 range adequately demonstrated a performance gap.

---

## **2. Scientific Acceptability of Measure Properties: The measure meets the Scientific Acceptability criteria**

(2a. Reliability - precise specifications, testing; 2b. Validity - testing, threats to validity)

2a. Reliability: **M-13; L-1; I-0**; 2b. Validity: **H-0; M-14; L-0; I-0**

### Rationale:

- Empirical validity testing of patient-level data was presented to demonstrate both reliability and validity. The developer provided agreement rates from a 2014 audit of 108 Society of Thoracic Surgeons (STS) Adult Cardiac Surgery Database (ASCD) participants. Agreement rates ranged from 87.5 to 100.0 with an overall agreement rate of 95.7. The Committee agreed the testing results are acceptable; however, commented that it would be helpful to see an updated analysis from a more recent data set since performance has improved over time.
- The discussion from #2561 about the [level of analysis](#), [predicative validity analysis](#), and [face validity](#) applies to this measure.

---

## **3. Feasibility: H-3; M-11; L-0; I-0**

(3a. Clinical data generated during care delivery; 3b. Electronic sources; 3c. Susceptibility to inaccuracies/unintended consequences identified 3d. Data collection strategy can be implemented)

### Rationale:

- The discussion about Feasibility for [#2561](#) applies to this measure. The Committee did not raise additional concerns.

---

## **4. Use and Usability: This maintenance measure meets the Use subcriterion**

4a. Use; 4a1. Accountability and transparency; 4a2. Feedback on the measure by those being measured and others; 4b. Usability; 4b1. Improvement; 4b2. The benefits to patients outweigh evidence of unintended negative consequences to patients)

4a. Use: **Pass-12; No Pass-5** 4b. Usability: **H-3; M-13; L-1; I-0**

### Rationale:

- This measure is a component of the *Use of All Evidence-Based Perioperative Medications* domain within the composite measure, *0696 STS CABG Composite Score*, that is publicly reported on the STS website. The developer confirmed that the calculated performance score for this measure is not publicly reported.
- Though the individual measure does not meet NQF's must-pass Use criterion, most of the Committee concluded that publicly reporting the measure within a composite is acceptable.

Committee members agreed public reporting is a good concept but should not be required to maintain endorsement. Members of the Committee were also concerned of the potential effect on organizations like STS and other specialty societies if multiple measures were not re-endorsed. Members also expressed concern that not endorsing the measure would cause harm to the public and that there are so few existing meaningful measures and that STS should not be held to a “perfect” standard.

---

## 5. Related and Competing Measures

- This measure is related to:
  - 0114 Risk-Adjusted Postoperative Renal Failure
  - 0115 Risk-Adjusted Surgical Re-exploration
  - 0119 Risk-Adjusted Operative Mortality for CABG
  - 0129 Risk-Adjusted Postoperative Prolonged Intubation (Ventilation)
  - 0130 Risk-Adjusted Deep Sternal Wound Infection
  - 0131 Risk-Adjusted Stroke/Cerebrovascular Accident
  - 0696 CABG Composite Score
- The Committee agreed the related measures add value that outweigh any concern regarding interpretability or burden of data collection.

---

## 6. Standing Committee Recommendation for Endorsement: Y-14; N-3

### Rationale

---

## 7. Public and Member Comment

Following the Committee’s evaluation of the measure, NQF did not receive any additional comments besides the overarching comments submitted by the measure steward. These overarching comments, the Committee and NQF responses are captured below, following the details of the 15 measure evaluations.

---

## 8. Consensus Standards Approval Committee (CSAC) Vote: Y-14; N-0 (June 5, 2019: Approved for endorsement)

- CSAC upheld the Committee’s decision to recommend the measure for endorsement.

---

## 9. Appeals

No appeals were received.



---

## 0115 Risk-Adjusted Surgical Re-exploration

[Submission](#) | [Specifications](#)

**Description:** Percent of patients aged 18 years and older undergoing isolated CABG who require a re-intervention during the current hospitalization for mediastinal bleeding with or without tamponade, graft occlusion, valve dysfunction, or other cardiac reason

**Numerator Statement:** Number of patients undergoing isolated CABG who require a re-intervention during the current hospitalization for mediastinal bleeding with or without tamponade, graft occlusion, valve dysfunction, or other cardiac reason

**Denominator Statement:** All patients undergoing isolated CABG

**Exclusions:** N/A

**Adjustment/Stratification:** Statistical risk model

Rate/proportion

better quality = lower score

Please refer to numerator and denominator sections for detailed information.

**Level of Analysis:** Facility, Clinician : Group/Practice

**Setting of Care:** Inpatient/Hospital

**Type of Measure:** Outcome

**Data Source:** Registry Data

**Measure Steward:** The Society of Thoracic Surgeons

---

### STANDING COMMITTEE MEETING 02/13/2019

#### 1. Importance to Measure and Report: The measure meets the Importance criteria

(1a. Evidence, 1b. Performance Gap)

1a. Evidence: **Pass-14; No Pass-3**; 1b. Performance Gap: **H-1; M-12; L-3 I-1**

#### Rationale:

- For the 2014 endorsement evaluation, the relationship between the outcome to at least one healthcare structure or process included measures such as withholding antiplatelet drugs preoperatively, the use of intraoperative checklists along with meticulous surgical technique to substantially reduce the rate of re-exploration for bleeding.
- For the current evaluation, the developer attested that there have been no changes in the evidence since the measure was last evaluated; however, the Committee noted that there are new publications looking at sources of bleeding and use of an intraoperative checklist to decrease postoperative bleeding after CABG.
- The developer provided July 2015 – June 2016 and July 2016 – June 2017 performance data on the measure using the STS database. The odds ratio (OR) ranged from 0.5 to 3.88 (median OR 0.99) from July 2015 – June 2016 and 0.52 to 4.25 (median OR 0.98) from July 2016 – June 2017.
- The developer presented disparities data by sex, race and ethnicity in July 2015 – June 2016 and July 2016 – June 2017. The median odds ratio and risk adjusted event rates varied among males and females and generally higher in patients  $\geq 75$ .
- Some Committee members were concerned that the information was difficult to interpret and determine if there was room for improvement. Other members of the Committee noted that

the measure was close to topped out, although the percentile data demonstrated some opportunity for improvement. Other members noted a moderate gap in performance, however, the data did not demonstrate a disparity in care.

---

## **2. Scientific Acceptability of Measure Properties: The measure meets the Scientific Acceptability criteria**

(2a. Reliability - precise specifications, testing; 2b. Validity - testing, threats to validity)

2a. Reliability: **M-15; L-1; I-1**; 2b. Validity: **H-2; M-13; L-2; I-0**

### **Rationale:**

- Empirical validity testing of patient-level data was presented to demonstrate both reliability and validity. The developer provided agreement rates from a 2014 audit of 108 STS Adult Cardiac Surgery Database (ASCD) participants. Agreement rates ranged from 84.9 to 100.0 with an overall agreement rate of 95.7.
- The discussion from #2561 about the [level of analysis](#), [predicative validity analysis](#), [face validity](#), and [risk-adjustment](#) applies to this measure. The Committee did not raise additional concerns about reliability and validity.

---

## **3. Feasibility: H-3; M-12; L-2; I-0**

(3a. Clinical data generated during care delivery; 3b. Electronic sources; 3c. Susceptibility to inaccuracies/unintended consequences identified 3d. Data collection strategy can be implemented)

### **Rationale:**

- The discussion about Feasibility for [#2561](#) applies to this measure. The Committee did not raise additional concerns.

---

## **4. Use and Usability: This maintenance measure meets the Use subcriterion**

4a. Use; 4a1. Accountability and transparency; 4a2. Feedback on the measure by those being measured and others; 4b. Usability; 4b1. Improvement; 4b2. The benefits to patients outweigh evidence of unintended negative consequences to patients)

4a. Use: **Pass-11; No Pass-6** 4b. Usability: **H-2; M-13; L-2; I-0**

### **Rationale:**

- This measure is a component of the *Absence of Major Morbidity* domain within the composite measure, *0696 STS CABG Composite Score*, that is publicly reported on the STS website. The developer confirmed that the calculated performance score for this measure is not publicly reported.
- The discussion about Use for [#0118](#) applies to this measure. The Committee did not raise additional concerns.

---

## **5. Related and Competing Measures**

- This measure is related to:
  - 0114 Risk-Adjusted Postoperative Renal Failure
  - 0115 Risk-Adjusted Surgical Re-exploration
  - 0118 Anti-Lipid Treatment Discharge

- 0129 Risk-Adjusted Postoperative Prolonged Intubation (Ventilation)
    - 0130 Risk-Adjusted Deep Sternal Wound Infection
    - 0131 Risk-Adjusted Stroke/Cerebrovascular Accident
    - 0696 CABG Composite Score
  - The Committee agreed the related measures add value that outweigh any concern regarding interpretability or burden of data collection.
- 

## **6. Standing Committee Recommendation for Endorsement: Y-13; N-4**

### Rationale

---

## **7. Public and Member Comment**

Following the Committee's evaluation of the measure, NQF did not receive any additional comments besides the overarching comments submitted by the measure steward. These overarching comments, the Committee and NQF responses are captured below, following the details of the 15 measure evaluations.

---

## **8. Consensus Standards Approval Committee (CSAC) Vote: Y-14; N-0 (June 5, 2019: Approved for endorsement)**

- CSAC upheld the Committee's decision to recommend the measure for endorsement,
- 

## **9. Appeals**

No appeals were received.

---

## 0119 Risk-Adjusted Operative Mortality for CABG

[Submission](#) | [Specifications](#)

**Description:** Percent of patients aged 18 years and older undergoing isolated CABG who die, including both 1) all deaths occurring during the hospitalization in which the CABG was performed, even if after 30 days, and 2) those deaths occurring after discharge from the hospital, but within 30 days of the procedure

**Numerator Statement:** Number of patients undergoing isolated CABG who die, including both 1) all deaths occurring during the hospitalization in which the operation was performed, even if after 30 days, and 2) those deaths occurring after discharge from the hospital, but within 30 days of the procedure

**Denominator Statement:** All patients undergoing isolated CABG

**Exclusions:** N/A

**Adjustment/Stratification:** Statistical risk model

Rate/proportion

better quality = lower score

Please refer to numerator and denominator sections for detailed information.

**Level of Analysis:** Facility, Clinician : Group/Practice

**Setting of Care:** Inpatient/Hospital

**Type of Measure:** Outcome

**Data Source:** Registry Data

**Measure Steward:** The Society of Thoracic Surgeons

---

### STANDING COMMITTEE MEETING 02/13/2019

#### 1. Importance to Measure and Report: The measure meets the Importance criteria

(1a. Evidence, 1b. Performance Gap)

1a. Evidence: **Pass-16; No Pass-1**; 1b. Performance Gap: **H-1; M-14; L-1 I-1**

Rationale:

- For the 2014 endorsement evaluation, the Committee agreed that there is a strong rationale and evidence base indicating that mortality rates for patients undergoing CABG surgery can be affected through a variety of well-established healthcare interventions and approaches. For the current evaluation, the Committee agreed the evidence has not changed and did not repeat the discussion.
- The developer provided July 2015 – June 2016 and July 2016 – June 2017 performance data on the measure using the STS database. From July 2015 – June 2016 the odds ratio (OR) ranged from 0.46 to 2.85 (median 0.98) and the risk adjusted event rate ranged from 1.10 to 5.54 (median 2.14). The OR ranged from 0.44 to 2.84 (median 0.97) in July 2016-June 2017 and the risk adjusted event rate ranged from 0.67 to 6.11 (median 2.21) in the same period. The developer presented disparities data by sex, race and ethnicity from July 2015-June 2016 and July 2016-June 2017. The median odds ratio was generally lower for males and among whites.
- Committee members noted though the performance gap has narrowed over time and there is no evidence of a gap related to disparities, this outcome is so important that continued endorsement is advisable. Others stated that it is still important to monitor given the frequency

of this procedure, seriousness of the outcome, and the persistent variation in performance for an elective procedure. On the contrary, other Committee members concluded that the information was difficult to interpret and performance from two time points made it difficult to determine trends in performance.

---

## **2. Scientific Acceptability of Measure Properties: The measure meets the Scientific Acceptability criteria**

(2a. Reliability - precise specifications, testing; 2b. Validity - testing, threats to validity)

2a. Reliability: **M-16; L-1; I-0**; 2b. Validity: **H-3; M-14; L-0; I-0**

### **Rationale:**

- Empirical validity testing of patient-level data was presented to demonstrate both reliability and validity. The developer provided agreement rates from a 2013 audit of 86 STS Adult Cardiac Surgery Database (ASCD) participants. The developer assessed percent agreement rates for 72 data elements related to demographics, hospitalization, patient risk factors, and mortality. The percent agreement for mortality, discharge status, status at 30 day after surgery, and operative death was 99.7, 100.0, 96.9, and 96.9, respectively.
- Some of the Committee's concerns included the registry's ability to accurately capture deaths that occur after discharge from the hospital without validating the data with a source like the National Death Index (NDI). There were also concerns that clinicians can potentially game the measure by omitting the amount of information they report due to the imputation strategy the developer uses for missing data.
- The discussion from #2561 about the [level of analysis](#), [predicative validity analysis](#), and [face validity](#) applies to this measure. The Committee did not raise additional concerns about reliability and validity.

---

## **3. Feasibility: **H-7; M-10; L-0; I-0****

(3a. Clinical data generated during care delivery; 3b. Electronic sources; 3c. Susceptibility to inaccuracies/unintended consequences identified 3d. Data collection strategy can be implemented)

### **Rationale:**

- The discussion about Feasibility for [#2561](#) applies to this measure. The Committee did not raise additional concerns.

---

## **4. Use and Usability: This maintenance measure meets the Use subcriterion**

4a. Use; 4a1. Accountability and transparency; 4a2. Feedback on the measure by those being measured and others; 4b. Usability; 4b1. Improvement; 4b2. The benefits to patients outweigh evidence of unintended negative consequences to patients)

4a. Use: **Pass-15; No Pass-24b. Usability: H-5; M-12; L-0; I-0**

### **Rationale:**

- This measure is a component of the *Absence of Operative Mortality* domain within the composite measure, *0696 STS CABG Composite Score*, that is publicly reported on the STS website. The developer confirmed that the calculated performance score for this measure is not publicly reported.

- The discussion about Use and Usability for [#0118](#) applies to this measure. The Committee did not raise additional concerns.

---

## 5. Related and Competing Measures

- This measure is related to:
  - 0114 Risk-Adjusted Postoperative Renal Failure
  - 0115 Risk-Adjusted Surgical Re-exploration
  - 0118 Anti-Lipid Treatment Discharge
  - 0129 Risk-Adjusted Postoperative Prolonged Intubation (Ventilation)
  - 0130 Risk-Adjusted Deep Sternal Wound Infection
  - 0131 Risk-Adjusted Stroke/Cerebrovascular Accident
  - 0696 CABG Composite Score
- The Committee agreed the related measures add value that outweigh any concern regarding interpretability or burden of data collection.

---

## 6. Standing Committee Recommendation for Endorsement: Y-15; N-2

### Rationale

---

## 7. Public and Member Comment

Following the Committee's evaluation of the measure, NQF did not receive any additional comments besides the overarching comments submitted by the measure steward. These overarching comments, the Committee and NQF responses are captured below, following the details of the 15 measure evaluations.

---

## 8. Consensus Standards Approval Committee (CSAC) Vote: Y-14; N-0 (June 5, 2019: Approved for endorsement)

- CSAC upheld the Committee's decision to recommend the measure for endorsement.

---

## 9. Appeals

No appeals were received.

---

## 0120 Risk-Adjusted Operative Mortality for Aortic Valve Replacement (AVR)

[Submission](#) | [Specifications](#)

**Description:** Percent of patients aged 18 years and older undergoing Aortic Valve Replacement (AVR) who die, including both 1) all deaths occurring during the hospitalization in which the procedure was performed, even if after 30 days, and 2) those deaths occurring after discharge from the hospital, but within 30 days of the procedure

**Numerator Statement:** Number of patients aged 18 years and older undergoing AVR who die, including both 1) all deaths occurring during the hospitalization in which the operation was performed, even if after 30 days, and 2) those deaths occurring after discharge from the hospital, but within 30 days of the procedure

**Denominator Statement:** All patients undergoing isolated AVR surgery

**Exclusions:** N/A

**Adjustment/Stratification:** Statistical risk model

Rate/proportion

better quality = lower score

Please refer to numerator and denominator sections for detailed information.

**Level of Analysis:** Facility, Clinician : Group/Practice

**Setting of Care:** Inpatient/Hospital

**Type of Measure:** Outcome

**Data Source:** Registry Data

**Measure Steward:** The Society of Thoracic Surgeons

---

### STANDING COMMITTEE MEETING 02/13/2019

#### 1. Importance to Measure and Report: The measure meets the Importance criteria

(1a. Evidence, 1b. Performance Gap)

1a. Evidence: **Pass-17; No Pass-0**; 1b. Performance Gap: **H-1; M-15; L-0 I-1**

#### Rationale:

- For the 2014 endorsement evaluation, the Committee agreed that evaluating operative mortality related to the risk of AVR surgery and identifying various patient characteristics can minimize that risk. For the current evaluation, the Committee agreed the evidence has not changed and did not repeat the discussion. However, one of the Committee members questioned how the data has been used to systematically improve outcomes.
- The developer provided July 2014 – June 2017 and July 2016 – June 2017 performance data on the measure using the STS database. From July 2014 – June 2017 the odds ratio (OR) ranged from 0.73 to 4.79 (median 0.98) and the risk adjusted event rate ranged from 1.83 to 9.98 (median 2.41). The OR ranged from 0.88 to 3.11 (median 0.99) in July 2016 – June 2017 and the risk adjusted event rate ranged from 1.78 to 5.81 (median 2.17) in the same period.
- The developer provided disparities data by sex and age from July 2011 – June 2014 and July 2014 – June 2017. The median odds ratio was the same among males and females (OR 0.97). The median OR among age groups was the same (0.97 and 0.98, for the first and second time periods). The risk adjusted odds ratios between race groups were estimated from a model with

race and other covariates from the 2008 validated valve risk models. The risk adjusted OR for black versus white patients was 1.04 (0.85-1.26). The risk adjusted OR for Asian versus white patients was 1.05 (0.73-1.50).

- The Committee agreed variability exists in the risk-adjusted outcome from the most recent year of data though there were no significant differences in the disparities data provided.

---

## **2. Scientific Acceptability of Measure Properties: The measure meets the Scientific Acceptability criteria**

(2a. Reliability - precise specifications, testing; 2b. Validity - testing, threats to validity)

2a. Reliability: **M-17; L-0; I-0**; 2b. Validity: **H-5; M-12; L-0; I-0**

### **Rationale:**

- A Committee member asked if deaths occurring 30-days post discharge from the hospital should be included in the specifications because this measure is like other mortality measures.
- Empirical validity testing of patient-level data was presented to demonstrate both reliability and validity. The developer provided agreement rates from a 2013 audit of 86 STS Adult Cardiac Surgery Database (ASCD) participants. Agreement rates ranged from 87.5 to 100.0 with an overall agreement rate of 95.7. Critical data elements and agreement rates relevant to risk-adjusted surgical re-exploration were also included.
- One of the Committee members had some concerns about the reliability of the measure because it was not tested at the facility level. They also noted that much of the data is abstracted by humans and no evidence of inter-rater reliability between practices was provided.
- A Committee member noted that the rate of missing data reported by the developer (approximately 32.0 of cases) was a threat to validity.
- The discussion from #2561 about the [level of analysis](#), [predicative validity analysis](#), and [face validity](#) applies to this measure. The Committee did not raise additional concerns about reliability and validity.

---

## **3. Feasibility: H-4; M-13; L-0; I-0**

(3a. Clinical data generated during care delivery; 3b. Electronic sources; 3c. Susceptibility to inaccuracies/unintended consequences identified 3d. Data collection strategy can be implemented)

### **Rationale:**

- The discussion about Feasibility for [#2561](#) applies to this measure. One of the Committee members recommended that STS move towards eQMs because although the data is routinely collected it is often retrieved by abstractors rather than electronically. The Committee did not raise additional concerns.

---

## **4. Use and Usability: This maintenance measure meets the Use subcriterion**

4a. Use; 4a1. Accountability and transparency; 4a2. Feedback on the measure by those being measured and others; 4b. Usability; 4b1. Improvement; 4b2. The benefits to patients outweigh evidence of unintended negative consequences to patients)

4a. Use: **Pass-15; No Pass-2** 4b. Usability: **H-3; M-14; L-0; I-0**

### **Rationale:**



- This measure is a component of the *Absence of Major Morbidity* domain within composite measure, *2561 STS Aortic Valve Replacement (AVR) Composite Score*, that is publicly reported on the STS website. The developer confirmed that the calculated performance score for this measure is not publicly reported.
- The discussion about Use for [#0118](#) applies to this measure. The Committee did not raise additional concerns.

---

## 5. Related and Competing Measures

- This measure is related to:
  - 0120 Risk-Adjusted Operative Mortality for Aortic Valve Replacement (AVR)
  - 0123 Risk-Adjusted Operative Mortality for Aortic Valve Replacement (AVR) + CABG
  - 0121 Risk-Adjusted Operative Mortality for Mitral Valve (MV) Replacement
  - 1501 Risk-Adjusted Operative Mortality for Mitral Valve (MV) Repair
  - 0122 Risk-Adjusted Operative Mortality for Mitral Valve (MV) Replacement + CABG
  - 1502 Risk-Adjusted Operative Mortality for Mitral Valve (MV) Repair + CABG Surgery
  - 0131 Risk-Adjusted Stroke/Cerebrovascular Accident
  - 0115 Risk-Adjusted Surgical Re-exploration
  - 0130 Risk-Adjusted Deep Sternal Wound Infection
  - 0114 Risk-Adjusted Postoperative Renal Failure
  - 0129 Risk-Adjusted Postoperative Prolonged Intubation (Ventilation)
  - 0118 Anti-Lipid Treatment Discharge
  - 0119 Risk-Adjusted Operative Mortality for CABG
  - 0696 CABG Composite Score
- The Committee agreed the related measures add value that outweigh any concern regarding interpretability or burden of data collection.

---

## 6. Standing Committee Recommendation for Endorsement: Y-15; N-2

### Rationale

---

## 7. Public and Member Comment

Following the Committee's evaluation of the measure, NQF did not receive any additional comments besides the overarching comments submitted by the measure steward. These overarching comments, the Committee and NQF responses are captured below, following the details of the 15 measure evaluations.

---

## 8. Consensus Standards Approval Committee (CSAC) Vote: Y-14; N-0 (June 5, 2019: Approved for endorsement)

- CSAC upheld the Committee's decision to recommend the measure for endorsement.

---

## 9. Appeals

No appeals were received.

---

## 0121 Risk-Adjusted Operative Mortality for Mitral Valve (MV) Replacement

[Submission](#) | [Specifications](#)

**Description:** Percent of patients aged 18 years and older undergoing MV Replacement who die, including both 1) all deaths occurring during the hospitalization in which the procedure was performed, even if after 30 days, and 2) those deaths occurring after discharge from the hospital, but within 30 days of the procedure

**Numerator Statement:** Number of patients aged 18 years and older undergoing MV Replacement who die, including both 1) all deaths occurring during the hospitalization in which the operation was performed, even if after 30 days, and 2) those deaths occurring after discharge from the hospital, but within 30 days of the procedure

**Denominator Statement:** All patients undergoing isolated MV replacement surgery

**Exclusions:** N/A

**Adjustment/Stratification:** Statistical risk model

Rate/proportion

better quality = lower score

Please refer to numerator and denominator sections for detailed information.

**Level of Analysis:** Facility, Clinician : Group/Practice

**Setting of Care:** Inpatient/Hospital

**Type of Measure:** Outcome

**Data Source:** Registry Data

**Measure Steward:** The Society of Thoracic Surgeons

---

### STANDING COMMITTEE MEETING 02/13/2019

#### 1. Importance to Measure and Report: The measure meets the Importance criteria

(1a. Evidence, 1b. Performance Gap)

1a. Evidence: **Pass-17; No Pass-0**; 1b. Performance Gap: **H-3; M-14; L-0 I-0**

#### Rationale:

- For the 2014 endorsement evaluation, the Committee agreed that evaluating operative mortality related to the risk of MV replacement surgery and identifying various patient characteristics can minimize that risk. For the current evaluation, the Committee agreed the evidence has not changed and did not repeat the discussion.
- The developer provided July 2011 – June 2014 and July 2014 – June 2017 performance data on the measure using the STS database. From July 2011 – June 2014 the odds ratio (OR) ranged from 0.82 to 2.67 (median 0.98) and the risk adjusted event rate ranged from 4.27 to 11.56 (median 4.99). The OR ranged from 0.80 to 2.54 (median 0.98) in July 2014 – June 2017 and the risk adjusted event rate ranged from 3.99 to 11.11 (median 4.73).in the same period.
- The developer provided disparities data by sex and age from July 2011 – June 2014 and July 2014 – June 2017. The median odds ratio was the same among males and females (OR 0.97). The median OR among age groups was 0.97 for patients <75 compared to 0.97 and 0.98 (for the first and second time periods, respectively) for patients >75. The risk adjusted odds ratios between race groups were estimated from a model with race and other covariates from the

2008 validated Valve risk models. The risk adjusted OR for black versus white patients was 0.77 (0.62-0.95). The risk adjusted OR for Asian versus white patients was 1.17 (0.83-1.66).

---

## **2. Scientific Acceptability of Measure Properties: The measure meets the Scientific Acceptability criteria**

(2a. Reliability - precise specifications, testing; 2b. Validity - testing, threats to validity)

2a. Reliability: **M-17; L-0; I-0**; 2b. Validity: **H-4; M-13; L-0; I-0**

### Rationale:

- Empirical validity testing of patient-level data was presented to demonstrate both reliability and validity. The developer provided agreement rates from a 2013 audit of 86 STS Adult Cardiac Surgery Database (ASCD) participants. Agreement rates ranged from 87.5 to 100.0 with an overall agreement rate of 87.5. Critical data elements and agreement rates relevant to risk-adjusted surgical re-exploration were also included.
- The discussion from #2561 about the [level of analysis](#), [predicative validity analysis](#), and [face validity](#) applies to this measure. The Committee did not raise additional concerns about reliability and validity.

---

## **3. Feasibility: H-5; M-12; L-0; I-0**

(3a. Clinical data generated during care delivery; 3b. Electronic sources; 3c. Susceptibility to inaccuracies/unintended consequences identified 3d. Data collection strategy can be implemented)

### Rationale:

- The discussion about Feasibility for [#2561](#) applies to this measure. The Committee did not raise additional concerns.

---

## **4. Use and Usability: This maintenance measure meets the Use subcriterion**

4a. Use; 4a1. Accountability and transparency; 4a2. Feedback on the measure by those being measured and others; 4b. Usability; 4b1. Improvement; 4b2. The benefits to patients outweigh evidence of unintended negative consequences to patients)

4a. Use: **Pass-14; No Pass-3** 4b. Usability: **H-3; M-14; L-0; I-0**

### Rationale:

- This measure is a component of the *Absence of Major Morbidity* domain within the composite measure, *3031 Mitral Valve Repair/Replacement (MVRR) Composite Score*, scheduled to be publicly reported on the STS website beginning January 2019. The developer confirmed that the calculated performance score for this measure is not publicly reported.
- The discussion about Use for [#0118](#) applies to this measure. The Committee did not raise additional concerns.

---

## **5. Related and Competing Measures**

- This measure is related to:
  - 0120 Risk-Adjusted Operative Mortality for Aortic Valve Replacement (AVR)
  - 0123 Risk-Adjusted Operative Mortality for Aortic Valve Replacement (AVR) + CABG
  - 0122 Risk-Adjusted Operative Mortality for Mitral Valve (MV) Replacement + CABG

- 1502 Risk-Adjusted Operative Mortality for Mitral Valve (MV) Repair + CABG Surgery
  - 1501 Risk-Adjusted Operative Mortality for Mitral Valve (MV) Repair
  - 0121 Risk-Adjusted Operative Mortality for Mitral Valve (MV) Replacement
  - 3031 Mitral Valve Repair/Replacement MVRR Composite
- The Committee agreed the related measures add value that outweigh any concern regarding interpretability or burden of data collection.

---

## **6. Standing Committee Recommendation for Endorsement: Y-15; N-2**

### Rationale

---

## **7. Public and Member Comment**

Following the Committee's evaluation of the measure, NQF did not receive any additional comments besides the overarching comments submitted by the measure steward. These overarching comments, the Committee and NQF responses are captured below, following the details of the 15 measure evaluations.

---

## **8. Consensus Standards Approval Committee (CSAC) Vote: Y-14; N-0 (June 5, 2019: Approved for endorsement)**

- CSAC upheld the Committee's decision to recommend the measure for endorsement.

---

## **9. Appeals**

No appeals were received.

---

## 0123 Risk-Adjusted Operative Mortality for Aortic Valve Replacement (AVR) + CABG Surgery

[Submission](#) | [Specifications](#)

**Description:** Percent of patients aged 18 years and older undergoing combined AVR and CABG who die, including both 1) all deaths occurring during the hospitalization in which the procedure was performed, even if after 30 days, and 2) those deaths occurring after discharge from the hospital, but within 30 days of the procedure

**Numerator Statement:** Number of patients aged 18 years and older undergoing combined AVR and CABG who die, including both 1) all deaths occurring during the hospitalization in which the operation was performed, even if after 30 days, and 2) those deaths occurring after discharge from the hospital, but within 30 days of the procedure.

**Denominator Statement:** All patients undergoing combined AVR + CABG

**Exclusions:** N/A

**Adjustment/Stratification:** Statistical risk model

Rate/proportion

better quality = lower score

Please refer to numerator and denominator sections for detailed information.

**Level of Analysis:** Facility, Clinician : Group/Practice

**Setting of Care:** Inpatient/Hospital

**Type of Measure:** Outcome

**Data Source:** Registry Data

**Measure Steward:** The Society of Thoracic Surgeons

---

### STANDING COMMITTEE MEETING 02/13/2019

#### 1. Importance to Measure and Report: The measure meets the Importance criteria

(1a. Evidence, 1b. Performance Gap)

1a. Evidence: **Pass-17; No Pass-0**; 1b. Performance Gap: **H-1; M-15; L-0 I-1**

#### Rationale:

- For the 2014 endorsement evaluation, the Committee agreed that evaluating operative mortality related to the risk of aortic valve replacement with concomitant coronary artery bypass grafting surgery (AVR + CABG) and identifying various patient characteristics can minimize that risk. For the current evaluation, the Committee agreed the evidence has not changed and did not repeat the discussion.
- The developer provided July 2011 – June 2014 and July 2014 – June 2017 performance data on the measure using the STS database. The OR ranged from 0.79 to 2.25 (median 0.98) from July 2011 – June 2014 and the risk adjusted event rate ranged from 3.24 to 8.51 (median 3.98). From July 2014 – June 2017 the OR ranged from 0.78 to 3.72 (median 0.98) and the risk adjusted event rate ranged from 2.96 to 11.63 (median 3.66).
- The developer provided disparities data by sex and age for July 2011 – June 2014 and July 2014 – June 2017. The median odds ratio was the same among males and females (0.98) for July 2011 – June 2014 and lower for females (0.97) from July 2014 – June 2017. The median OR among age groups was generally higher for patients >75. The risk adjusted odds ratios between race groups

were estimated from a model with race and other covariates from the 2008 validated valve risk models. The risk adjusted OR for black versus white patients was 1.00 (0.85-1.16). The risk adjusted OR for Asian versus white patients was 1.05 (0.82-1.34).

- One of the Committee members noted the importance to measure and report this measure is limited because combined AV replacement + CABG surgery is a relatively rare surgical procedure.

---

## **2. Scientific Acceptability of Measure Properties: The measure meets the Scientific Acceptability criteria**

(2a. Reliability - precise specifications, testing; 2b. Validity - testing, threats to validity)

2a. Reliability: **M-17; L-0; I-0**; 2b. Validity: **H-3; M-14; L-0; I-0**

### Rationale:

- Empirical validity testing of patient-level data was presented to demonstrate both reliability and validity. The developer provided agreement rates from a 2014 audit of 108 STS Adult Cardiac Surgery Database (ASCD) participants. The developer assessed percent agreement rates for 74 data elements related to demographics, hospitalization, patient risk factors, coronary bypass, valve surgery and mortality. The percent agreement for aortic valve procedure performed, mortality, discharge status, status at 30 day after surgery, and operative death was 100.0, 99.4, 100.0, 94.2, and 97.4, respectively.
- Generally, the Committee agreed the testing provided demonstrates the measure's reliability and validity, although a Committee member questioned the validity of the measure due to the small volume of surgical procedures.
- The discussion from #2561 about the [level of analysis](#), [predicative validity analysis](#), and [face validity](#) applies to this measure. The Committee did not raise additional concerns about reliability and validity.

---

## **3. Feasibility: H-4; M-13; L-0; I-0**

(3a. Clinical data generated during care delivery; 3b. Electronic sources; 3c. Susceptibility to inaccuracies/unintended consequences identified 3d. Data collection strategy can be implemented)

### Rationale:

- The discussion about Feasibility for [#2561](#) applies to this measure. The Committee did not raise additional concerns.

---

## **4. Use and Usability: This maintenance measure meets the Use subcriterion**

4a. Use; 4a1. Accountability and transparency; 4a2. Feedback on the measure by those being measured and others; 4b. Usability; 4b1. Improvement; 4b2. The benefits to patients outweigh evidence of unintended negative consequences to patients)

4a. Use: **Pass-15; No Pass-2** 4b. Usability: **H-5; M-12; L-0; I-0**

### Rationale:

- This measure is a component of the *Absence of Major Morbidity* domain within composite measure, *2563 STS Aortic Valve Replacement (AVR) + Coronary Artery Bypass Graft (CABG) Composite Score*, that is publicly reported on the STS website. The developer confirmed that the calculated performance score for this measure is not publicly reported.

- The discussion about Use for [#0118](#) applies to this measure. The Committee did not raise additional concerns.

---

## 5. Related and Competing Measures

- This measure is related to:
  - 0120 Risk-Adjusted Operative Mortality for Aortic Valve Replacement (AVR)
  - 0119 Risk-Adjusted Operative Mortality for CABG
  - 0121 Risk-Adjusted Operative Mortality for Mitral Valve (MV) Replacement
  - 1501 Risk-Adjusted Operative Mortality for Mitral Valve (MV) Repair
  - 0122 Risk-Adjusted Operative Mortality for Mitral Valve (MV) Replacement + CABG
  - 1502 Risk-Adjusted Operative Mortality for Mitral Valve (MV) Repair + CABG Surgery
  - 2563 STS Aortic Valve Replacement (AVR) + CABG Composite Score (STS)
- The Committee agreed the related measures add value that outweigh any concern regarding interpretability or burden of data collection.

---

## 6. Standing Committee Recommendation for Endorsement: Y-15; N-2

### Rationale

---

## 7. Public and Member Comment

Following the Committee's evaluation of the measure, NQF did not receive any additional comments besides the overarching comments submitted by the measure steward. These overarching comments, the Committee and NQF responses are captured below, following the details of the 15 measure evaluations.

---

## 8. Consensus Standards Approval Committee (CSAC) Vote: Y-14; N-0 (June 5, 2019: Approved for endorsement)

- CSAC upheld the Committee's decision to recommend the measure for endorsement.

---

## 9. Appeals

No appeals were received.

---

## 0129 Risk-Adjusted Postoperative Prolonged Intubation (Ventilation)

[Submission](#) | [Specifications](#)

**Description:** Percent of patients aged 18 years and older undergoing isolated CABG who require intubation for more than 24 hours postoperatively

**Numerator Statement:** Number of patients undergoing isolated CABG who require intubation > 24 hours following exit from the operating room

**Denominator Statement:** All patients undergoing isolated CABG

**Exclusions:** N/A

**Adjustment/Stratification:** Statistical risk model

Rate/proportion

better quality = lower score

Please refer to numerator and denominator sections for detailed information.

**Level of Analysis:** Facility, Clinician : Group/Practice

**Setting of Care:** Inpatient/Hospital

**Type of Measure:** Outcome

**Data Source:** Registry Data

**Measure Steward:** The Society of Thoracic Surgeons

---

### STANDING COMMITTEE MEETING 02/13/2019

#### 1. Importance to Measure and Report: The measure meets the Importance criteria

(1a. Evidence, 1b. Performance Gap)

1a. Evidence: **Pass-16; No Pass-1**; 1b. Performance Gap: **H-1; M-14; L-1 I-1**

#### Rationale:

- For the 2014 endorsement evaluation, the Committee agreed several modalities exist to decrease the rate of prolonged intubation. For the current evaluation, the Committee agreed the evidence has not changed and did not repeat the discussion.
- The developer provided July 2015 – June 2016 and July 2016 – June 2017 performance data on the measure using the STS database. The OR ranged from 0.25 to 5.47 (median 0.97) from July 2015 – June 2016 and the risk adjusted event rate ranged from 2.53 to 24.68 (median 7.87). From July 2016 – June 2017 the OR ranged from 0.27 to 3.81 (median 0.99) and the risk adjusted event rate ranged from 2.62 to 22.78 (median 7.66).
- Disparities data by sex, race, and ethnicity from July 2016 – June 2017 showed the mean OR favors females (1.06 vs 1.10); mean OR is lower for blacks (1.02) than for whites (1.11) and those of other races (1.03); and the mean OR is lower for Hispanics (1.01) than for non-Hispanics (1.11).
- The Committee noted the data provided demonstrated some improvement in odds ratio and risk adjusted rates, but a performance gap and disparities are still present.



---

## 2. Scientific Acceptability of Measure Properties: The measure meets the Scientific Acceptability criteria

(2a. Reliability - precise specifications, testing; 2b. Validity - testing, threats to validity)

2a. Reliability: **M-15; L-2; I-0**; 2b. Validity: **H-2; M-13; L-2; I-0**

### Rationale:

- Empirical validity testing of patient-level data was presented to demonstrate both reliability and validity. The developer provided agreement rates from a 2013 audit of 86 STS Adult Cardiac Surgery Database (ASCD) participants. The developer assessed percent agreement rates for 72 data elements related to demographics, hospitalization, patient risk factors, and post-operative events. The percent agreement for additional hours ventilated was 86.11.
- The discussion from #2561 about the [level of analysis](#), [predicative validity analysis](#), [face validity](#), and [risk-adjustment](#) applies to this measure. The Committee did not raise additional concerns about reliability and validity.

---

## 3. Feasibility: **H-3; M-12; L-2; I-0**

(3a. Clinical data generated during care delivery; 3b. Electronic sources; 3c. Susceptibility to inaccuracies/unintended consequences identified 3d. Data collection strategy can be implemented)

### Rationale:

- The discussion about Feasibility for [#2561](#) applies to this measure. The Committee did not raise additional concerns.

---

## 4. Use and Usability: This maintenance measure meets the Use subcriterion

4a. Use; 4a1. Accountability and transparency; 4a2. Feedback on the measure by those being measured and others; 4b. Usability; 4b1. Improvement; 4b2. The benefits to patients outweigh evidence of unintended negative consequences to patients)

4a. Use: **Pass-11; No Pass-6** 4b. Usability: **H-2; M-13; L-2; I-0**

### Rationale:

- This measure is a component of the *Absence of Major Morbidity* domain within the composite measure, *0696 STS CABG Composite Score*, that is publicly reported on the STS website. The developer confirmed that the calculated performance score for this measure is not publicly reported.
- The discussion about Use for [#0118](#) applies to this measure. The Committee did not raise additional concerns.

---

## 5. Related and Competing Measures

- This measure is related to:
  - 0114 Risk-Adjusted Postoperative Renal Failure
  - 0115 Risk-Adjusted Surgical Re-exploration
  - 0118 Anti-Lipid Treatment Discharge
  - 0119 Risk-Adjusted Operative Mortality for CABG
  - 0130 Risk-Adjusted Deep Sternal Wound Infection
  - 0131 Risk-Adjusted Stroke/Cerebrovascular Accident

- 0696 CABG Composite Score
  - The Committee agreed the related measures add value that outweigh any concern regarding interpretability or burden of data collection.
- 

## **6. Standing Committee Recommendation for Endorsement: Y-12; N-5**

---

### **7. Public and Member Comment**

Following the Committee’s evaluation of the measure, NQF did not receive any additional comments besides the overarching comments submitted by the measure steward. These overarching comments, the Committee and NQF responses are captured below, following the details of the 15 measure evaluations.

---

### **8. Consensus Standards Approval Committee (CSAC) Vote: Y-14; N-0 (June 5, 2019: Approved for endorsement)**

- CSAC upheld the Committee’s decision to recommend the measure for endorsement.
- 

### **9. Appeals**

No appeals were received.

---

## 0130 Risk-Adjusted Deep Sternal Wound Infection

[Submission](#) | [Specifications](#)

**Description:** Percent of patients aged 18 years and older undergoing isolated CABG for whom mediastinitis or deep sternal wound infection is diagnosed within 30 days postoperatively or at any time during the hospitalization for surgery

**Numerator Statement:** Number of patients aged 18 years and older undergoing isolated CABG for whom mediastinitis or deep sternal wound infection is diagnosed within 30 days postoperatively or at any time during the hospitalization for surgery

**Denominator Statement:** All patients undergoing isolated CABG

**Exclusions:** N/A

**Adjustment/Stratification:** Statistical risk model

Rate/proportion

better quality = lower score

Please refer to numerator and denominator sections for detailed information.

**Level of Analysis:** Facility, Clinician : Group/Practice

**Setting of Care:** Inpatient/Hospital

**Type of Measure:** Outcome

**Data Source:** Registry Data

**Measure Steward:** The Society of Thoracic Surgeons

---

### STANDING COMMITTEE MEETING 02/13/2019

#### 1. Importance to Measure and Report: The measure meets the Importance criteria

(1a. Evidence, 1b. Performance Gap)

1a. Evidence: **Pass-15; No Pass-2**; 1b. Performance Gap: **H-1; M-14; L-1 I-1**

Rationale:

- For the 2014 endorsement evaluation, the developer reported that studies have shown that implementing multidisciplinary team processes in the preoperative, intraoperative, and postoperative phase can eliminate this cardiac surgery complication. For the current evaluation, the Committee agreed the evidence has not changed and did not repeat the discussion.
- The developer provided July 2015 – June 2016 and July 2016 – June 2017 performance data on the measure using the STS database. The mean OR for 1,067 participants and 157,532 operations (July 2015 – June 2016) was 1.16; for 1,050 participants and 155,582 operations (July 2016 – June 2017) it was 1.15. The mean risk adjusted rate was 0.37 and 0.36, respectively. The developer provided disparities data by sex, race and ethnicity in July 2011-June 2014 and July 2014-June 2017. The median odds ratio and risk adjusted event rates were generally lower among males than females.
- One of the Committee members noted there is little variability outside of a few outliers and suggested performance for this measure is topped out.

---

## 2. Scientific Acceptability of Measure Properties: The measure meets the Scientific Acceptability criteria

(2a. Reliability - precise specifications, testing; 2b. Validity - testing, threats to validity)

2a. Reliability: **M-15; L-2; I-0**; 2b. Validity: **H-3; M-13; L-1; I-0**

### Rationale:

- Empirical validity testing of patient-level data was presented to demonstrate both reliability and validity. The developer provided agreement rates from a 2014 audit of 108 STS Adult Cardiac Surgery Database (ASCD) participants. The developer assessed percent agreement rates for 74 data elements related to demographics, hospitalization, patient risk factors, and post-operative events. The percent agreement for deep sternal wound infection was 100.0.
- The discussion from #2561 about the [level of analysis](#), [predicative validity analysis](#), [face validity](#), and [risk-adjustment](#) applies to this measure. The Committee did not raise additional concerns about reliability and validity.

---

## 3. Feasibility: **H-3; M-13; L-1; I-0**

(3a. Clinical data generated during care delivery; 3b. Electronic sources; 3c. Susceptibility to inaccuracies/unintended consequences identified 3d. Data collection strategy can be implemented)

### Rationale:

- The discussion about Feasibility for [#2561](#) applies to this measure. The Committee did not raise additional concerns.

---

## 4. Use and Usability: This maintenance measure meets the Use subcriterion

4a. Use; 4a1. Accountability and transparency; 4a2. Feedback on the measure by those being measured and others; 4b. Usability; 4b1. Improvement; 4b2. The benefits to patients outweigh evidence of unintended negative consequences to patients)

4a. Use: **Pass-12; No Pass-5** 4b. Usability: **H-1; M-15; L-1; I-0**

### Rationale:

- This measure is a component of the *Absence of Major Morbidity* domain within the composite measure, *0696 STS CABG Composite Score*, that is publicly reported on the STS website. The developer confirmed that the calculated performance score for this measure is not publicly reported.
- The discussion about Use for [#0118](#) applies to this measure. The Committee did not raise additional concerns.

---

## 5. Related and Competing Measures

- This measure is related to:
  - 0114 Risk-Adjusted Postoperative Renal Failure
  - 0115 Risk-Adjusted Surgical Re-exploration
  - 0118 Anti-Lipid Treatment Discharge
  - 0119 Risk-Adjusted Operative Mortality for CABG
  - 0129 Risk-Adjusted Postoperative Prolonged Intubation (Ventilation)
  - 0131 Risk-Adjusted Stroke/Cerebrovascular Accident

- 0696 CABG Composite Score
  - The Committee agreed the related measures add value that outweigh any concern regarding interpretability or burden of data collection.
- 

#### **6. Standing Committee Recommendation for Endorsement: Y-13; N-4**

---

#### **7. Public and Member Comment**

Following the Committee's evaluation of the measure, NQF did not receive any additional comments besides the overarching comments submitted by the measure steward. These overarching comments, the Committee and NQF responses are captured below, following the details of the 15 measure evaluations.

---

#### **8. Consensus Standards Approval Committee (CSAC) Vote: Y-14; N-0 (June 5, 2019: Approved for endorsement)**

- CSAC upheld the Committee's decision to recommend the measure for endorsement.
- 

#### **9. Appeals**

No appeals were received.

---

## 0131 Risk-Adjusted Stroke/Cerebrovascular Accident

[Submission](#) | [Specifications](#)

**Description:** Percent of patients aged 18 years and older undergoing isolated CABG who have a postoperative stroke (i.e., any confirmed neurological deficit of abrupt onset caused by a disturbance in blood supply to the brain) that did not resolve within 24 hours

**Numerator Statement:** Number of patients undergoing isolated CABG who have a postoperative stroke (i.e., any confirmed neurological deficit of abrupt onset caused by a disturbance in blood supply to the brain) that did not resolve within 24 hours

**Denominator Statement:** All patients undergoing isolated CABG

**Exclusions:** N/A

**Adjustment/Stratification:** Statistical risk model

Rate/proportion

better quality = lower score

Please refer to numerator and denominator sections for detailed information.

**Level of Analysis:** Facility, Clinician : Group/Practice

**Setting of Care:** Inpatient/Hospital

**Type of Measure:** Outcome

**Data Source:** Registry Data

**Measure Steward:** The Society of Thoracic Surgeons

---

### STANDING COMMITTEE MEETING 02/13/2019

#### 1. Importance to Measure and Report: The measure meets the Importance criteria

(1a. Evidence, 1b. Performance Gap)

1a. Evidence: **Pass-15; No Pass-2**; 1b. Performance Gap: **H-2; M-13; L-1 I-1**

Rationale:

- For the 2014 endorsement evaluation, the developer reported many opportunities exist to decrease stroke rates by increasing implementation of evidence-based strategies. For the current evaluation, one of the Committee members stated that “stroke” should be further defined by the type of stroke. The Committee member recommended the specifications distinguish between ischemic and hemorrhagic stroke the next time the measure is evaluated for maintenance endorsement because evidence-based strategies for the management of strokes varies. Additionally, the Committee questioned if there was evidence supporting the 24-hour timeframe in the numerator.
- The developer provided July 2015 – June 2016 and July 2016 – June 2017 performance data on the measure using the STS database. From July 2015 – June 2016 the OR ranged from 0.69 to 1.83 (median 0.99) and the risk adjusted event rate ranged from 0.92 to 2.37 (median 1.30). The OR ranged from 0.58 to 2.14 (median 0.97) from July 2016 – June 2017 and the risk adjusted event rate ranged from 0.81 to 2.88 (median 1.34).
- The developer presented disparities data by sex, race and ethnicity in July 2015 – June 2016 and July 2016 – June 2017. The mean odds ratio was identical for males and females (OR 1.01); mean OR was lower for blacks and others at 1.00, and 1.02 for whites. The median OR was lowest

among whites (1.24), and at 2.08 for blacks. The mean OR was 1.00 for Hispanics (median 0.99) and 1.02 for non-Hispanics (median 0.97).

- The Committee noted there is little variation in performance; however, some of the disparities data showed there is still some opportunity for improvement.

---

## **2. Scientific Acceptability of Measure Properties: The measure meets the Scientific Acceptability criteria**

(2a. Reliability - precise specifications, testing; 2b. Validity - testing, threats to validity)

2a. Reliability: **M-15; L-2; I-0**; 2b. Validity: **H-4; M-11; L-2; I-0**

### **Rationale:**

- One of the Committee members stated that the specifications are not precise and clearly defined. The Committee member noted the specifications do not define the “postoperative” period for developing a stroke that does not resolve within 24 hours.
- Empirical validity testing of patient-level data was presented to demonstrate both reliability and validity. The developer provided agreement rates from a 2013 audit of 86 STS Adult Cardiac Surgery Database (ASCD) participants. The developer assessed percent agreement rates for 72 data elements related to demographics, hospitalization, patient risk factors, and post-operative events. The percent agreement for postoperative stroke > 24 hours was 99.7.
- Committee members’ concerns about reliability and validity included the lack of inter-rater reliability testing across multiple providers, the last chart review for validity was in 2013, and the developer did not provide enough information on social determinants of health for risk-adjustment.
- The discussion from #2561 about the [level of analysis](#), [predicative validity analysis](#), [face validity](#), and [risk-adjustment](#) applies to this measure. The Committee did not raise additional concerns about reliability and validity.

---

## **3. Feasibility: H-5; M-11; L-1; I-0**

(3a. Clinical data generated during care delivery; 3b. Electronic sources; 3c. Susceptibility to inaccuracies/unintended consequences identified 3d. Data collection strategy can be implemented)

### **Rationale:**

- The discussion about Feasibility for [#2561](#) applies to this measure. The Committee did not raise additional concerns.

---

## **4. Use and Usability: This maintenance measure meets the Use subcriterion**

4a. Use; 4a1. Accountability and transparency; 4a2. Feedback on the measure by those being measured and others; 4b. Usability; 4b1. Improvement; 4b2. The benefits to patients outweigh evidence of unintended negative consequences to patients)

4a. Use: **Pass-11; No Pass-6** 4b. Usability: **H-1; M-14; L-2; I-0**

### **Rationale:**

- This measure is a component of the *Absence of Major Morbidity* domain within the composite measure, *0696 STS CABG Composite Score*, that is publicly reported on the STS website. The developer confirmed that the calculated performance score for this measure is not publicly reported.

- The discussion about Use for [#0118](#) applies to this measure. The Committee did not raise additional concerns.

---

## 5. Related and Competing Measures

- This measure is related to:
  - 0114 Risk-Adjusted Postoperative Renal Failure
  - 0115 Risk-Adjusted Surgical Re-exploration
  - 0118 Anti-Lipid Treatment Discharge
  - 0119 Risk-Adjusted Operative Mortality for CABG
  - 0129 Risk-Adjusted Postoperative Prolonged Intubation (Ventilation)
  - 0130 Risk-Adjusted Deep Sternal Wound Infection
  - 0696 CABG Composite Score
- The Committee agreed the related measures add value that outweigh any concern regarding interpretability or burden of data collection.

---

## 6. Standing Committee Recommendation for Endorsement: Y-12; N-5

---

## 7. Public and Member Comment

Following the Committee's evaluation of the measure, NQF did not receive any additional comments besides the overarching comments submitted by the measure steward. These overarching comments, the Committee and NQF responses are captured below, following the details of the 15 measure evaluations.

---

## 8. Consensus Standards Approval Committee (CSAC) Vote: Y-14; N-0 (June 5, 2019: Approved for endorsement)

- CSAC upheld the Committee's decision to recommend the measure for endorsement.

---

## 9. Appeals

No appeals were received.



---

## 1501 Risk-Adjusted Operative Mortality for Mitral Valve (MV) Repair

[Submission](#) | [Specifications](#)

**Description:** Percent of patients aged 18 years and older undergoing MV Repair who die, including both 1) all deaths occurring during the hospitalization in which the procedure was performed, even if after 30 days, and 2) those deaths occurring after discharge from the hospital, but within 30 days of the procedure

(This measure applies to the procedure of MV repair, regardless of approach)

**Numerator Statement:** Number of patients aged 18 years and older undergoing MV Repair who die, including both 1) all deaths occurring during the hospitalization in which the operation was performed, even if after 30 days, and 2) those deaths occurring after discharge from the hospital, but within 30 days of the procedure

**Denominator Statement:** All patients undergoing isolated MV repair surgery

**Exclusions:** N/A

**Adjustment/Stratification:** Statistical risk model

Rate/proportion

better quality = lower score

Please refer to numerator and denominator sections for detailed information.

**Level of Analysis:** Facility, Clinician : Group/Practice

**Setting of Care:** Inpatient/Hospital

**Type of Measure:** Outcome

**Data Source:** Registry Data

**Measure Steward:** The Society of Thoracic Surgeons

---

### STANDING COMMITTEE MEETING 02/13/2019

#### 1. Importance to Measure and Report: The measure meets the Importance criteria

(1a. Evidence, 1b. Performance Gap)

1a. Evidence: **Pass-17; No Pass-0**; 1b. Performance Gap: **H-2; M-14; L-0 I-1**

#### Rationale:

- For the 2014 endorsement evaluation, the developer reported that decreasing the risk associated with surgical procedures and various patient characteristics leads to decreased operative mortality and increased survival for patients undergoing isolated mitral valve (MV) repair. For the current evaluation, the Committee agreed the evidence has not changed and did not repeat the discussion.
- The developer provided Society of Thoracic Surgeons (STS) data on participant-specific risk adjusted odds ratio (OR) and event rates from July 2011 – June 2014 and July 2014 – June 2017. The mean OR for 986 participants and 25,694 operations (July 2011 – June 2014) was 1.02; for 993 participants and 26,475 operations (July 2014 – June 2017) was 1.08. The mean risk adjusted rate was 1.28 and 1.19, respectively. The developer also provided disparities data by sex, race and ethnicity from July 2011 – June 2014 and July 2014 – June 2017. The median odds ratio and risk adjusted event rates were generally lower among males than females and age <75 vs. age = 75. The Committee did not express any concerns about the performance data.

---

## **2. Scientific Acceptability of Measure Properties: The measure meets the Scientific Acceptability criteria**

(2a. Reliability - precise specifications, testing; 2b. Validity - testing, threats to validity)

2a. Reliability: **M-16; L-1; I-0**; 2b. Validity: **H-3; M-14; L-0; I-0**

### **Rationale:**

- Empirical validity testing of patient-level data was presented to demonstrate both reliability and validity. The developer provided agreement rates from a 2014 audit of 108 STS Adult Cardiac Surgery Database (ASCD) participants. The developer assessed percent agreement rates for 35 data elements related to demographics, hospitalization, patient risk factors, coronary bypass, mitral valve repair and mortality. The percent agreement for mortality, discharge status, status at 30 days after surgery, and operative death were 99.4, 100.0, 94.2, and 97.4, respectively.
- The discussion from #2561 about the [level of analysis](#), [predicative validity analysis](#), and [face validity](#), applies to this measure. The Committee did not raise additional concerns about reliability and validity.

---

## **3. Feasibility: H-4; M-13; L-0; I-0**

(3a. Clinical data generated during care delivery; 3b. Electronic sources; 3c. Susceptibility to inaccuracies/unintended consequences identified 3d. Data collection strategy can be implemented)

### **Rationale:**

- The discussion about Feasibility for [#2561](#) applies to this measure. The Committee did not raise additional concerns.

---

## **4. Use and Usability: This maintenance measure meets the Use subcriterion**

4a. Use; 4a1. Accountability and transparency; 4a2. Feedback on the measure by those being measured and others; 4b. Usability; 4b1. Improvement; 4b2. The benefits to patients outweigh evidence of unintended negative consequences to patients)

4a. Use: **Pass-14; No Pass-3** 4b. Usability: **H-2; M-15; L-0; I-0**

### **Rationale:**

- This measure is a component of the *Absence of Operative Mortality* domain within the composite measure, *3031 Mitral Valve Repair/Replacement (MVRR) Composite Score*, scheduled to be publicly reported on the STS website beginning January 2019. The developer confirmed that the calculated performance score for this measure is not publicly reported.
- The discussion about Use for [#0118](#) applies to this measure. The Committee did not raise additional concerns.

---

## **5. Related and Competing Measures**

- This measure is related to:
  - 0121 Risk-Adjusted Operative Mortality for Mitral Valve (MV) Replacement
  - 0120 Risk-Adjusted Operative Mortality for Aortic Valve Replacement (AVR)
  - 0123 Risk-Adjusted Operative Mortality for Aortic Valve Replacement (AVR) + CABG
  - 0119 Risk-Adjusted Operative Mortality for CABG

- 0122 Risk-Adjusted Operative Mortality for Mitral Valve (MV) Replacement + CABG Surgery
    - 1502 Risk-Adjusted Operative Mortality for Mitral Valve (MV) Repair + CABG Surgery
    - 3031 Mitral Valve Repair/Replacement MVRR Composite
  - The Committee agreed the related measures add value that outweigh any concern regarding interpretability or burden of data collection.
- 

## **6. Standing Committee Recommendation for Endorsement: Y-15; N-2**

---

### **7. Public and Member Comment**

Following the Committee's evaluation of the measure, NQF did not receive any additional comments besides the overarching comments submitted by the measure steward. These overarching comments, the Committee and NQF responses are captured below, following the details of the 15 measure evaluations.

---

### **8. Consensus Standards Approval Committee (CSAC) Vote: Y-14; N-0 (June 5, 2019: Approved for endorsement)**

- CSAC upheld the Committee's decision to recommend the measure for endorsement.
- 

### **9. Appeals**

No appeals were received.

---

## 1502 Risk-Adjusted Operative Mortality for Mitral Valve (MV) Repair + CABG Surgery

[Submission](#) | [Specifications](#)

**Description:** Percent of patients aged 18 years and older undergoing combined MV Repair and CABG who die, including both 1) all deaths occurring during the hospitalization in which the procedure was performed, even if after 30 days, and 2) those deaths occurring after discharge from the hospital, but within 30 days of the procedure

**Numerator Statement:** Number of patients aged 18 years and older undergoing combined MV Repair and CABG who die, including both 1) all deaths occurring during the hospitalization in which the operation was performed, even if after 30 days, and 2) those deaths occurring after discharge from the hospital, but within 30 days of the procedure

**Denominator Statement:** All patients undergoing combined MV Repair + CABG

**Exclusions:** N/A

**Adjustment/Stratification:** Statistical risk model

Rate/proportion

better quality = lower score

Please refer to numerator and denominator sections for detailed information.

**Level of Analysis:** Facility, Clinician : Group/Practice

**Setting of Care:** Inpatient/Hospital

**Type of Measure:** Outcome

**Data Source:** Registry Data

**Measure Steward:** The Society of Thoracic Surgeons

---

### STANDING COMMITTEE MEETING 02/13/2019

#### 1. Importance to Measure and Report: The measure meets the Importance criteria

(1a. Evidence, 1b. Performance Gap)

1a. Evidence: **Pass-17; No Pass-0**; 1b. Performance Gap: **H-1; M-15; L-0 I-1**

#### Rationale:

- For the 2014 evaluation, the developer stated that patients undergoing combined mitral valve (MV) repair and coronary artery bypass grafting (CABG) have one of the highest surgical mortality rates due to the number and severity of co-morbidity risk-factors. Reducing the risk associated with surgical procedures and various patient characteristics leads to decreased operative mortality and increased survival. For the current evaluation, the Committee agreed the evidence has not changed and did not repeat the discussion.
- The developer provided Society of Thoracic Surgeons (STS) data on participant-specific risk adjusted odds ratio (OR) and event rates from July 2011 – June 2014 and July 2014 – June 2017. The mean OR for 983 participants and 13,929 operations (July 2011 – June 2014) was 1.03; for 968 participants and 11,443 operations (July 2014 – June 2017) it was 1.08. The mean risk adjusted rate was 5.07 and 4.71, respectively. The developer also provided disparities data by sex, race and ethnicity from July 2011 – June 2014 and July 2014 – June 2017. The median odds ratio and risk adjusted event rates were generally lower among males than females and age <75 vs. age = 75.

- The Committee agreed the data submitted by the developer demonstrates a quality problem and opportunity for improvement in operative mortality for MV repair and CABG surgery. However, one of the Committee members noted the importance to measure and report this measure is limited because combined MV repair and CABG surgery is a relatively rare surgical procedure. Additionally, identifying outliers among registry participants is difficult due to the small volume of surgical procedures.

---

## **2. Scientific Acceptability of Measure Properties: The measure meets the Scientific Acceptability criteria**

(2a. Reliability - precise specifications, testing; 2b. Validity - testing, threats to validity)

2a. Reliability: **M-17; L-0; I-0**; 2b. Validity: **H-4; M-13; L-0; I-0**

### Rationale:

- Empirical validity testing of patient-level data was presented to demonstrate both reliability and validity. The developer provided agreement rates from a 2014 audit of 108 STS Adult Cardiac Surgery Database (ASCD) participants. The developer assessed percent agreement rates for 35 data elements related to demographics, hospitalization, patient risk factors, coronary bypass, mitral valve repair and mortality. The percent agreement for mitral valve procedure performed, mortality, discharge status, status at 30 days after surgery, and operative death were 99.4, 99.4, 100.0, 94.2, and 97.4, respectively.
- Generally, the Committee agreed the testing provided demonstrates the measure's reliability and validity, although a Committee member questioned the validity of the measure due to the small volume of surgical procedures.
- The discussion from #2561 about the [level of analysis](#), [predicative validity analysis](#), and [face validity](#), applies to this measure. The Committee did not raise additional concerns about reliability and validity.

---

## **3. Feasibility: H-4; M-13; L-0; I-0**

(3a. Clinical data generated during care delivery; 3b. Electronic sources; 3c. Susceptibility to inaccuracies/unintended consequences identified 3d. Data collection strategy can be implemented)

### Rationale:

- The discussion about Feasibility for [#2561](#) applies to this measure. The Committee did not raise additional concerns.

---

## **4. Use and Usability: This maintenance measure meets the Use subcriterion**

4a. Use; 4a1. Accountability and transparency; 4a2. Feedback on the measure by those being measured and others; 4b. Usability; 4b1. Improvement; 4b2. The benefits to patients outweigh evidence of unintended negative consequences to patients)

4a. Use: **Pass-14; No Pass-3** 4b. Usability: **H-1; M-16; L-0; I-0**

### Rationale:

- This measure is a component of the *Absence of Operative Mortality* domain within the composite measure, *3031 Mitral Valve Repair/Replacement (MVRR) Composite Score*, scheduled to be publicly reported on the STS website beginning January 2019. The developer confirmed that the calculated performance score for this measure is not publicly reported.

- The discussion about Use for [#0118](#) applies to this measure. The Committee did not raise additional concerns.

---

## 5. Related and Competing Measures

- This measure is related to:
  - 0120 Risk-Adjusted Operative Mortality for Aortic Valve Replacement (AVR)
  - 0123 Risk-Adjusted Operative Mortality for Aortic Valve Replacement (AVR) + CABG
  - 0119 Risk-Adjusted Operative Mortality for CABG
  - 0121 Risk-Adjusted Operative Mortality for Mitral Valve (MV) Replacement
  - 0122 Risk-Adjusted Operative Mortality for Mitral Valve (MV) Replacement + CABG Surgery
  - 1501 Risk-Adjusted Operative Mortality for Mitral Valve (MV) Repair
  - 3032 Mitral Valve Repair/Replacement (MVRR) + CABG Composite
- The Committee agreed the related measures add value that outweigh any concern regarding interpretability or burden of data collection.

---

## 6. Standing Committee Recommendation for Endorsement: Y-15; N-2

---

## 7. Public and Member Comment

Following the Committee's evaluation of the measure, NQF did not receive any additional comments besides the overarching comments submitted by the measure steward. These overarching comments, the Committee and NQF responses are captured below, following the details of the 15 measure evaluations.

---

## 8. Consensus Standards Approval Committee (CSAC) Vote: Y-14; N-0 (June 5, 2019: Approved for endorsement)

- CSAC upheld the Committee's decision to recommend the measure for endorsement.

---

## 9. Appeals

No appeals were received.

## Comments Received from the Measure Steward, Standing Committee, and NQF Responses

### General Comments from the Measure Steward (STS)

The Society of Thoracic Surgeons (STS) appreciates the opportunity to comment on the "overarching issues" described in the Surgery Standing Committee report on its recent evaluation of fifteen STS measures.

**Levels of Analysis:** The Meeting Summary Report states the following: "The developer confirmed that physicians are the accountable entity for these measures rather than hospital/facilities. However, NQF guidance states that the level of analysis must align with testing; therefore, "hospital/facilities" will be removed from the specifications. Additional testing at the facility level is required for endorsement at both levels of analysis." This statement is inaccurate. None of these measures were designed for individual physicians, but rather for physician group practices and - at the option of these practices - the facilities/hospitals at which they perform surgery. That point was made clear by all STS representatives at the meeting, who have been intimately involved in the development of these measures.

**Race and Risk-Adjustment:** As noted at the Committee meetings in February, the STS contends that it remains appropriate to include race in our risk models, not as a sociodemographic factor (nor as a surrogate for such factors), but as one of various preoperative variables that are independently and significantly associated with clinical outcomes. Race has an empirical association with outcomes and has the potential to confound the interpretation of a hospital's outcomes, although the underlying mechanism is unknown (e.g., genetic factors, differential effectiveness of certain medications, rates of certain associated diseases not accounted for in the risk models, and racial differences in vessel anatomy and suitability for bypass). This is similar to the well-known fact that female gender is associated with worse outcomes and is included in our CABG models (e.g. their coronary arteries tend to be smaller and more challenging for anastomoses). For future submissions, a reasonable compromise would be to present results with adjustment for race as well as results stratified by race but without race adjustment.

**Score-Level Validity Testing Methodology:** The Meeting Summary states that "...star-rating consistency over time is expected and is not an appropriate approach to demonstrating validity." Our major validity indicator is the association of our 1, 2, and 3 star (worse than expected, as expected, and better than expected) composite ratings with the relevant mortality and morbidity scores, which we regard as the "gold standard."

**Public Reporting and Transparency:** With all of our outcome measures, the STS seeks to produce consistent, credible results that discriminate between significant differences in performance and facilitate informed decision-making, as required by NQF criteria. Data analysis for the first STS composite measure (1) demonstrated that risk-adjusted mortality, estimated separately, was able to statistically discriminate only 1% of providers as outliers, whereas the CABG composite (which also includes process measures and a morbidity domain) was able to discriminate 23%. A more recent analysis conducted for our newest publicly-reported composite (mitral repair/replacement) showed that, based on mortality

data alone, the performance of less than 1% of surgical programs could reliably be classified as significantly higher or lower than the STS mean score; the mortality-morbidity composite classified 8.3% of programs as high or low performers (2). We have therefore concluded that it is more clinically meaningful to publicly report operative mortality in a composite with other quality metrics rather than reporting each item separately. The same reasoning applies to components of the composite morbidity domain, most of which have occurrence rates in the same range as that of mortality. If publicly reported as individual risk-adjusted measures, they would effectively be useless to patients in distinguishing quality differences among providers. The STS decision to not publicly report operative mortality alone or individual complication rates is not based solely on the statistical analyses described above. Qualitatively, the any-or-none approach to the morbidity composite domain is also a far more demanding and patient-centric standard. For patients and their families, it is much more relevant to know how best to avoid not just one or two of the major complications, but all of them. The composite therefore provides the likelihood that they will achieve this goal at different institutions. Reporting individual rates with inevitably wide confidence intervals would have greater probability of misleading rather than informing patients.

**Patient and Consumer Perspective:** The STS agrees that easy-to-access, meaningful information on provider performance is essential to enable patients to make informed decisions about their health care. It is for this reason that we continue to publicly report our composite measures as described above and are among the leaders in public reporting across all medical specialties. Additionally, following the Surgery Standing Committee meetings in February, we took immediate steps to expand definitions and other explanatory information on our public reporting web pages to enhance the transparency of composite results reported online. We also plan to expand the educational and quality-related information available on our patient website (The Patient Guide to Heart, Lung, and Esophageal Surgery) to assist patients with treatment options and decision-making related to cardiothoracic surgery.

1. Quality Measurement in Adult Cardiac Surgery: Part 2-Statistical Considerations in Composite Measure Scoring and Provider Rating. Brien SM, Shahian DM, DeLong ER, et al. (2007) *Annals of Thoracic Surgery*, 83 (4 SUPPL.), pp. S13-S26.

2. The Society of Thoracic Surgeons Mitral Repair/Replacement Composite Score: A Report of the Society of Thoracic Surgeons Quality Measurement Task Force. Badhwar V, Rankin JS, He X, et al. (2016) *Annals of Thoracic Surgery*, 101 (6), pp. 2265-2271.

#### **NQF Responses:**

**Level of Analysis:** NQF criteria requires that testing be provided for all the levels specified and intended for measure implementation (e.g., individual clinician, group/practice, hospital/facility, health plan, etc.). The developer conducted testing at the clinician group/practice level; therefore, the measures will be re-endorsed at this level of analysis. Testing was not conducted at the hospital/facility level; thus, the measures will not be endorsed at the hospital level of analysis.

**Race and Risk-Adjustment:** In 2014, NQF's Expert Panel on Risk Adjustment for Sociodemographic Factors determined the effects of race and ethnicity are confounded by socioeconomic status (SES) and should not be used as proxies for SES (Socioeconomic Status or Other Sociodemographic Factors



Technical Report, p. 42). The Expert Panel acknowledged that some see race and ethnicity like other potential confounders but recommended careful thought, consideration, and a clear rationale be used when adjusting performance measures for race and ethnicity because of concerns about bias and racism. The Expert Panel also encouraged reporting of data stratified by race and ethnicity to assess and address disparities in healthcare. If the developer provides stratified measure results for future submissions then stratification variables, definitions, specific data collection items/responses, etc. are required.

During the initial phase of the social risk trial, the Disparities Standing Committee provided additional guidance on the use of race and ethnicity as risk factors. Standing Committee members and members of the public raised concerns that some measures may have used race as proxy for socioeconomic status. Guidance from the Disparities Standing Committee stressed that race should not be used as a proxy for SES; however, there may be certain biological reasons when race could be an appropriate clinical factor to include in a risk-adjustment model (e.g., potential tumor characteristics in African-American women with breast cancer). As part of the social risk trial measure developers are required to provide a conceptual rationale describing the relationship between a social risk factor and the outcome of interest. If a conceptual relationship exists, developers should conduct empirical analyses to examine the relationship between the social risk factor and the outcome of interest.

#### **NQF and Committee Response:**

**Score-Level Validity Testing Methodology:** The NQF Scientific Methods Panel, made up of individuals with methodologic expertise, determined that star-rating consistency over time is not an appropriate approach to demonstrating validity and questioned the utility of the content validation approach used by the developer. The Methods Panel did not reach consensus on the validity of the measures. The Committee discussed the validity and determined the results were acceptable. NQF and the Committee recommend that STS explore other types of analysis to strengthen the demonstration of validity for future submissions.

#### **NQF Response:**

**Public Reporting and Transparency:** Component measures in a composite measure are not required to be NQF endorsed. NQF endorsed measures are required to be used in at least one accountability application within three years after initial endorsement and publicly reported within six years after initial endorsement. This must-pass criterion (accountability and transparency) for maintenance measures is under advisement by the CSAC and may change additional guidance will be available in the future.

#### **Committee Response:**

**Patient and Consumer Perspective:** The Committee appreciates STS's efforts to improve the quality of their publicly available information so patients and their families, and other consumers can make more informed decisions about their health care. The Committee looks forward to working with STS to continue improving the quality of surgical care and publicly available data.

## Appendix B: Surgery Portfolio—Use in Federal Programs<sup>a</sup>

NQF #	Title	Federal Programs: Finalized or Implemented as of July 19, 2019
0225	At least 12 regional lymph nodes are removed and pathologically examined for resected colon cancer	Prospective Payment System-Exempt Cancer Hospital Quality Reporting (Considered)
0456	Participation in a Systematic National Database for General Thoracic Surgery	N/A
0564/3056	Cataracts: Complications within 30 Days Following Cataract Surgery Requiring Additional Surgical Procedures	Merit-Based Incentive Payment System (MIPS) Program (Finalized)
0565/3057	Cataracts: 20/40 or Better Visual Acuity within 90 Days Following Cataract Surgery	Merit-Based Incentive Payment System (MIPS) Program (Finalized)
1790	Risk-Adjusted Morbidity and Mortality for Lung Resection for Lung Cancer	N/A
3294	STS Lobectomy for Lung Cancer Composite Score	N/A
3357	Facility Level 7-Day Hospital Visits after General Surgery Procedures Performed at Ambulatory Surgical Centers	N/A
0697	Risk Adjusted Case Mix Adjusted Elderly Surgery Outcomes Measure	N/A
0706	Risk Adjusted Colon Surgery Outcome Measure	N/A
0127	Preoperative Beta Blockade	N/A
0134	Use of Internal Mammary Artery (IMA) in Coronary Artery Bypass Graft (CABG)	N/A
1519	Statin Therapy at Discharge after Lower Extremity Bypass (LEB)	N/A
1523	Rate of Open Repair of Abdominal Aortic Aneurysms (AAA) Where Patients Are Discharged Alive	Merit-Based Incentive Payment System (MIPS) Program (Finalized)
1534	In-hospital mortality following elective EVAR of AAAs	Merit-Based Incentive Payment System (MIPS) Program (Finalized)
1540	Postoperative Stroke or Death in Asymptomatic Patients undergoing Carotid Endarterectomy	Merit-Based Incentive Payment System (MIPS) Program (Implemented)

<sup>a</sup> Per CMS Measures Inventory Tool as of July 11, 2019

NQF #	Title	Federal Programs: Finalized or Implemented as of July 19, 2019
1550	Hospital-level risk-standardized complication rate (RSCR) following elective primary total hip arthroplasty (THA) and/or total knee arthroplasty (TKA)	Hospital Compare (Implemented), Hospital Inpatient Quality Reporting (Implemented; To be removed 2022-10-01), Hospital Value-Based Purchasing (Implemented)
1551	Hospital-level 30-day, all-cause risk-standardized readmission rate (RSRR) following elective primary total hip arthroplasty (THA) and/or total knee arthroplasty (TKA)	Hospital Compare (Implemented), Hospital Inpatient Quality Reporting (Implemented, To be removed 2019-10-01), Hospital Readmission Reduction Program (Implemented)
0114	Risk-Adjusted Postoperative Renal Failure	Merit-Based Incentive Payment System (MIPS) Program (Finalized)
0115	Risk-Adjusted Surgical Re-exploration	Merit-Based Incentive Payment System (MIPS) Program (Finalized)
0117	Beta Blockade at Discharge	N/A
0118	Anti-Lipid Treatment Discharge	N/A
0119	Risk-Adjusted Operative Mortality for CABG	Merit-Based Incentive Payment System (MIPS) Program (Finalized)
0120	Risk-Adjusted Operative Mortality for Aortic Valve Replacement (AVR)	N/A
0121	Risk-Adjusted Operative Mortality for Mitral Valve (MV) Replacement	N/A
0122	Risk-Adjusted Operative Mortality for Mitral Valve (MV) Replacement + CABG Surgery	N/A
0123	Risk-Adjusted Operative Mortality for Aortic Valve Replacement (AVR) + CABG Surgery	N/A
0127	Preoperative Beta Blockade	N/A
0129	Risk-Adjusted Postoperative Prolonged Intubation (Ventilation)	Merit-Based Incentive Payment System (MIPS) Program (Finalized)
0130	Risk-Adjusted Deep Sternal Wound Infection	Merit-Based Incentive Payment System (MIPS) Program (Finalized)
0131	Risk-Adjusted Stroke/Cerebrovascular Accident	Merit-Based Incentive Payment System (MIPS) Program (Finalized)
0134	Use of Internal Mammary Artery (IMA) in Coronary Artery Bypass Graft (CABG)	N/A
0236	Coronary Artery Bypass Graft (CABG): Preoperative Beta-Blocker in Patients with Isolated CABG Surgery	Merit-Based Incentive Payment System (MIPS) Program (Finalized)
0339	RACHS-1 Pediatric Heart Surgery Mortality Rate (PDI 06)	N/A

NQF #	Title	Federal Programs: Finalized or Implemented as of July 19, 2019
0340	RACHS-1 Pediatric Heart Surgery Volume (PDI 7)	N/A
0354	Hip Fracture Mortality Rate (IQI 19)	N/A
0357	Abdominal Aortic Aneurysm (AAA) Repair Volume (IQI 4)	N/A
0359	Abdominal Aortic Aneurysm (AAA) Repair Mortality Rate (IQI 11)	N/A
0365	Pancreatic Resection Mortality Rate (IQI 9)	N/A
0366	Pancreatic Resection Volume (IQI 2)	N/A
0465	Perioperative Anti-platelet Therapy for Patients undergoing Carotid Endarterectomy	Merit-Based Incentive Payment System (MIPS) Program (Finalized; To be removed 2020-10-01)
0533	Postoperative Respiratory Failure Rate (PSI 11)	N/A
0564	Cataracts: Complications within 30 Days Following Cataract Surgery Requiring Additional Surgical Procedures	Merit-Based Incentive Payment System (MIPS) Program (Finalized)
0696	STS CABG Composite Score (Composite Measure)	N/A
0697	Risk Adjusted Case Mix Adjusted Elderly Surgery Outcomes Measure	N/A
0706	Risk Adjusted Colon Surgery Outcome Measure	N/A
0732	Surgical Volume for Pediatric and Congenital Heart Surgery: Total Programmatic Volume and Programmatic Volume Stratified by the 5 STAT Mortality Categories	N/A
0733	Operative Mortality Stratified by the 5 STAT Mortality Categories	Merit-Based Incentive Payment System (MIPS) Program (Finalized)
0734	Participation in a National Database for Pediatric and Congenital Heart Surgery	N/A
1501	Risk-Adjusted Operative Mortality for Mitral Valve (MV) Repair	N/A
1502	Risk-Adjusted Operative Mortality for Mitral Valve (MV) Repair + CABG Surgery	N/A
1543	Postoperative Stroke or Death in Asymptomatic Patients undergoing Carotid Artery Stenting (CAS)	Merit-Based Incentive Payment System (MIPS) Program (Implemented)

NQF #	Title	Federal Programs: Finalized or Implemented as of July 19, 2019
1790	Risk-Adjusted Morbidity and Mortality for Lung Resection for Lung Cancer	N/A
2038	Performing vaginal apical suspension at the time of hysterectomy to address pelvic organ prolapse	N/A
2063	Performing cystoscopy at the time of hysterectomy for pelvic organ prolapse to detect lower urinary tract injury	Merit-Based Incentive Payment System (MIPS) Program (Finalized)
2558	Hospital 30-Day, All-Cause, Risk-Standardized Mortality Rate (RSMR) Following Coronary Artery Bypass Graft (CABG) Surgery	Hospital Compare (Implemented), Hospital Inpatient Quality Reporting (Implemented; To be removed 2021-10-01), Hospital Value-Based Purchasing (Finalized; Implemented 2021-10-01)
2561	STS Aortic Valve Replacement (AVR) Composite Score (Composite Measure)	N/A
2563	STS Aortic Valve Replacement (AVR) + Coronary Artery Bypass Graft (CABG) Composite Score (Composite Measure)	N/A
2677	Preoperative evaluation for stress urinary incontinence prior to hysterectomy for pelvic organ prolapse	N/A
2681	Perioperative Temperature Management	Merit-Based Incentive Payment System (MIPS) Program (Finalized)
2683	Risk-Adjusted Operative Mortality for Pediatric and Congenital Heart Surgery	N/A
2687	Hospital Visits after Hospital Outpatient Surgery	Hospital Outpatient Quality Reporting (Finalized; To be implemented 2020-01-01)
3030	STS Individual Surgeon Composite Measure for Adult Cardiac Surgery (Composite Measure)	N/A
3031	STS Mitral Valve Repair/Replacement (MVRR) Composite Score (Composite Measure)	N/A
3032	STS Mitral Valve Repair/Replacement (MVRR) + Coronary Artery Bypass Graft (CABG) Composite Score (Composite Measure)	N/A

## Appendix C: Surgery Standing Committee and NQF Staff

### STANDING COMMITTEE

**Lee Fleisher, MD** (Co-chair)

Professor and Chair of Anesthesiology, University of Pennsylvania/American Society of Anesthesiologists  
Philadelphia, Pennsylvania

**William Gunnar, MD, JD** (Co-chair)

Director, National Center for Patient Safety, Veterans Health Administration  
Ann Arbor, MI

**Robert Cima, MD, MA**

Professor of Surgery, Mayo Clinic  
Rochester, Minnesota

**Richard Dutton, MD, MBA**

Chief Quality Officer, United States Anesthesia Partners  
Park Ridge, Illinois

**Temaya Eatmon**

Patient Representative  
Atlanta, Georgia

**Elisabeth Erekson, MD, MPH, FACOG, FACS**

Interim Chair, Department of Obstetrics and Gynecology at the Geisel School of Medicine Dartmouth  
Hitchcock Medical Center  
Manchester, New Hampshire

**Frederick Grover, MD**

Professor of Cardiothoracic Surgery, University of Colorado School of Medicine  
Aurora, Colorado

**John Handy, MD**

Thoracic Surgeon, American College of Chest Physicians  
Portland, Oregon

**Mark Jarrett, MD, MBA**

Chief Quality Officer, Associate Chief Medical Officer, North Shore-LIJ Health System  
Great Neck, New York

**Clifford Ko, MD, MS, MSHS, FACS, FASCRS**

Director, Division of Research and Optimal Patient Care, American College of Surgeons Professor of  
Surgery, Department of Surgery, UCLA School of Medicine and Public Health  
Chicago, Illinois

**Barbara Levy, MD, FACOG, FACS**

Vice President, Health Policy, American College of Obstetricians and Gynecologists  
Washington, DC

**Lawrence Moss, MD**

Surgeon-in-Chief, Nationwide Children's Hospital  
Columbus, Ohio

**Amy Moyer**

Manager of Value Measurement, The Alliance  
Fitchburg, Wisconsin

**Keith Olsen, PharmD, FCCP, FCCM**

Professor and Dean, College of Pharmacy, University of Arkansas for Medical Sciences  
Omaha, Nebraska

**Lynn Reede, DNP, MBA, CRNA, FNAP**

Chief Clinical Officer, American Association of Nurse Anesthetists  
Park Ridge, Illinois

**Christopher Saigal, MD, MPH**

Professor, UCLA  
Los Angeles, California

**Salvatore T. Scali, MD, FACS, RPVI**

Assistant Professor of Vascular Surgery, University of Florida-Gainesville  
Gainesville, Florida

**Allan Siperstein, MD**

Chairman Endocrine Surgery, Cleveland Clinic  
Cleveland, Ohio

**Joshua D. Stein, MD, MS**

Associate Professor, University of Michigan, Department of Ophthalmology & Visual Sciences,  
Department of Health Management & Policy, Director, Center for Eye Policy and Innovation  
Ann Arbor, Michigan

**Larissa Temple, MD**

Colorectal Service, Department of Surgery, Memorial Sloan-Kettering Cancer Center  
New York, New York

**Barbee Whitaker, PhD**

Director, American Association of Blood Banks  
Bethesda, Maryland

**A.J. Yates, MD**

Associate Professor and Vice Chairman for Quality Management, Department of Orthopedic Surgery,  
University of Pittsburgh Medical Center  
Pittsburgh, Pennsylvania

NQF STAFF

**Elisa Munthali, MPH**

Senior Vice President, Quality Measurement

**Melissa Mariñelarena, RN, MPA, CPHQ**

Senior Director

**Kathryn Goodwin, MS**

Senior Project Manager

**Christy Skipper, MS, PMP**

Senior Project Manager

**Janaki Panchal, MSPH**

Project Manager



## Appendix D: Measure Specifications

---

### 0114 Risk-Adjusted Postoperative Renal Failure

#### STEWARD

The Society of Thoracic Surgeons

#### DESCRIPTION

Percent of patients aged 18 years and older undergoing isolated CABG (without pre-existing renal failure) who develop postoperative renal failure or require dialysis

#### TYPE

Outcome

#### DATA SOURCE

Registry Data STS Adult Cardiac Surgery Database Version 2.81 (effective July 1, 2014); Version 2.9 (effective July 1, 2017)

#### LEVEL

Facility, Clinician : Group/Practice

#### SETTING

Inpatient/Hospital

#### NUMERATOR STATEMENT

Number of patients undergoing isolated CABG who develop postoperative renal failure or require dialysis

#### NUMERATOR DETAILS

Definition of renal failure/dialysis requirement – Patients with acute renal failure or worsening renal function resulting in one or both of the following:

- Increase of serum creatinine to 4.0 or higher, or 3x the most recent preoperative creatinine level
- New requirement for dialysis postoperatively

Number of isolated CABG procedures in which postoperative renal failure [CRenFail (STS Adult Cardiac Surgery Database Version 2.9)] is marked as "yes"

#### DENOMINATOR STATEMENT

All patients undergoing isolated CABG

#### DENOMINATOR DETAILS

Number of isolated CABG procedures including re-operations; the SQL code used to create the function to identify cardiac procedures is provided in the appendix.

#### EXCLUSIONS

Patients with documented history of renal failure, baseline serum creatinine of 4.0 or higher; prior renal transplants are not considered preoperative renal failure unless since transplantation their Cr has been or is 4.0 or higher

#### EXCLUSION DETAILS

(Dialysis) is marked yes; Last Creatinine Level (CreatLst) is 4.0 or higher

#### RISK ADJUSTMENT

Statistical risk model

#### STRATIFICATION

N/A

#### TYPE SCORE

Rate/proportion better quality = lower score

#### ALGORITHM

Please refer to numerator and denominator sections for detailed information. 111855| 137290| 114638| 141015

#### COPYRIGHT / DISCLAIMER

None

---

## 0115 Risk-Adjusted Surgical Re-exploration

### STEWARD

The Society of Thoracic Surgeons

### DESCRIPTION

Percent of patients aged 18 years and older undergoing isolated CABG who require a re-intervention during the current hospitalization for mediastinal bleeding with or without tamponade, graft occlusion, valve dysfunction, or other cardiac reason

### TYPE

Outcome

### DATA SOURCE

Registry Data STS Adult Cardiac Surgery Database Version 2.81 (effective July 1, 2014); Version 2.9 (effective July 1, 2017)

### LEVEL

Facility, Clinician : Group/Practice

### SETTING

Inpatient/Hospital

### NUMERATOR STATEMENT

Number of patients undergoing isolated CABG who require a re-intervention during the current hospitalization for mediastinal bleeding with or without tamponade, graft occlusion, valve dysfunction, or other cardiac reason

### NUMERATOR DETAILS

Number of isolated CABG procedures in which any of the following are marked "yes" – ReOp for Bleeding [COPReBld (STS Adult Cardiac Surgery Database Version 2.73)], Reintervention for Graft Occlusion (COPReGft), ReOp for Valve Dysfunction (COPReVlv), ReOp for Other Cardiac Reason (COPReOth)

### DENOMINATOR STATEMENT

All patients undergoing isolated CABG

### DENOMINATOR DETAILS

Number of isolated CABG procedures. The SQL code used to create the function used to identify cardiac procedures is provided in the Appendix.

### EXCLUSIONS

N/A

### EXCLUSION DETAILS

N/A

RISK ADJUSTMENT

Statistical risk model

STRATIFICATION

N/A

TYPE SCORE

Rate/proportion better quality = lower score

ALGORITHM

Please refer to numerator and denominator sections for detailed information. 111855 | 137290 | 114638

COPYRIGHT / DISCLAIMER

None

---

## 0118 Anti-Lipid Treatment Discharge

### STEWARD

The Society of Thoracic Surgeons

### DESCRIPTION

Percent of patients aged 18 years and older undergoing isolated CABG who were discharged on a lipid lowering statin

### TYPE

Process

### DATA SOURCE

Registry Data STS Adult Cardiac Surgery Database Version 2.81 (effective July 1, 2014); Version 2.9 (effective July 1, 2017)

### LEVEL

Facility, Clinician : Group/Practice

### SETTING

Inpatient/Hospital

### NUMERATOR STATEMENT

Number of patients undergoing isolated CABG who were discharged on a lipid lowering statin

### NUMERATOR DETAILS

Number of isolated CABG procedures in which discharge lipid lowering medication [DCLipid (STS Adult Cardiac Surgery Database Version 2.73)] is marked "yes" and lipid lowering discharge medication type [DCLipMT (STS Adult Cardiac Surgery Database Version 2.73)] is marked "statin"

### DENOMINATOR STATEMENT

All patients undergoing isolated CABG

### DENOMINATOR DETAILS

Number of isolated CABG procedures excluding cases with an in-hospital mortality or cases for which discharge anti-lipid treatment use was contraindicated. The SQL code used to create the function used to identify cardiac procedures is provided in the Appendix.

### EXCLUSIONS

Cases are removed from the denominator if there was an in-hospital mortality or if discharge anti-lipid treatment was contraindicated.

### EXCLUSION DETAILS

Mortality Discharge Status (MtDCStat), Mortality Date (MtDate), and Discharge Date (DischDt) indicate an in-hospital mortality; DCLipid is marked as "Contraindicated"

RISK ADJUSTMENT

No risk adjustment or risk stratification

STRATIFICATION

N/A

TYPE SCORE

Rate/proportion better quality = higher score

ALGORITHM

Please refer to numerator and denominator sections for detailed information. 111855 | 137290 | 114638

COPYRIGHT / DISCLAIMER

None

---

## 0119 Risk-Adjusted Operative Mortality for CABG

### STEWARD

The Society of Thoracic Surgeons

### DESCRIPTION

Percent of patients aged 18 years and older undergoing isolated CABG who die, including both 1) all deaths occurring during the hospitalization in which the CABG was performed, even if after 30 days, and 2) those deaths occurring after discharge from the hospital, but within 30 days of the procedure

### TYPE

Outcome

### DATA SOURCE

Registry Data STS Adult Cardiac Surgery Database Version 2.81 (effective July 1, 2014); Version 2.9 (effective July 1, 2017)

### LEVEL

Facility, Clinician : Group/Practice

### SETTING

Inpatient/Hospital

### NUMERATOR STATEMENT

Number of patients undergoing isolated CABG who die, including both 1) all deaths occurring during the hospitalization in which the operation was performed, even if after 30 days, and 2) those deaths occurring after discharge from the hospital, but within 30 days of the procedure

### NUMERATOR DETAILS

Number of isolated CABG procedures with an operative mortality;

Number of isolated CABG procedures in which Mortality [Mortality (STS Adult Cardiac Surgery Database Version 2.9)] and Mortality Operative Death (MtOpD) are marked “yes.” Operative mortality is further verified by the following variables: Mortality Status at 30 days (Mt30Stat), Mortality Date (MtDate), Mortality Discharge Status (MtDCStat)

### DENOMINATOR STATEMENT

All patients undergoing isolated CABG

### DENOMINATOR DETAILS

Number of isolated CABG procedures. The SQL code used to create the function to identify cardiac procedures is provided in the appendix.

### EXCLUSIONS

N/A

EXCLUSION DETAILS

N/A

RISK ADJUSTMENT

Statistical risk model

STRATIFICATION

N/A

TYPE SCORE

Rate/proportion better quality = lower score

ALGORITHM

Please refer to numerator and denominator sections for detailed information. 111855| 137290| 114638| 141015

COPYRIGHT / DISCLAIMER

None



---

## 0120 Risk-Adjusted Operative Mortality for Aortic Valve Replacement (AVR)

### STEWARD

The Society of Thoracic Surgeons

### DESCRIPTION

Percent of patients aged 18 years and older undergoing Aortic Valve Replacement (AVR) who die, including both 1) all deaths occurring during the hospitalization in which the procedure was performed, even if after 30 days, and 2) those deaths occurring after discharge from the hospital, but within 30 days of the procedure

### TYPE

Outcome

### DATA SOURCE

Registry Data STS Adult Cardiac Surgery Database Version 2.81 (effective July 1, 2014); Version 2.9 (effective July 1, 2017)

### LEVEL

Facility, Clinician : Group/Practice

### SETTING

Inpatient/Hospital

### NUMERATOR STATEMENT

Number of patients aged 18 years and older undergoing AVR who die, including both 1) all deaths occurring during the hospitalization in which the operation was performed, even if after 30 days, and 2) those deaths occurring after discharge from the hospital, but within 30 days of the procedure

### NUMERATOR DETAILS

Number of isolated AVR procedures with an operative mortality;

Number of isolated AVR procedures in which Mortality [Mortality (STS Adult Cardiac Surgery Database Version 2.73)] and Mortality Operative Death (MtOpD) are marked “yes.” Operative mortality is further verified by the following variables: Mortality Status at 30 days (Mt30Stat), Mortality Date (MtDate), Mortality Discharge Status (MtDCStat)

### DENOMINATOR STATEMENT

All patients undergoing isolated AVR surgery

### DENOMINATOR DETAILS

Number of isolated AVR procedures. The SQL code used to create the function used to identify cardiac procedures is provided in the Appendix.

### EXCLUSIONS

N/A

EXCLUSION DETAILS

N/A

RISK ADJUSTMENT

Statistical risk model

STRATIFICATION

N/A

TYPE SCORE

Rate/proportion better quality = lower score

ALGORITHM

Please refer to numerator and denominator sections for detailed information. 111855| 137290| 114638

COPYRIGHT / DISCLAIMER

None

---

## 0121 Risk-Adjusted Operative Mortality for Mitral Valve (MV) Replacement

### STEWARD

The Society of Thoracic Surgeons

### DESCRIPTION

Percent of patients aged 18 years and older undergoing MV Replacement who die, including both 1) all deaths occurring during the hospitalization in which the procedure was performed, even if after 30 days, and 2) those deaths occurring after discharge from the hospital, but within 30 days of the procedure

### TYPE

Outcome

### DATA SOURCE

Registry Data STS Adult Cardiac Surgery Database Version 2.81 (effective July 1, 2014); Version 2.9 (effective July 1, 2017)

### LEVEL

Facility, Clinician : Group/Practice

### SETTING

Inpatient/Hospital

### NUMERATOR STATEMENT

Number of patients aged 18 years and older undergoing MV Replacement who die, including both 1) all deaths occurring during the hospitalization in which the operation was performed, even if after 30 days, and 2) those deaths occurring after discharge from the hospital, but within 30 days of the procedure

### NUMERATOR DETAILS

Number of isolated MV Replacement procedures with an operative mortality;  
Number of isolated MV Replacement procedures in which Mortality [Mortality (STS Adult Cardiac Surgery Database Version 2.73)] and Mortality Operative Death (MtOpD) are marked “yes.”  
Operative mortality is further verified by the following variables: Mortality Status at 30 days (Mt30Stat), Mortality Date (MtDate), Mortality Discharge Status (MtDCStat)

### DENOMINATOR STATEMENT

All patients undergoing isolated MV replacement surgery

### DENOMINATOR DETAILS

Number of isolated mitral valve replacement procedures. The SQL code used to create the function used to identify cardiac procedures is provided in the Appendix.

### EXCLUSIONS

N/A

EXCLUSION DETAILS

N/A

RISK ADJUSTMENT

Statistical risk model

STRATIFICATION

N/A

TYPE SCORE

Rate/proportion better quality = lower score

ALGORITHM

Please refer to numerator and denominator sections for detailed information. 111855| 137290| 114638

COPYRIGHT / DISCLAIMER

None

---

## 0122 Risk-Adjusted Operative Mortality for Mitral Valve (MV) Replacement + CABG Surgery

### STEWARD

The Society of Thoracic Surgeons

### DESCRIPTION

Percent of patients aged 18 years and older undergoing combined MV Replacement and CABG who die, including both 1) all deaths occurring during the hospitalization in which the procedure was performed, even if after 30 days, and 2) those deaths occurring after discharge from the hospital, but within 30 days of the procedure

### TYPE

Outcome

### DATA SOURCE

Registry Data STS Adult Cardiac Surgery Database Version 2.81 (effective July 1, 2014); Version 2.9 (effective July 1, 2017)

### LEVEL

Facility, Clinician : Group/Practice

### SETTING

Inpatient/Hospital

### NUMERATOR STATEMENT

Number of patients aged 18 years and older undergoing combined MV Replacement and CABG who die, including both 1) all deaths occurring during the hospitalization in which the operation was performed, even if after 30 days, and 2) those deaths occurring after discharge from the hospital, but within 30 days of the procedure

### NUMERATOR DETAILS

Number of MV Replacement + CABG procedures with an operative mortality;  
Number of MV Replacement + CABG procedures in which Mortality [Mortality (STS Adult Cardiac Surgery Database Version 2.73)] and Mortality Operative Death (MtOpD) are marked "yes."  
Operative mortality is further verified by the following variables: Mortality Status at 30 days (Mt30Stat), Mortality Date (MtDate), Mortality Discharge Status (MtDCStat)

### DENOMINATOR STATEMENT

All patients undergoing combined MV Replacement + CABG

### DENOMINATOR DETAILS

Number of MV Replacement + CABG procedures. The SQL code used to create the function used to identify cardiac procedures is provided in the Appendix.

### EXCLUSIONS

N/A

EXCLUSION DETAILS

N/A

RISK ADJUSTMENT

Statistical risk model

STRATIFICATION

N/A

TYPE SCORE

Rate/proportion better quality = lower score

ALGORITHM

Please refer to numerator and denominator sections for detailed information. 111855| 137290| 114638| 141015

COPYRIGHT / DISCLAIMER

None

---

## 0123 Risk-Adjusted Operative Mortality for Aortic Valve Replacement (AVR) + CABG Surgery

### STEWARD

The Society of Thoracic Surgeons

### DESCRIPTION

Percent of patients aged 18 years and older undergoing combined AVR and CABG who die, including both 1) all deaths occurring during the hospitalization in which the procedure was performed, even if after 30 days, and 2) those deaths occurring after discharge from the hospital, but within 30 days of the procedure

### TYPE

Outcome

### DATA SOURCE

Registry Data STS Adult Cardiac Surgery Database Version 2.81 (effective July 1, 2014); Version 2.9 (effective July 1, 2017)

### LEVEL

Facility, Clinician : Group/Practice

### SETTING

Inpatient/Hospital

### NUMERATOR STATEMENT

Number of patients aged 18 years and older undergoing combined AVR and CABG who die, including both 1) all deaths occurring during the hospitalization in which the operation was performed, even if after 30 days, and 2) those deaths occurring after discharge from the hospital, but within 30 days of the procedure.

### NUMERATOR DETAILS

Number of AVR + CABG procedures with an operative mortality;

Number of AVR + CABG procedures in which Mortality [Mortality (STS Adult Cardiac Surgery Database Version 2.73)] and Mortality Operative Death (MtOpD) are marked "yes." Operative mortality is further verified by the following variables: Mortality Status at 30 days (Mt30Stat), Mortality Date (MtDate), Mortality Discharge Status (MtDCStat)

### DENOMINATOR STATEMENT

All patients undergoing combined AVR + CABG

### DENOMINATOR DETAILS

Number of AVR + CABG procedures. The SQL code used to create the function used to identify cardiac procedures is provided in the Appendix.

### EXCLUSIONS

N/A

EXCLUSION DETAILS

N/A

RISK ADJUSTMENT

Statistical risk model

STRATIFICATION

N/A

TYPE SCORE

Rate/proportion better quality = lower score

ALGORITHM

Please refer to numerator and denominator sections for detailed information. 111855| 137290| 114638

COPYRIGHT / DISCLAIMER

None



---

## 0129 Risk-Adjusted Postoperative Prolonged Intubation (Ventilation)

### STEWARD

The Society of Thoracic Surgeons

### DESCRIPTION

Percent of patients aged 18 years and older undergoing isolated CABG who require intubation for more than 24 hours postoperatively

### TYPE

Outcome

### DATA SOURCE

Registry Data STS Adult Cardiac Surgery Database Version 2.81 (effective July 1, 2014); Version 2.9 (effective July 1, 2017)

### LEVEL

Facility, Clinician : Group/Practice

### SETTING

Inpatient/Hospital

### NUMERATOR STATEMENT

Number of patients undergoing isolated CABG who require intubation > 24 hours following exit from the operating room

### NUMERATOR DETAILS

Number of isolated CABG procedures in which Prolonged Ventilation (CPVntLng) is marked "yes" (STS Adult Cardiac Surgery Database Version 2.9)

The hours of postoperative ventilation time include OR exit until extubation, plus any additional hours following reintubation.

### DENOMINATOR STATEMENT

All patients undergoing isolated CABG

### DENOMINATOR DETAILS

Number of isolated CABG procedures. The SQL code used to create the function to identify cardiac procedures is provided in the appendix.

### EXCLUSIONS

N/A

### EXCLUSION DETAILS

N/A

### RISK ADJUSTMENT

Statistical risk model

STRATIFICATION

N/A

TYPE SCORE

Rate/proportion better quality = lower score

ALGORITHM

Please refer to numerator and denominator sections for detailed information. 111855 | 137290 | 114638 | 141015

COPYRIGHT / DISCLAIMER

None

---

## 0130 Risk-Adjusted Deep Sternal Wound Infection

### STEWARD

The Society of Thoracic Surgeons

### DESCRIPTION

Percent of patients aged 18 years and older undergoing isolated CABG for whom mediastinitis or deep sternal wound infection is diagnosed within 30 days postoperatively or at any time during the hospitalization for surgery

### TYPE

Outcome

### DATA SOURCE

Registry Data STS Adult Cardiac Surgery Database Version 2.81 (effective July 1, 2014); Version 2.9 (effective July 1, 2017)

### LEVEL

Facility, Clinician : Group/Practice

### SETTING

Inpatient/Hospital

### NUMERATOR STATEMENT

Number of patients aged 18 years and older undergoing isolated CABG for whom mediastinitis or deep sternal wound infection is diagnosed within 30 days postoperatively or at any time during the hospitalization for surgery

### NUMERATOR DETAILS

Numerator time period:

Within 30 days postoperatively or at any time during the hospitalization for surgery

Number of isolated CABG procedures in which deep sternal infection/mediastinitis [DeepSternInf (STS Adult Cardiac Surgery Database Version 2.9)] is marked "yes"

DeepSternInf

Deep incisional SSI: Must meet the following criteria

- Infection occurs within 30 days after the operative procedure, and involves deep soft tissues of the incision (e.g., fascial and muscle layers) and patient has at least one of the following:

- Purulent drainage from the deep incision.

- A deep incision that spontaneously dehisces or is deliberately opened by a surgeon, attending physician or other designee and is culture-positive or not cultured, and patient has at least one of the following signs or symptoms:

- Fever (>38°C)

- Localized pain or tenderness

- An abscess or other evidence of infection involving the deep incision that is detected on direct examination, during invasive procedure, or by histopathologic examination or imaging test.

- A culture with negative findings does not meet this criterion.
- There are two specific types of deep incisional SSIs:
  - Deep Incisional Primary (DIP) – a deep incisional SSI that is identified in a primary incision in a patient that has had an operation with one or more incisions (e.g., chest incision for CABG)
  - Deep Incisional Secondary (DIS) – a deep incisional SSI that is identified in the secondary incision in a patient that has had an operation with more than one incision (e.g., donor site incision for CABG)

MED-Mediastinitis: Must meet the following criteria

- Mediastinitis must meet at least 1 of the following criteria:
  - Patient has organisms cultured from mediastinal tissue or fluid obtained during an invasive procedure.
  - Patient has evidence of mediastinitis seen during an invasive procedure or histopathologic examination.
  - Patient has at least 1 of the following signs or symptoms:
    - Fever (>38°C)
    - Chest pain (with no other recognized cause)
    - Sternal instability (with no other recognized cause) and at least 1 of the following:
      - Purulent discharge from mediastinal area
      - Organisms cultured from blood or discharge from mediastinal area
    - Mediastinal widening on imaging test.

#### DENOMINATOR STATEMENT

All patients undergoing isolated CABG

#### DENOMINATOR DETAILS

Number of isolated CABG procedures. The SQL code used to create the function used to identify cardiac procedures is provided in the Appendix.

#### EXCLUSIONS

N/A

#### EXCLUSION DETAILS

N/A

#### RISK ADJUSTMENT

Statistical risk model

#### STRATIFICATION

N/A

#### TYPE SCORE

Rate/proportion better quality = lower score

#### ALGORITHM

Please refer to numerator and denominator sections for detailed information. 111855| 137290| 114638

#### COPYRIGHT / DISCLAIMER

None

---

## 0131 Risk-Adjusted Stroke/Cerebrovascular Accident

### STEWARD

The Society of Thoracic Surgeons

### DESCRIPTION

Percent of patients aged 18 years and older undergoing isolated CABG who have a postoperative stroke (i.e., any confirmed neurological deficit of abrupt onset caused by a disturbance in blood supply to the brain) that did not resolve within 24 hours

### TYPE

Outcome

### DATA SOURCE

Registry Data STS Adult Cardiac Surgery Database Version 2.81 (effective July 1, 2014); Version 2.9 (effective July 1, 2017)

### LEVEL

Facility, Clinician : Group/Practice

### SETTING

Inpatient/Hospital

### NUMERATOR STATEMENT

Number of patients undergoing isolated CABG who have a postoperative stroke (i.e., any confirmed neurological deficit of abrupt onset caused by a disturbance in blood supply to the brain) that did not resolve within 24 hours

### NUMERATOR DETAILS

Number of isolated CABG procedures in which postoperative stroke [CNStrokP (STS Adult Cardiac Surgery Database Version 2.9)] is marked "yes"

### DENOMINATOR STATEMENT

All patients undergoing isolated CABG

### DENOMINATOR DETAILS

Number of isolated CABG procedures. The SQL code used to create the function to identify cardiac procedures is provided in the appendix.

### EXCLUSIONS

N/A

### EXCLUSION DETAILS

N/A

### RISK ADJUSTMENT

Statistical risk model

STRATIFICATION

N/A

TYPE SCORE

Rate/proportion better quality = lower score

ALGORITHM

Please refer to numerator and denominator sections for detailed information. 111855 | 137290 | 114638 | 141015

COPYRIGHT / DISCLAIMER

None

---

## 1501 Risk-Adjusted Operative Mortality for Mitral Valve (MV) Repair

### STEWARD

The Society of Thoracic Surgeons

### DESCRIPTION

Percent of patients aged 18 years and older undergoing MV Repair who die, including both 1) all deaths occurring during the hospitalization in which the procedure was performed, even if after 30 days, and 2) those deaths occurring after discharge from the hospital, but within 30 days of the procedure

(This measure applies to the procedure of MV repair, regardless of approach)

### TYPE

Outcome

### DATA SOURCE

Registry Data STS Adult Cardiac Surgery Database Version 2.81 (effective July 1, 2014); Version 2.9 (effective July 1, 2017)

### LEVEL

Facility, Clinician : Group/Practice

### SETTING

Inpatient/Hospital

### NUMERATOR STATEMENT

Number of patients aged 18 years and older undergoing MV Repair who die, including both 1) all deaths occurring during the hospitalization in which the operation was performed, even if after 30 days, and 2) those deaths occurring after discharge from the hospital, but within 30 days of the procedure

### NUMERATOR DETAILS

Number of isolated MV repair procedures with an operative mortality;

Number of isolated MV repair procedures in which Mortality [Mortality (STS Adult Cardiac Surgery Database Version 2.73)] and Mortality Operative Death (MtOpD) are marked “yes.”

Operative mortality is further verified by the following variables: Mortality Status at 30 days (Mt30Stat), Mortality Date (MtDate), Mortality Discharge Status (MtDCStat)

### DENOMINATOR STATEMENT

All patients undergoing isolated MV repair surgery

### DENOMINATOR DETAILS

Number of isolated mitral valve repair procedures. The SQL code used to create the function used to identify cardiac procedures is provided in the Appendix.

### EXCLUSIONS

N/A



EXCLUSION DETAILS

N/A

RISK ADJUSTMENT

Statistical risk model

STRATIFICATION

N/A

TYPE SCORE

Rate/proportion better quality = lower score

ALGORITHM

Please refer to numerator and denominator sections for detailed information. 111855| 137290| 114638

COPYRIGHT / DISCLAIMER

None

---

## 1502 Risk-Adjusted Operative Mortality for Mitral Valve (MV) Repair + CABG Surgery

### STEWARD

The Society of Thoracic Surgeons

### DESCRIPTION

Percent of patients aged 18 years and older undergoing combined MV Repair and CABG who die, including both 1) all deaths occurring during the hospitalization in which the procedure was performed, even if after 30 days, and 2) those deaths occurring after discharge from the hospital, but within 30 days of the procedure

### TYPE

Outcome

### DATA SOURCE

Registry Data STS Adult Cardiac Surgery Database Version 2.81 (effective July 1, 2014); Version 2.9 (effective July 1, 2017)

### LEVEL

Facility, Clinician : Group/Practice

### SETTING

Inpatient/Hospital

### NUMERATOR STATEMENT

Number of patients aged 18 years and older undergoing combined MV Repair and CABG who die, including both 1) all deaths occurring during the hospitalization in which the operation was performed, even if after 30 days, and 2) those deaths occurring after discharge from the hospital, but within 30 days of the procedure

### NUMERATOR DETAILS

Number of MV Repair + CABG procedures with an operative mortality;  
Number of MV Repair + CABG procedures in which Mortality [Mortality (STS Adult Cardiac Surgery Database Version 2.73)] and Mortality Operative Death (MtOpD) are marked "yes."  
Operative mortality is further verified by the following variables: Mortality Status at 30 days (Mt30Stat), Mortality Date (MtDate), Mortality Discharge Status (MtDCStat)

### DENOMINATOR STATEMENT

All patients undergoing combined MV Repair + CABG

### DENOMINATOR DETAILS

Number of MV Repair + CABG procedures. The SQL code used to create the function used to identify cardiac procedures is provided in the Appendix.

### EXCLUSIONS

N/A

EXCLUSION DETAILS

N/A

RISK ADJUSTMENT

Statistical risk model

STRATIFICATION

N/A

TYPE SCORE

Rate/proportion better quality = lower score

ALGORITHM

Please refer to numerator and denominator sections for detailed information. 111855| 137290| 114638

COPYRIGHT / DISCLAIMER

None

---

## 2561 STS Aortic Valve Replacement (AVR) Composite Score

### STEWARD

The Society of Thoracic Surgeons

### DESCRIPTION

STS AVR 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 during the same hospitalization as surgery or after discharge but within 30 days of the procedure; and Domain 2) Absence of Major Morbidity – Proportion of patients (risk-adjusted) who do not experience any major morbidity. Major morbidity is defined as having at least one of the following adverse outcomes: 1. reoperations for any cardiac reason, 2. renal failure, 3. deep sternal wound infection, 4. prolonged ventilation/intubation, and 5. cerebrovascular accident/permanent stroke. All measures are based on audited clinical data collected in a prospective registry and are risk-adjusted.

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 star (below average performance), two stars (average performance), or three stars (above average performance). Star ratings are publicly reported on the STS website and are also currently reported on the Consumer Reports website.

### TYPE

Composite

### DATA SOURCE

Registry Data STS Adult Cardiac Surgery Database Version 2.81 (effective July 1, 2014); Version 2.9 (effective July 1, 2017)

### LEVEL

Facility, Clinician : Group/Practice

### SETTING

Inpatient/Hospital

### 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 AVR Composite Score comprises two domains consisting of six individual measures:

1. Absence of Operative Mortality

NQF # 0120 Risk-Adjusted Operative Mortality for AVR

2. Absence of Major Morbidity, scored any-or-none. The measures used are the same morbidity outcomes included in NQF #0696 STS CABG Composite Score.

Risk-Adjusted Postoperative Stroke/Cerebrovascular Accident

Risk-Adjusted Postoperative Surgical Re-exploration

Risk-Adjusted Postoperative Deep Sternal Wound Infection Rate

Risk-Adjusted Postoperative Renal Failure

Risk-Adjusted Postoperative Prolonged Intubation (Ventilation)

Participants 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 one star (below average performance), two stars (average performance), or three stars (above average performance).

Patient Population: The analysis population consists of adult patients aged 18 years or older who undergo isolated AVR surgery

Time Period: 3 years

Data Completeness Requirement: Participants are excluded from the analysis if they have fewer than 10 isolated AVR procedures in the patient population.

Technical Details

The unit of measurement for the STS AVR Composite Score can be either a participant (most often a cardiac surgical practice but occasionally an individual surgeon) or a hospital.

For the Absence of Operative Mortality domain, the NUMERATOR is:

Number of patients undergoing isolated AVR who survived until after discharge and >30 days post-surgery

For the Absence of Major Morbidity domain, the NUMERATOR is:

Number of patients undergoing isolated AVR who did not experience any of the five specified major morbidity endpoints\*

\*Morbidity endpoints consist of postoperative stroke/cerebrovascular accident, surgical re-exploration, deep sternal wound infection, renal failure, prolonged intubation (ventilation). Patients with documented history of renal failure (i.e., dialysis or baseline serum creatinine of 4.0 or higher) are excluded when counting renal failure outcomes.

STS AVR risk models are used to estimate expected rates of mortality and any-or-none morbidity (Reference: 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). To enhance interpretation, mortality rates are converted to survival rates (risk-standardized survival rate =  $100 - \text{risk-standardized mortality rate}$ ), and morbidity rates are converted to “absence of morbidity” rates (risk-standardized absence of morbidity rate =  $100 - \text{risk-standardized morbidity rate}$ ). Defining scores in this manner ensures that increasingly positive values reflect better performance, which is easier for consumers to interpret.

(Please see the appendix for the formula used to calculate the overall composite score.)

The method is equivalent to calculating a weighted average, with weights proportional to the inverse of the SD. In the most recent production of the STS AVR Composite Score based on data from July 2010 – June 2013,  $\text{wtmort} = 0.79$  and  $\text{wtmorb} = 0.21$ .

Star Rating: Star ratings are derived by testing whether the participant's composite or domain score is significantly different from the overall STS average. For instance, if for each of the 2 composite score domains, a participant's estimated score is lower than the overall STS average, but the difference between the participant and STS is not statistically significant, the ratings would each be 2 stars. If however, for the overall composite, the point estimate is lower than

the STS average, AND this difference is statistically significant, the overall participant star rating is 1 star. The fact that statistical significance was achieved for the composite score but not the individual domains reflects the greater precision of the composite score compared to individual endpoints. This precision is achieved by aggregating information across multiple endpoints instead of a single endpoint.

Additional details regarding the AVR Composite Score are provided in the attached manuscript: Shahian DM, He X, Jacobs JP, et al. The Society of Thoracic Surgeons Isolated Aortic Valve Replacement (AVR) Composite Score: a report of the STS Quality Measurement Task Force. Ann Thorac Surg 2012;94:2166-71.

#### NUMERATOR DETAILS

Please see S.4 above

#### DENOMINATOR 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 AVR Composite Score comprises two domains consisting of six individual measures:

1. Absence of Operative Mortality

NQF # 0120 Risk-Adjusted Operative Mortality for AVR

2. Absence of Major Morbidity, scored any-or-none. The measures used are the same morbidity outcomes included in NQF #0696 STS CABG Composite Score.

Risk-Adjusted Postoperative Stroke/Cerebrovascular Accident

Risk-Adjusted Postoperative Surgical Re-exploration

Risk-Adjusted Postoperative Deep Sternal Wound Infection Rate

Risk-Adjusted Postoperative Renal Failure

Risk-Adjusted Postoperative Prolonged Intubation (Ventilation)

Participants 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 one star (below average performance), two stars (average performance), or three stars (above average performance).

Patient Population: The analysis population consists of adult patients aged 18 years or older who undergo isolated AVR surgery

Time Period: 3 years

Data Completeness Requirement: Participants are excluded from the analysis if they have fewer than 10 isolated AVR procedures in the patient population.

#### Technical Details

The unit of measurement for the STS AVR Composite Score can be either a participant (most often a cardiac surgical practice but occasionally an individual surgeon) or a hospital.

For the Absence of Operative Mortality domain AND the Absence of Major Morbidity domain, the DENOMINATOR is:

Number of patients undergoing isolated AVR during the measurement period

STS AVR risk models are used to estimate expected rates of mortality and any-or-none morbidity (Reference: 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). To enhance interpretation, mortality rates are converted to survival rates (risk-standardized survival rate = 100 – risk-standardized

mortality rate), and morbidity rates are 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, which is easier for consumers to interpret.

(Please see the appendix for the formula used to calculate the overall composite score.)

The method is equivalent to calculating a weighted average, with weights proportional to the inverse of the SD. In the most recent production of the STS AVR Composite Score based on data from July 2010 – June 2013, wtmort=0.79 and wtmorb = 0.21.

Star Rating: Star ratings are derived by testing whether the participant's composite or domain score is significantly different from the overall STS average. For instance, if for each of the 2 composite score domains, a participant's estimated score is lower than the overall STS average, but the difference between the participant and STS is not statistically significant, the ratings would each be 2 stars. If however, for the overall composite, the point estimate is lower than the STS average, AND this difference is statistically significant, the overall participant star rating is 1 star. The fact that statistical significance was achieved for the composite score but not the individual domains reflects the greater precision of the composite score compared to individual endpoints. This precision is achieved by aggregating information across multiple endpoints instead of a single endpoint.

Additional details regarding the AVR Composite Score are provided in the attached manuscript: Shahian DM, He X, Jacobs JP, et al. The Society of Thoracic Surgeons Isolated Aortic Valve Replacement (AVR) Composite Score: a report of the STS Quality Measurement Task Force. Ann Thorac Surg 2012;94:2166-71.

#### DENOMINATOR DETAILS

Please see S.6 above

#### EXCLUSIONS

Please see S.6 above

#### EXCLUSION DETAILS

Please see S.6 above

#### RISK ADJUSTMENT

Statistical risk model

#### STRATIFICATION

N/A

#### TYPE SCORE

Rate/proportion better quality = higher score

ALGORITHM

Please see S.4 and S.6 above 111855 | 137290 | 114638 | 141015

COPYRIGHT / DISCLAIMER

None



---

## 2563 STS Aortic Valve Replacement (AVR) + Coronary Artery Bypass Graft (CABG) Composite Score

### STEWARD

The Society of Thoracic Surgeons

### DESCRIPTION

The STS AVR+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 during the same hospitalization as surgery or after discharge but within 30 days of the procedure; and Domain 2) Absence of Major Morbidity – Proportion of patients (risk-adjusted) who do not experience any major morbidity. Major morbidity is defined as having at least one of the following adverse outcomes: 1. reoperations for any cardiac reason, 2. renal failure, 3. deep sternal wound infection, 4. prolonged ventilation/intubation, and 5. cerebrovascular accident/permanent stroke. All measures are based on audited clinical data collected in a prospective registry and are risk-adjusted.

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 star (below average performance), two stars (average performance), or three stars (above average performance). Star ratings are publicly reported on the STS website.

### TYPE

Composite

### DATA SOURCE

Registry Data STS Adult Cardiac Surgery Database Version 2.81 (effective July 1, 2014); Version 2.9 (effective July 1, 2017)

### LEVEL

Facility, Clinician : Group/Practice

### SETTING

Inpatient/Hospital

### 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 AVR+CABG Composite Score comprises two domains consisting of six individual measures:

1. Absence of Operative Mortality

NQF # 0123 Risk-Adjusted Operative Mortality for AVR+CABG Surgery

2. Absence of Major Morbidity, scored any-or-none. The measures used are the same morbidity outcomes included in NQF #0696 STS CABG Composite Score.

Risk-Adjusted Postoperative Stroke/Cerebrovascular Accident

Risk-Adjusted Postoperative Surgical Re-exploration

Risk-Adjusted Postoperative Deep Sternal Wound Infection Rate

Risk-Adjusted Postoperative Renal Failure

Risk-Adjusted Postoperative Prolonged Intubation (Ventilation)

Participants 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 one star (below average performance), two stars (average performance), or three stars (above average performance).

**Patient Population:** The analysis population consists of adult patients aged 18 years or older who undergo AVR+CABG surgery

**Time Period:** 3 years

**Data Completeness Requirement:** Participants are excluded from the analysis if they have fewer than 10 AVR+CABG procedures in the patient population.

#### Technical Details

The unit of measurement for the STS AVR+CABG Composite Score can be either a participant (most often a cardiac surgical practice but occasionally an individual surgeon) or a hospital.

For the Absence of Operative Mortality domain, the NUMERATOR is:

Number of patients undergoing AVR+CABG who survived until after discharge and >30 days post-surgery

For the Absence of Major Morbidity domain, the NUMERATOR is:

Number of patients undergoing AVR+CABG who did not experience any of the five specified major morbidity endpoints\*

\*Morbidity endpoints consist of postoperative stroke/cerebrovascular accident, surgical re-exploration, deep sternal wound infection, renal failure, prolonged intubation (ventilation). Patients with documented history of renal failure (i.e., dialysis or baseline serum creatinine of 4.0 or higher) are excluded when counting renal failure outcomes.

STS AVR+CABG risk models are used to estimate expected rates of mortality and any-or-none morbidity (Reference: 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.) To enhance interpretation, mortality rates are converted to survival rates (risk-standardized survival rate = 100 – risk-standardized mortality rate), and morbidity rates are 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, which is easier for consumers to interpret.

(Please see the appendix for the formula used to calculate the overall composite score.)

The method is equivalent to calculating a weighted average, with weights proportional to the inverse of the SD. In the most recent production of the STS AVR+CABG Composite Score based on data from July 2010 – June 2013, wtmort=0.77 and wtmorb = 0.23.

**Star Rating:** Star ratings are derived by testing whether the participant's composite or domain score is significantly different from the overall STS average. For instance, if for each of the 2

composite score domains, a participant's estimated score is lower than the overall STS average, but the difference between the participant and STS is not statistically significant, the ratings would each be 2 stars. If however, for the overall composite, the point estimate is lower than the STS average, AND this difference is statistically significant, the overall participant star rating is 1 star. The fact that statistical significance was achieved for the composite score but not the individual domains reflects the greater precision of the composite score compared to individual endpoints. This precision is achieved by aggregating information across multiple endpoints instead of a single endpoint.

Additional details regarding the AVR+CABG Composite Score are provided in the manuscript: Shahian DM, He X, Jacobs JP, et al. The STS AVR + CABG Composite Score: A Report of the STS Quality Measurement Task Force. *Ann Thorac Surg* 2014;97(5),1604-9.

#### NUMERATOR DETAILS

Please see S.4 above

#### DENOMINATOR 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 AVR+CABG Composite Score comprises two domains consisting of six individual measures:

1. Absence of Operative Mortality

NQF # 0123 Risk-Adjusted Operative Mortality for AVR+CABG Surgery

2. Absence of Major Morbidity, scored any-or-none. The measures used are the same morbidity outcomes included in NQF #0696 STS CABG Composite Score.

Risk-Adjusted Postoperative Stroke/Cerebrovascular Accident

Risk-Adjusted Postoperative Surgical Re-exploration

Risk-Adjusted Postoperative Deep Sternal Wound Infection Rate

Risk-Adjusted Postoperative Renal Failure

Risk-Adjusted Postoperative Prolonged Intubation (Ventilation)

Participants 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 one star (below average performance), two stars (average performance), or three stars (above average performance).

Patient Population: The analysis population consists of adult patients aged 18 years or older who undergo AVR+CABG surgery

Time Period: 3 years

Data Completeness Requirement: Participants are excluded from the analysis if they have fewer than 10 AVR+CABG procedures in the patient population.

#### Technical Details

The unit of measurement for the STS AVR+CABG Composite Score can be either a participant (most often a cardiac surgical practice but occasionally an individual surgeon) or a hospital.

For the Absence of Operative Mortality domain AND the Absence of Major Morbidity domain, the DENOMINATOR is:

Number of patients undergoing isolated AVR+CABG during the measurement period

STS AVR+CABG risk models are used to estimate expected rates of mortality and any-or-none morbidity (Reference: 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.) To enhance interpretation, mortality rates are converted to survival rates (risk-standardized survival rate = 100 – risk-standardized mortality rate), and morbidity rates are 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, which is easier for consumers to interpret.

(Please see the appendix for the formula used to calculate the overall composite score.)

The method is equivalent to calculating a weighted average, with weights proportional to the inverse of the SD. In the most recent production of the STS AVR+CABG Composite Score based on data from July 2010 – June 2013, wtmort=0.77 and wtmorb = 0.23.

Star Rating: Star ratings are derived by testing whether the participant's composite or domain score is significantly different from the overall STS average. For instance, if for each of the 2 composite score domains, a participant's estimated score is lower than the overall STS average, but the difference between the participant and STS is not statistically significant, the ratings would each be 2 stars. If however, for the overall composite, the point estimate is lower than the STS average, AND this difference is statistically significant, the overall participant star rating is 1 star. The fact that statistical significance was achieved for the composite score but not the individual domains reflects the greater precision of the composite score compared to individual endpoints. This precision is achieved by aggregating information across multiple endpoints instead of a single endpoint.

Additional details regarding the AVR+CABG Composite Score are provided in the manuscript:

Shahian DM, He X, Jacobs JP, et al. The STS AVR + CABG Composite Score: A Report of the STS Quality Measurement Task Force. Ann Thorac Surg 2014;97(5),1604-9.

#### DENOMINATOR DETAILS

Please see S.6 above

#### EXCLUSIONS

Please see S.6 above

#### EXCLUSION DETAILS

Please see S.6 above

#### RISK ADJUSTMENT

Statistical risk model

#### STRATIFICATION

N/A

TYPE SCORE

Rate/proportion better quality = higher score

ALGORITHM

Please see S.4 and S.6 above 111855 | 137290 | 114638 | 141015

COPYRIGHT / DISCLAIMER

None

## Appendix E1: Related and Competing Measures (tabular format)

### Comparison of NQF 2561 and NQF 0120

NQF #	2561 STS Aortic Valve Replacement (AVR) Composite Score (STS)	0120 Risk-Adjusted Operative Mortality for Aortic Valve Replacement (AVR) (STS)
<b>Endorsement Activity</b>	Currently under review in surgery project	Currently under review in surgery project
<b>Level of Analysis</b>	Individual Clinician, Group Practice	Individual Clinician, Group Practice
<b>Setting</b>	Inpatient, Hospital	Inpatient, Hospital
<b>Measure Type</b>	Composite	Outcome
<b>Data Source</b>	Registry	Registry
<b>Measure Focus</b>	Operative mortality & major morbidity	Operative mortality
<b>Target Population</b>	Patients undergoing isolated AVR surgery	Patients undergoing isolated AVR surgery
<b>Numerator</b>	NQF 0120 Risk-Adjusted Operative Mortality for AVR NQF 0131 Risk-Adjusted Postoperative Stroke/Cerebrovascular Accident NQF 0115 Risk-Adjusted Postoperative Surgical Re-exploration NQF 0130 Risk-Adjusted Postoperative Deep Sternal Wound Infection Rate NQF 0114 Risk-Adjusted Postoperative Renal Failure NQF 0129 Risk-Adjusted Postoperative Prolonged Intubation (Ventilation)	Number of patients aged 18 years and older undergoing AVR who die, including both 1) all deaths occurring during the hospitalization in which the operation was performed, even if after 30 days, and 2) those deaths occurring after discharge from the hospital, but within 30 days of the procedure
<b>Denominator</b>	Number of patients undergoing isolated AVR during the measurement period	All patients undergoing isolated AVR surgery
<b>Exclusions</b>	None	None

## Comparison of NQF 2563 and NQF 0123

NQF #	2563 STS Aortic Valve Replacement (AVR) + CABG Composite Score (STS)	0123 Risk-Adjusted Operative Mortality for Aortic Valve Replacement (AVR) + CABG (STS)
<b>Endorsement Activity</b>	Currently under review in surgery project	Currently under review in surgery project
<b>Level of Analysis</b>	Individual Clinician, Group Practice	Individual Clinician, Group Practice
<b>Setting</b>	Inpatient, Hospital	Inpatient, Hospital
<b>Measure Type</b>	Composite	Outcome
<b>Data Source</b>	Registry	Registry
<b>Measure Focus</b>	Operative mortality & major morbidity	Operative mortality
<b>Target Population</b>	Patients undergoing combined AVR + CABG surgery	Patients undergoing combined AVR + CABG surgery
<b>Numerator</b>	<p>NQF 0123 Risk-Adjusted Operative Mortality for AVR + CABG</p> <p>NQF 0131 Risk-Adjusted Postoperative Stroke/Cerebrovascular Accident</p> <p>NQF 0115 Risk-Adjusted Postoperative Surgical Re-exploration</p> <p>NQF 0130 Risk-Adjusted Postoperative Deep Sternal Wound Infection Rate</p> <p>NQF 0114 Risk-Adjusted Postoperative Renal Failure</p> <p>NQF 0129 Risk-Adjusted Postoperative Prolonged Intubation (Ventilation)</p>	Number of patients aged 18 years and older undergoing combined AVR and CABG who die, including both 1) all deaths occurring during the hospitalization in which the operation was performed, even if after 30 days, and 2) those deaths occurring after discharge from the hospital, but within 30 days of the procedure
<b>Denominator</b>	Number of patients undergoing AVR + CABG during the measurement period	All patients undergoing combined AVR + CABG
<b>Exclusions</b>	None	None

## Comparison of NQF 0121, NQF 1501 and NQF 3031

NQF #	0121 Risk-Adjusted Operative Mortality for Mitral Valve (MV) Replacement (STS)	1501 Risk-Adjusted Operative Mortality for Mitral Valve (MV) Repair (STS)	3031 Mitral Valve Repair/Replacement MVRR Composite (STS)
<b>Endorsement Activity</b>	Currently under review in surgery project	Currently under review in surgery project	Initially endorsed January 2017
<b>Level of Analysis</b>	Individual Clinician, Group Practice	Individual Clinician, Group Practice	Individual Clinician, Group Practice
<b>Setting</b>	Inpatient, Hospital	Inpatient, Hospital	Inpatient, Hospital
<b>Measure Type</b>	Outcome	Outcome	Composite
<b>Data Source</b>	Registry	Registry	Registry
<b>Measure Focus</b>	Operative mortality	Operative mortality	Operative mortality and major morbidity
<b>Target Population</b>	Patients undergoing isolated MV replacement surgery	Patients undergoing isolated MV repair surgery	Patients undergoing MV repair/replacement surgery



NQF #	0121 Risk-Adjusted Operative Mortality for Mitral Valve (MV) Replacement (STS)	1501 Risk-Adjusted Operative Mortality for Mitral Valve (MV) Repair (STS)	3031 Mitral Valve Repair/Replacement MVRR Composite (STS)
<b>Numerator</b>	Number of patients aged 18 years and older undergoing MV Replacement who die, including both 1) all deaths occurring during the hospitalization in which the operation was performed, even if after 30 days, and 2) those deaths occurring after discharge from the hospital, but within 30 days of the procedure	Number of patients aged 18 years and older undergoing MV Repair who die, including both 1) all deaths occurring during the hospitalization in which the operation was performed, even if after 30 days, and 2) those deaths occurring after discharge from the hospital, but within 30 days of the procedure	Surgical performance for isolated MVRR with or without concomitant tricuspid valve repair (TVr), surgical ablation for atrial fibrillation (AF), or repair of atrial septal defect (ASD). To assess overall quality, the STS MVRR Composite Score comprises two domains consisting of <b>six measures</b> : Risk-adjusted operative mortality 0131 – Stroke/cerebrovascular accident 0115 – Surgical re-exploration 0130 – Deep sternal wound infection rate 0114 – Postoperative renal failure 0129 – Prolonged intubation (ventilation)
<b>Denominator</b>	All patients undergoing isolated MV replacement surgery	All patients undergoing isolated MV repair surgery	All patients undergoing isolated MVRR with or without concomitant tricuspid valve repair (TVr), surgical ablation for atrial fibrillation (AF), or repair of atrial septal defect (ASD)
<b>Exclusions</b>	None	None	Participants are excluded from the analysis if they have fewer than 36 isolated MVRR procedures in the patient population.

## Comparison of NQF 0122, NQF 1502 and NQF 3032

NQF #	0122 Risk-Adjusted Operative Mortality for Mitral Valve (MV) Replacement + CABG Surgery (STS)	1502 Risk-Adjusted Operative Mortality for Mitral Valve (MV) Repair + CABG Surgery (STS)	3032 Mitral Valve Repair/Replacement (MVRR) + CABG Composite (STS)
<b>Endorsement Activity</b>	Currently under review in surgery project	Currently under review in surgery project	Initially endorsed January 2017
<b>Level of Analysis</b>	Individual Clinician, Group Practice	Individual Clinician, Group Practice	Individual Clinician, Group Practice
<b>Setting</b>	Inpatient, Hospital	Inpatient, Hospital	Inpatient, Hospital
<b>Measure Type</b>	Outcome	Outcome	Composite
<b>Data Source</b>	Registry	Registry	Registry
<b>Measure Focus</b>	Operative mortality	Operative mortality	Operative mortality and major morbidity
<b>Target Population</b>	Patients undergoing isolated MV replacement surgery + CABG	Patients undergoing isolated MV repair surgery + CABG	Patients undergoing MV repair/replacement surgery + CABG

NQF #	0122 Risk-Adjusted Operative Mortality for Mitral Valve (MV) Replacement + CABG Surgery (STS)	1502 Risk-Adjusted Operative Mortality for Mitral Valve (MV) Repair + CABG Surgery (STS)	3032 Mitral Valve Repair/Replacement (MVRR) + CABG Composite (STS)
<b>Numerator</b>	Number of patients aged 18 years and older undergoing combined MV Replacement and CABG who die, including both 1) all deaths occurring during the hospitalization in which the operation was performed, even if after 30 days, and 2) those deaths occurring after discharge from the hospital, but within 30 days of the procedure	Number of patients aged 18 years and older undergoing combined MV Repair and CABG who die, including both 1) all deaths occurring during the hospitalization in which the operation was performed, even if after 30 days, and 2) those deaths occurring after discharge from the hospital, but within 30 days of the procedure	<p>The STS Mitral Valve Repair/Replacement (MVRR) Composite Score comprises two domains consisting of six measures:</p> <p>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.</p> <p>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:</p> <ol style="list-style-type: none"> <li>1. Prolonged ventilation,</li> <li>2. Deep sternal wound infection,</li> <li>3. Permanent stroke,</li> <li>4. Renal failure, and</li> <li>5. Reoperations for bleeding, coronary graft occlusion, prosthetic or native valve dysfunction, and other cardiac reasons, but not for other non-cardiac reasons.</li> </ol>
<b>Denominator</b>	All patients undergoing combined MV Replacement + CABG	All patients undergoing combined MV Repair + CABG	All patients undergoing 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)
<b>Exclusions</b>	None	None	Participants are excluded from the analysis if they have fewer than 25 MVRR + CABG procedures in the patient population.

## **Appendix E2: Related and Competing Measures (narrative format)**

### **Comparison of NQF 2561 and NQF 0120**

2561 STS Aortic Valve Replacement (AVR) Composite Score (STS)

0120 Risk-Adjusted Operative Mortality for Aortic Valve Replacement (AVR) (STS)

#### *Endorsement Activity*

##### **2561 STS Aortic Valve Replacement (AVR) Composite Score (STS)**

Currently under review in surgery project

##### **0120 Risk-Adjusted Operative Mortality for Aortic Valve Replacement (AVR) (STS)**

Currently under review in surgery project

#### *Level of Analysis*

##### **2561 STS Aortic Valve Replacement (AVR) Composite Score (STS)**

Individual Clinician, Group Practice

##### **0120 Risk-Adjusted Operative Mortality for Aortic Valve Replacement (AVR) (STS)**

Individual Clinician, Group Practice

#### *Setting*

##### **2561 STS Aortic Valve Replacement (AVR) Composite Score (STS)**

Inpatient, Hospital

##### **0120 Risk-Adjusted Operative Mortality for Aortic Valve Replacement (AVR) (STS)**

Inpatient, Hospital

#### *Measure Type*

##### **2561 STS Aortic Valve Replacement (AVR) Composite Score (STS)**

Composite

##### **0120 Risk-Adjusted Operative Mortality for Aortic Valve Replacement (AVR) (STS)**

Outcome

#### *Data Source*

##### **2561 STS Aortic Valve Replacement (AVR) Composite Score (STS)**

Registry

##### **0120 Risk-Adjusted Operative Mortality for Aortic Valve Replacement (AVR) (STS)**

Registry

#### *Measure Focus*

##### **2561 STS Aortic Valve Replacement (AVR) Composite Score (STS)**

Operative mortality & major morbidity

##### **0120 Risk-Adjusted Operative Mortality for Aortic Valve Replacement (AVR) (STS)**

Operative mortality

### *Target Population*

#### **2561 STS Aortic Valve Replacement (AVR) Composite Score (STS)**

Patients undergoing isolated AVR surgery

#### **0120 Risk-Adjusted Operative Mortality for Aortic Valve Replacement (AVR) (STS)**

Patients undergoing isolated AVR surgery

### *Numerator*

#### **2561 STS Aortic Valve Replacement (AVR) Composite Score (STS)**

NQF 0120 Risk-Adjusted Operative Mortality for AVR

NQF 0131 Risk-Adjusted Postoperative Stroke/Cerebrovascular Accident

NQF 0115 Risk-Adjusted Postoperative Surgical Re-exploration

NQF 0130 Risk-Adjusted Postoperative Deep Sternal Wound Infection Rate

NQF 0114 Risk-Adjusted Postoperative Renal Failure

NQF 0129 Risk-Adjusted Postoperative Prolonged Intubation (Ventilation)

#### **0120 Risk-Adjusted Operative Mortality for Aortic Valve Replacement (AVR) (STS)**

Number of patients aged 18 years and older undergoing AVR who die, including both 1) all deaths occurring during the hospitalization in which the operation was performed, even if after 30 days, and 2) those deaths occurring after discharge from the hospital, but within 30 days of the procedure

### *Denominator*

#### **2561 STS Aortic Valve Replacement (AVR) Composite Score (STS)**

Number of patients undergoing isolated AVR during the measurement period

#### **0120 Risk-Adjusted Operative Mortality for Aortic Valve Replacement (AVR) (STS)**

All patients undergoing isolated AVR surgery

### *Exclusions*

#### **2561 STS Aortic Valve Replacement (AVR) Composite Score (STS)**

None

#### **0120 Risk-Adjusted Operative Mortality for Aortic Valve Replacement (AVR) (STS)**

None

## Comparison of NQF 2563 and NQF 0123

2563 STS Aortic Valve Replacement (AVR) + CABG Composite Score (STS)

0123 Risk-Adjusted Operative Mortality for Aortic Valve Replacement (AVR) + CABG (STS)

### *Endorsement Activity*

#### **2563 STS Aortic Valve Replacement (AVR) + CABG Composite Score (STS)**

Currently under review in surgery project

#### **0123 Risk-Adjusted Operative Mortality for Aortic Valve Replacement (AVR) + CABG (STS)**

Currently under review in surgery project

### *Level of Analysis*

#### **2563 STS Aortic Valve Replacement (AVR) + CABG Composite Score (STS)**

Individual Clinician, Group Practice

#### **0123 Risk-Adjusted Operative Mortality for Aortic Valve Replacement (AVR) + CABG (STS)**

Individual Clinician, Group Practice

### *Setting*

#### **2563 STS Aortic Valve Replacement (AVR) + CABG Composite Score (STS)**

Inpatient, Hospital

#### **0123 Risk-Adjusted Operative Mortality for Aortic Valve Replacement (AVR) + CABG (STS)**

Inpatient, Hospital

### *Measure Type*

#### **2563 STS Aortic Valve Replacement (AVR) + CABG Composite Score (STS)**

Composite

#### **0123 Risk-Adjusted Operative Mortality for Aortic Valve Replacement (AVR) + CABG (STS)**

Outcome

### *Data Source*

#### **2563 STS Aortic Valve Replacement (AVR) + CABG Composite Score (STS)**

Registry

#### **0123 Risk-Adjusted Operative Mortality for Aortic Valve Replacement (AVR) + CABG (STS)**

Registry

### *Measure Focus*

#### **2563 STS Aortic Valve Replacement (AVR) + CABG Composite Score (STS)**

Operative mortality & major morbidity

#### **0123 Risk-Adjusted Operative Mortality for Aortic Valve Replacement (AVR) + CABG (STS)**

Operative mortality

### *Target Population*

#### **2563 STS Aortic Valve Replacement (AVR) + CABG Composite Score (STS)**

Patients undergoing combined AVR + CABG surgery

#### **0123 Risk-Adjusted Operative Mortality for Aortic Valve Replacement (AVR) + CABG (STS)**

Patients undergoing combined AVR + CABG surgery

### *Numerator*

#### **2563 STS Aortic Valve Replacement (AVR) + CABG Composite Score (STS)**

NQF 0123 Risk-Adjusted Operative Mortality for AVR + CABG

NQF 0131 Risk-Adjusted Postoperative Stroke/Cerebrovascular Accident

NQF 0115 Risk-Adjusted Postoperative Surgical Re-exploration

NQF 0130 Risk-Adjusted Postoperative Deep Sternal Wound Infection Rate

NQF 0114 Risk-Adjusted Postoperative Renal Failure

NQF 0129 Risk-Adjusted Postoperative Prolonged Intubation (Ventilation)

#### **0123 Risk-Adjusted Operative Mortality for Aortic Valve Replacement (AVR) + CABG (STS)**

Number of patients aged 18 years and older undergoing combined AVR and CABG who die, including both 1) all deaths occurring during the hospitalization in which the operation was performed, even if after 30 days, and 2) those deaths occurring after discharge from the hospital, but within 30 days of the procedure

### *Denominator*

#### **2563 STS Aortic Valve Replacement (AVR) + CABG Composite Score (STS)**

Number of patients undergoing AVR + CABG during the measurement period

#### **0123 Risk-Adjusted Operative Mortality for Aortic Valve Replacement (AVR) + CABG (STS)**

All patients undergoing combined AVR + CABG

### *Exclusions*

#### **2563 STS Aortic Valve Replacement (AVR) + CABG Composite Score (STS)**

None

#### **0123 Risk-Adjusted Operative Mortality for Aortic Valve Replacement (AVR) + CABG (STS)**

None

## Comparison of NQF 0121, NQF 1501 and NQF 3031

0121 Risk-Adjusted Operative Mortality for Mitral Valve (MV) Replacement (STS)

1501 Risk-Adjusted Operative Mortality for Mitral Valve (MV) Repair (STS)

3031 Mitral Valve Repair/Replacement MVRR Composite (STS)

### *Endorsement Activity*

#### **0121 Risk-Adjusted Operative Mortality for Mitral Valve (MV) Replacement (STS)**

Currently under review in surgery project

#### **1501 Risk-Adjusted Operative Mortality for Mitral Valve (MV) Repair (STS)**

Currently under review in surgery project

#### **3031 Mitral Valve Repair/Replacement MVRR Composite (STS)**

Initially endorsed January 2017

### *Level of Analysis*

#### **0121 Risk-Adjusted Operative Mortality for Mitral Valve (MV) Replacement (STS)**

Individual Clinician, Group Practice

#### **1501 Risk-Adjusted Operative Mortality for Mitral Valve (MV) Repair (STS)**

Individual Clinician, Group Practice

#### **3031 Mitral Valve Repair/Replacement MVRR Composite (STS)**

Individual Clinician, Group Practice

### *Setting*

#### **0121 Risk-Adjusted Operative Mortality for Mitral Valve (MV) Replacement (STS)**

Inpatient, Hospital

#### **1501 Risk-Adjusted Operative Mortality for Mitral Valve (MV) Repair (STS)**

Inpatient, Hospital

#### **3031 Mitral Valve Repair/Replacement MVRR Composite (STS)**

Inpatient, Hospital

### *Measure Type*

#### **0121 Risk-Adjusted Operative Mortality for Mitral Valve (MV) Replacement (STS)**

Outcome

#### **1501 Risk-Adjusted Operative Mortality for Mitral Valve (MV) Repair (STS)**

Outcome

#### **3031 Mitral Valve Repair/Replacement MVRR Composite (STS)**

Composite

### *Data Source*

#### **0121 Risk-Adjusted Operative Mortality for Mitral Valve (MV) Replacement (STS)**

Registry



**1501 Risk-Adjusted Operative Mortality for Mitral Valve (MV) Repair (STS)**

Registry

**3031 Mitral Valve Repair/Replacement MVRR Composite (STS)**

Registry

*Measure Focus*

**0121 Risk-Adjusted Operative Mortality for Mitral Valve (MV) Replacement (STS)**

Operative mortality

**1501 Risk-Adjusted Operative Mortality for Mitral Valve (MV) Repair (STS)**

Operative mortality

**3031 Mitral Valve Repair/Replacement MVRR Composite (STS)**

Operative mortality and major morbidity

*Target Population*

**0121 Risk-Adjusted Operative Mortality for Mitral Valve (MV) Replacement (STS)**

Patients undergoing isolated MV replacement surgery

**1501 Risk-Adjusted Operative Mortality for Mitral Valve (MV) Repair (STS)**

Patients undergoing isolated MV repair surgery

**3031 Mitral Valve Repair/Replacement MVRR Composite (STS)**

Patients undergoing MV repair/replacement surgery

*Numerator*

**0121 Risk-Adjusted Operative Mortality for Mitral Valve (MV) Replacement (STS)**

Number of patients aged 18 years and older undergoing MV Replacement who die, including both 1) all deaths occurring during the hospitalization in which the operation was performed, even if after 30 days, and 2) those deaths occurring after discharge from the hospital, but within 30 days of the procedure

**1501 Risk-Adjusted Operative Mortality for Mitral Valve (MV) Repair (STS)**

Number of patients aged 18 years and older undergoing MV Repair who die, including both 1) all deaths occurring during the hospitalization in which the operation was performed, even if after 30 days, and 2) those deaths occurring after discharge from the hospital, but within 30 days of the procedure

**3031 Mitral Valve Repair/Replacement MVRR Composite (STS)**

Surgical performance for isolated MVRR with or without concomitant tricuspid valve repair (TVr), surgical ablation for atrial fibrillation (AF), or repair of atrial septal defect (ASD). To assess overall quality, the STS MVRR Composite Score comprises two domains consisting of **six measures:**

Risk-adjusted operative mortality

0131 – Stroke/cerebrovascular accident

0115 – Surgical re-exploration

0130 – Deep sternal wound infection rate

- 0114 – Postoperative renal failure
- 0129 – Prolonged intubation (ventilation)

#### *Denominator*

##### **0121 Risk-Adjusted Operative Mortality for Mitral Valve (MV) Replacement (STS)**

All patients undergoing isolated MV replacement surgery

##### **1501 Risk-Adjusted Operative Mortality for Mitral Valve (MV) Repair (STS)**

All patients undergoing isolated MV repair surgery

##### **3031 Mitral Valve Repair/Replacement MVRR Composite (STS)**

All patients undergoing isolated MVRR with or without concomitant tricuspid valve repair (TVr), surgical ablation for atrial fibrillation (AF), or repair of atrial septal defect (ASD)

#### *Exclusions*

##### **0121 Risk-Adjusted Operative Mortality for Mitral Valve (MV) Replacement (STS)**

None

##### **1501 Risk-Adjusted Operative Mortality for Mitral Valve (MV) Repair (STS)**

None

##### **3031 Mitral Valve Repair/Replacement MVRR Composite (STS)**

Participants are excluded from the analysis if they have fewer than 36 isolated MVRR procedures in the patient population.

## Comparison of NQF 0122, NQF 1502 and NQF 3032

0122 Risk-Adjusted Operative Mortality for Mitral Valve (MV) Replacement + CABG Surgery (STS)

1502 Risk-Adjusted Operative Mortality for Mitral Valve (MV) Repair + CABG Surgery (STS)

3032 Mitral Valve Repair/Replacement (MVRR) + CABG Composite (STS)

### *Endorsement Activity*

#### **0122 Risk-Adjusted Operative Mortality for Mitral Valve (MV) Replacement + CABG Surgery (STS)**

Currently under review in surgery project

#### **1502 Risk-Adjusted Operative Mortality for Mitral Valve (MV) Repair + CABG Surgery (STS)**

Currently under review in surgery project

#### **3032 Mitral Valve Repair/Replacement (MVRR) + CABG Composite (STS)**

Initially endorsed January 2017

### *Level of Analysis*

#### **0122 Risk-Adjusted Operative Mortality for Mitral Valve (MV) Replacement + CABG Surgery (STS)**

Individual Clinician, Group Practice

#### **1502 Risk-Adjusted Operative Mortality for Mitral Valve (MV) Repair + CABG Surgery (STS)**

Individual Clinician, Group Practice

#### **3032 Mitral Valve Repair/Replacement (MVRR) + CABG Composite (STS)**

Individual Clinician, Group Practice

### *Setting*

#### **0122 Risk-Adjusted Operative Mortality for Mitral Valve (MV) Replacement + CABG Surgery (STS)**

Inpatient, Hospital

#### **1502 Risk-Adjusted Operative Mortality for Mitral Valve (MV) Repair + CABG Surgery (STS)**

Inpatient, Hospital

#### **3032 Mitral Valve Repair/Replacement (MVRR) + CABG Composite (STS)**

Inpatient, Hospital

### *Measure Type*

#### **0122 Risk-Adjusted Operative Mortality for Mitral Valve (MV) Replacement + CABG Surgery (STS)**

Outcome

#### **1502 Risk-Adjusted Operative Mortality for Mitral Valve (MV) Repair + CABG Surgery (STS)**

Outcome

#### **3032 Mitral Valve Repair/Replacement (MVRR) + CABG Composite (STS)**

Composite

### *Data Source*

#### **0122 Risk-Adjusted Operative Mortality for Mitral Valve (MV) Replacement + CABG Surgery (STS)**

Registry

#### **1502 Risk-Adjusted Operative Mortality for Mitral Valve (MV) Repair + CABG Surgery (STS)**

Registry

#### **3032 Mitral Valve Repair/Replacement (MVRR) + CABG Composite (STS)**

Registry

### *Measure Focus*

#### **0122 Risk-Adjusted Operative Mortality for Mitral Valve (MV) Replacement + CABG Surgery (STS)**

Operative mortality

#### **1502 Risk-Adjusted Operative Mortality for Mitral Valve (MV) Repair + CABG Surgery (STS)**

Operative mortality

#### **3032 Mitral Valve Repair/Replacement (MVRR) + CABG Composite (STS)**

Operative mortality and major morbidity

### *Target Population*

#### **0122 Risk-Adjusted Operative Mortality for Mitral Valve (MV) Replacement + CABG Surgery (STS)**

Patients undergoing isolated MV replacement surgery + CABG

#### **1502 Risk-Adjusted Operative Mortality for Mitral Valve (MV) Repair + CABG Surgery (STS)**

Patients undergoing isolated MV repair surgery + CABG

#### **3032 Mitral Valve Repair/Replacement (MVRR) + CABG Composite (STS)**

Patients undergoing MV repair/replacement surgery + CABG

### *Numerator*

#### **0122 Risk-Adjusted Operative Mortality for Mitral Valve (MV) Replacement + CABG Surgery (STS)**

Number of patients aged 18 years and older undergoing combined MV Replacement and CABG who die, including both 1) all deaths occurring during the hospitalization in which the operation was performed, even if after 30 days, and 2) those deaths occurring after discharge from the hospital, but within 30 days of the procedure

#### **1502 Risk-Adjusted Operative Mortality for Mitral Valve (MV) Repair + CABG Surgery (STS)**

Number of patients aged 18 years and older undergoing combined MV Repair and CABG who die, including both 1) all deaths occurring during the hospitalization in which the operation was performed, even if after 30 days, and 2) those deaths occurring after discharge from the hospital, but within 30 days of the procedure

### **3032 Mitral Valve Repair/Replacement (MVRR) + CABG Composite (STS)**

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.

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:

Prolonged ventilation,

Deep sternal wound infection,

Permanent stroke,

Renal failure, and

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

#### *Denominator*

#### **0122 Risk-Adjusted Operative Mortality for Mitral Valve (MV) Replacement + CABG Surgery (STS)**

All patients undergoing combined MV Replacement + CABG

#### **1502 Risk-Adjusted Operative Mortality for Mitral Valve (MV) Repair + CABG Surgery (STS)**

All patients undergoing combined MV Repair + CABG

#### **3032 Mitral Valve Repair/Replacement (MVRR) + CABG Composite (STS)**

All patients undergoing 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)

#### *Exclusions*

#### **0122 Risk-Adjusted Operative Mortality for Mitral Valve (MV) Replacement + CABG Surgery (STS)**

None

#### **1502 Risk-Adjusted Operative Mortality for Mitral Valve (MV) Repair + CABG Surgery (STS)**

None

#### **3032 Mitral Valve Repair/Replacement (MVRR) + CABG Composite (STS)**

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

National Quality Forum  
1030 15th St NW, Suite 800  
Washington, DC 20005  
<http://www.qualityforum.org>

ISBN 978-1-68248-131-8  
©2019 National Quality Forum