NQF-Endorsed Measures for Surgical Procedures, 2015-2017

DRAFT REPORT

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NATIONAL QUALITY FORUM

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DRAFT TECHNICAL REPORT

Executive Summary

The rate of surgical procedures continues to increase annually. The rate of procedures performed in freestanding ambulatory surgery centers increased by 300% in the ten-year period from 1996 to 2006. In 2006, an estimated 53.3 million surgical and nonsurgical procedures were performed in U.S. ambulatory surgery centers, both hospital-based and freestanding. In 2010, 51.4 million inpatient procedures were performed in non-federal hospitals in the United States. These data, and the potential for unintended consequences it portends, continues to explain the intense interest in measurement of surgical events and improvements.

The Surgery measure portfolio is one of NQF's largest and addresses cardiac, vascular, orthopedic, urologic, and gynecologic surgeries and includes adult, child and congenital measures as well as perioperative safety, care coordination, and a range of other clinical or procedural subtopics. Many of the measures in the portfolio are used in public and/or private sector accountability and quality improvement programs. However, while significant strides have been made in some areas, gaps remain in procedure areas as well as for measures that convey overall surgical quality, shared accountability, and patient focus.

The 25-member Surgery Standing Committee oversees the NQF surgery measure portfolio. The Committee evaluates both newly submitted and previously endorsed measures against NQF's measure evaluation criteria, identifies gaps in the measurement portfolio, provides feedback on how the portfolio should evolve, and serves on ad hoc or expedited projects in their designated topic areas.

On August 16-17, 2016, the Surgery Standing Committee evaluated ten new measures and 14 measures undergoing maintenance review against NQF's standard evaluation criteria. The Committee recommended 16 of these measures for endorsement; and eight were not recommended.

The 16 measures that are recommended by the Standing Committee are:

- 0117 Beta Blockade at Discharge
- 0127 Preoperative Beta Blockade
- 0134 Use of Internal Mammary Artery (IMA) in Coronary Artery Bypass Graft (CABG)
- 0351 Death Among Surgical Inpatients With Serious, Treatable Complications (PSI 4)
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- 3030 STS Individual Surgeon Composite Measure for Adult Cardiac Surgery
- 3031 STS Mitral Valve Repair/Replacement (MVRR) Composite Score
- 3032 STS Mitral Valve Repair/Replacement (MVRR) + Coronary Artery Bypass Graft (CABG) Composite Score

The Committee did not recommend the following measures:

- 0713 Ventriculoperitoneal (VP) Shunt Malfunction Rate in Children
- 2998 Infection Rate of Bicondylar Tibia Plateau Fractures
- 3024 Carotid Endarterectomy: Evaluation of Vital Status and NIH Stroke Scale at Follow Up
- 3016 PBM-01 Preoperative Anemia Screening
- 3017 PBM-02 Preoperative Hemoglobin Level
- 3019 PBM-03 Preoperative Blood Type Testing and Antibody Screening
- 3020 PBM-04 Initial Transfusion Threshold
- 3021 PBM-05 Blood Usage, Selected Elective Surgical Patients

Brief summaries of the measure reviews are included in the body of this report; detailed summaries of the Committee's discussion and ratings based on the criteria are included in Appendix A.

Introduction

Patients undergo surgery to repair injury, relieve symptoms, restore function, remove diseased organs and replace anatomical parts of the body. Many surgeries are planned though several types of surgery, such as trauma, fracture, and acute infection, or occur under emergency conditions. In 2006, an estimated 53.3 million procedures were performed in ambulatory surgery centers, both hospital-based and freestanding.[1] The rate of surgical procedures is increasing annually with 51.4 million inpatient surgeries performed in the United States in 2010.[2] Ambulatory surgical centers are the fastest growing provider type currently participating in Medicare.[3] The projected cost of a hospital stay for surgery in 2013 was $22,500.[4]

Surgery is a daunting prospect for patients, and increasingly consumers are seeking out information and turning to public reports of quality measures to make decisions about surgical care. In 2011, the Agency for Healthcare Research and Quality (AHRQ) studied users of public websites and publicly reported data. AHRQ found that the top medical conditions of interest to consumers using public websites are heart disease (27%) and surgery (23%).[5] The important aspects of quality for patients and families are the likelihood of surgical success—i.e., the surgery achieving its intended outcome—and avoidance of complications.

An important underpinning for the discussion of all measures in the project was that of the evaluation criteria and the specifications of measures as it relates to use of measures. The Surgery Standing Committee affirmed early in its discussions that the specifications of the measures and the criteria used to evaluate them for quality measurement should not differ based on use of the measures. The measures, and the science behind them, should be valid; the scientific merit of the measure is the central concern. While NQF endorsement is predicated on measures useful for both quality improvement and accountability, the uses to which measures are put are beyond the purview, and control, of the NQF committees.

Surgical Care

Care of a patient undergoing surgery can require many types of perioperative services from the time patients present for diagnosis of surgical need through post-surgical recovery and rehabilitation. High-quality care that is appropriate to the procedure and patient characteristics and is delivered by qualified and committed professionals is necessary for overall success of any surgery.

Ongoing concerns with the quality of surgical care and postoperative complications remain and include:

- Among Medicare patients, nearly one in seven patients hospitalized for a major surgical procedure is readmitted to the hospital within 30 days after discharge.[6]
- Unplanned readmission rates vary widely across surgery types but most often are associated with postoperative complications that occur after discharge.[7]
- Medicare payments around episodes of inpatient surgery are substantially higher at hospitals with high complication rates.[8]

- Despite overall improvement in surgical mortality, patients from low-income areas had worse surgical outcomes than those from high-income areas for nine of twelve measures in both 2000 and 2009.[9]

Trends and Performance

National Healthcare Quality Report

The National Healthcare Quality and Disparities Report Patient Safety Chartbook[10] identified several measures of the quality of surgical care:

- In 2013, the postoperative sepsis rate was 14.3 per 1,000 discharges with an elective operating room procedure.
- From 2009 to 2011, there were no statistically significant changes in the overall rate of postoperative catheter-associated urinary tract infections.
- From 2009 to 2013, the overall percentage of adverse events improved for patients who had hip joint replacement due to fracture or degenerative conditions. In 2013, 4.9% of patients receiving hip joint replacement experienced an adverse event.
- From 2008 to 2014, 30-day postoperative mortality after colorectal surgery improved. In 2014, risk-adjusted mortality rate among patients undergoing colorectal surgeries at ACS NSQIP participating hospitals was 3.1%. The rate was worse for Blacks (3.6%) compared with Whites (3.0%).
- In 2013, there were 19% fewer surgical site infections observed than predicted based on 2006 – 2008 baseline data.

Surgery Measure Evaluation: Refining the Evaluation Process

In an effort to respond to evolving stakeholder needs, NQF constantly works to improve the consensus development process (CDP). In 2014, NQF transitioned to the use of standing committees for ongoing maintenance of endorsed measures and in 2015, NQF updated its Maintenance of NQF Endorsement policy to emphasize what has been learned about previously endorsed measures. Changes to the Maintenance of Endorsement policy is described below.

Maintenance of NQF Endorsement

To streamline and improve the periodic evaluation of currently-endorsed measures, NQF has updated the way it re-evaluates measures for maintenance of endorsement. This change took effect beginning October 1, 2015. NQF's endorsement criteria have not changed, and all measures continue to be evaluated using the same criteria. However, under the new approach, there is a shift in emphasis for evaluation of currently-endorsed measures:

- **Evidence**: If the developer attests that the evidence for a measure has not changed since its previous endorsement evaluation, there is a decreased emphasis on evidence, meaning that the Committee may accept the prior evaluation of this criterion without further discussion or need for a vote. This applies only to measures that previously passed the evidence criterion without an exception. If a measure was granted an evidence exception, the evidence for that measure must be revisited.

- **Opportunity for Improvement (Gap)**: For re-evaluation of endorsed measures, there is increased emphasis on current performance and opportunity for improvement. Endorsed measures that are "topped out" with little opportunity for further improvement are eligible for Inactive Endorsement with Reserve Status.

- **Reliability**
  - Specifications: There is no change in the evaluation of the current specifications.
  - Testing: If the developer has not presented additional testing information, the Committee may accept the prior evaluation of the testing results without further discussion or need for a vote.

- **Validity:** There is less emphasis on this criterion if the developer has not presented additional testing information, and the Committee may accept the prior evaluation of this sub criterion without further discussion and vote. However, the Committee still considers whether the specifications are consistent with the evidence. Also, for outcome measures, the Committee discusses questions required for the SDS Trial even if no change in testing is presented.

- **Feasibility:** The emphasis on this criterion is the same for both new and previously-endorsed measures, as feasibility issues might have arisen for endorsed measures that have been implemented.

- **Usability and Use**: For re-evaluation of endorsed measures, there is increased emphasis on the use of the measure, especially use for accountability purposes. There also is an increased emphasis on improvement in results over time and on unexpected findings, both positive and negative.

NQF Portfolio of Performance Measures for Surgical Procedures/Conditions

NQF has endorsed at least 100 measures related to surgical care (Appendix B). These measures address subjects such as perioperative safety, cardiac surgery, vascular surgery, colorectal surgery, and a range of other clinical and procedural subtopics. For the purposes of maintenance, NQF's Surgery Standing Committee is responsible for 65 measures: 20 process measures, 33 outcome measures, 1 intermediate outcome measure, 5 structural measures, and 6 composite measures (Table 1).

Table 1. NQF Surgery Portfolio of Measures

Subtopic	Process	Outcome	Intermediate Outcome	Structure	Composite	Total
Cross-Cutting (Inpatient)	3	2	-	-	-	5
Cross-Cutting (Outpatient)	1	2	-	-	-	3
Cross-Cutting (Inpatient & Outpatient)	1	1	-	-	-	2
General Surgery	-	3	-	-	-	3
Anesthesia	1	-	1	-	-	2
Cardiac Surgery	8	12	-	1	6	27

Cardiac Surgery (Pediatric & Congenital)	-	4	-	3	-	7
Colorectal Surgery	-	1	-	-	-	1
Gynecology	2	-	-	-	-	2
Orthopedic Surgery	-	2	-	-	-	2
Urology	2	-	-	-	-	2
Thoracic Surgery	-	-	-	1	-	1
Vascular Surgery	2	6	-	-	-	8
Total	20	33	1	5	6	65

The remaining measures have been assigned to other endorsement projects. These include healthcare-associated infection measures (Patient Safety project), care coordination measures (Care Coordination project), imaging efficiency measures (Cost and Resource Use project), and a variety of condition- or procedure-specific outcome measures (Cardiovascular, Cancer, Renal, Pulmonary, etc.).

As NQF-endorsed measures undergo routine "maintenance" (i.e., re-evaluation) to ensure that they are the best available measures and reflect current evidence, some previously endorsed surgery measures have been removed from the NQF portfolio. In some cases, measure stewards elect to withdraw their measures from consideration; other measures have lost endorsement upon maintenance review. Loss of endorsement can occur for many different reasons including—but not limited to—a change in evidence without an associated change in measure specifications, universally high performance on a measure signifying no further opportunity for improvement, and endorsement of a superior measure.

NQF's portfolio of surgery measures is currently organized by topic area. However, the Surgery Standing Committee and other stakeholders are encouraged to consider other measurement domains, such as measure type (e.g., process, outcome, patient-reported), care setting, data source, clinical area, or other relevant factors, for the purposes of identifying and highlighting gaps in measurement related to surgery.

National Quality Strategy

NQF-endorsed measures for surgical care support the National Quality Strategy (NQS).[11] NQS serves as the overarching framework for guiding and aligning public and private efforts across all levels (local, state, and national) to improve the quality of healthcare in the U.S. The NQS establishes the "triple aim" of better care, affordable care, and healthy people/communities, focusing on six priorities to achieve those aims: *Safety, Person and Family Centered Care, Communication and Care Coordination, Effective Prevention and Treatment of Illness, Best Practices for Healthy Living, and Affordable Care.*

Quality measures for surgical care align with several of the NQS priorities, including:

- Making care safer by reducing harm caused in the delivery of care.
- Ensuring that each person and family is engaged as partners in their care.
- Promoting effective communication and coordination of care.

- Promoting the most effective prevention and treatment practices for the leading causes of mortality, starting with cardiovascular disease.

Effort across surgical disciplines to achieve the listed priorities is evident in the performance targets of the measures in the surgical portfolio and in the effort of developers who continue to come forward with strong evidence-based measures that focus on safe surgical care and patient and family engagement. Further, as structure and process measures continue to form a smaller proportion of the surgery portfolio they are increasingly replaced by a more broad-based group of measures that capture the range of perioperative care and outcomes by focusing on prevention of complications and return to pre-surgical function. In fact, these efforts taken together also help foster the other two NQS priorities of healthy living and affordable care.

Use of Measures in the Portfolio

Federal programs use many of the measures in the surgery portfolio (Appendix C). Additionally, NQF-endorsed surgery measures are in use as part of state, regional, and institutional quality improvement and reporting initiatives.

Endorsement of measures by NQF is valued not only because the evaluation process itself is both rigorous and transparent, but also because evaluations are conducted by multi-stakeholder committees comprised of clinicians and other experts from the full range of healthcare providers, employers, health plans, public agencies, community coalitions, and patients—many of whom use measures on a daily basis to ensure better care. Moreover, NQF-endorsed measures undergo routine "maintenance" (i.e., re-evaluation) to ensure that they are still the best available measures and reflect current science. Importantly, federal law requires that preference be given to NQF-endorsed measures for use in federal public reporting and performance-based payment programs. NQF-endorsed measures also are used by a variety of stakeholders in the private sector, including hospitals, health plans, and communities. Given the various uses of NQF-endorsed measures, the Committee suggested that NQF consider a tiered approach to endorsement that would recognize, by its tiered designation, measures suitable for uses from local self-improvement to public reporting with pay for performance. NQF staff and select Committee members shared findings from NQF's recent Intended Use project that concluded the evidence necessary to tier measures according to the intended use was not yet available.

Improving NQF's Surgery Portfolio

Committee Input on Gaps in the Portfolio

During its discussions and subsequent review of potential measure gaps, the Surgery Standing Committee emphasized the need for outcome measures from extensively validated databases and identified numerous areas where additional measure development is needed, including:

- Specialty areas that are still in early stages of quality measurement, including orthopedic surgery, bariatric surgery, neurosurgery, obstetrics, gynecology, and smaller specialties (MAP also identified gynecology and genitourinary measurement as gaps.)

- Pediatric (<18 years of age), including morbidity and mortality, either added to existing measures or specific to pediatric populations
- Adult and pediatric morbidity and mortality related to frequently performed cardiac procedures beyond measures now available
- Post-surgical functional status, including neurodevelopmental morbidity following pediatric and congenital heart surgery
- Surgery-related infections
- Patient-centered approach to decision-making including determination to forego treatment
- Aggregated picture of episodes of care, including short- and long-term morbidity and patient reported outcomes, to include measures that cross organizational borders
- Discharge coordination
- Shared accountability

Concern for lack of pediatric measures was a theme throughout the meeting. While constructing measures that include both adult and pediatric populations has been a concern based on issues around inherent differences in diseases in these groups, there was an expressed belief that a subset of the measures could be applied to children. The Committee would like a pediatric component included in measures within the surgery portfolio wherever possible or to see the rationale for exclusion (See Appendix B). Several other surgery-related measures outside the Surgery Standing Committee's purview were also flagged because they did not include children. These recommendations will be shared with the relevant committees for consideration.

As in previous phases, the Committee discussed the value of appropriately constructed registries in filling gaps as well as monitoring and reporting quality. The superior ability of registries to accurately capture data regarding complications contributes to both the reliability and validity of measurement and has been a significant part of the reason that the surgical specialties are moving to registry-based measurement. Still, there remain challenges for both the registries and for participating entities. Start-up costs, data collection instruments, research that leads to measure development, testing, application, and maintenance are the major costs of establishing, growing and maintaining registries. Registry participation fees help defray some of those costs. Participating entities often belong to multiple registries and, in addition to registry fees, employ staff dedicated to record review, data extraction and registry submission. The costs and value of registry participation will continue to provide both challenge and opportunity.

Surgery Measure Evaluation

On August 16 - 17, 2016 the Surgery Standing Committee evaluated 10 new measures, and 14 measures undergoing maintenance review against NQF's standard evaluation criteria. Of these, the Committee recommended 14 for initial or continued endorsement; did not recommend eight measures and did not reach consensus on two measures. The Committee's discussion and ratings of the criteria are summarized in the evaluation tables in Appendix A.

During the post draft report comment call on November 7, 2016, the Committee reconvened to discuss public comments received; re-evaluate two measures where consensus was not reached; and to review

a request for reconsideration. Of the two measures where consensus was not reached, one was recommended for continued endorsement and the other was not approved for trial use. The Committee reviewed the measure where the developer had requested a reconsideration and recommended that measure for continued endorsement.

Table 2 summarizes the results of the Committee's evaluation.

Table 2. Surgery Measure Evaluation Summary

	Maintenance	New	Total
Measures under consideration	14	10	24
Measures endorsed	13	3	16
Measures not recommended for endorsement	1	7	8
Reasons for not recommending	Importance -1 Scientific Acceptability -1 Overall – 0	Importance-5 Scientific Acceptability -2 Overall – 0	

Evaluation of eMeasures for Trial Use

The Standing Committee evaluated five new eMeasure(s) for NQF Approval for Trial Use. NQF Approval for Trial Use is intended for eMeasures that are ready for implementation but cannot yet be adequately tested to meet NQF endorsement criteria. NQF uses the multi-stakeholder consensus process to evaluate and approve eMeasures for trial use that address important areas for performance measurement and quality improvement, though they may not have the requisite testing data needed for NQF endorsement. These eMeasures must be assessed to be technically acceptable for implementation. The goal for approving eMeasures for trial use is to promote implementation of innovative and needed measures and the ability to conduct more robust reliability and validity testing that can take advantage of clinical data in electronic health records.

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 has begun soliciting comments prior to evaluation of measures via an online tool located on the project webpage. For this evaluation cycle, the pre-evaluation comment period was open from June 30 – July 14, 2016 for all measures under review. One pre-evaluation comment was received (Appendix G) and provided to the Committee prior to its deliberations during the in-person meeting. The commentary supported endorsement of the measure.

Overarching Issues

During the Standing Committee's discussion of the measures, a number of overarching issues were considered. The issues discussed below are not repeated in detail with each individual measure.

Reserve Status

In its review of measures that have been in use for some years, the Committee looked carefully at whether there was a continued gap in performance representing opportunity for improvement. In 2010, the NQF Board of Directors approved a category of endorsement called "Reserve Status" for measures that meet all criteria except *1b. Opportunity for Improvement*. While identifying a single measure for Reserve Status, the Committee noted that the designation represents an opportunity to hold these fully endorsed measures at the ready, while decreasing the burden of data collection when performance is high. Measures designated for Reserve Status remain available for use both as individual measures and in combination with other measures, such as components of composites. The Committee observed that the opportunity for improvement for measures derived from databases where participation is quite high versus those where reporting and data capture is elective and variable could be very different and should be considered in that light. In terms of viewing opportunity for improvement in different ways, recent decisions by the Consensus Standards Approval Committee (CSAC) permits NQF committees to apply the concept of improvement opportunity somewhat more liberally for low occurrence outcomes and those that should never occur. In such instances, committees may deem that there is opportunity for improvement at a lower threshold than would otherwise be expected.

Increasing Measure Utility

The Committee noted that surgery is moving to use of registries for collecting and reporting performance data. While claims data continues to be collected, some organizations are moving away from using claims data as other data sources become available. Members suggested that while all data sources have challenges, measures can be appropriately specified for collection through both registries using standardized collection processes and through administrative claims or clinical data using ICD, CPT codes, chart review, etc., to facilitate their use by more providers. The Committee noted that while robust clinical data are preferred over administrative data, the latter can provide significant, complementary information.

Summary of Measure Evaluation

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

Measures Recommended

0117 Beta Blockade at Discharge (The Society of Thoracic Surgeons): Recommended

Description: Percent of patients aged 18 years and older undergoing isolated CABG who were discharged on beta blockers; **Measure Type**: Process; **Level of Analysis**: Facility, Clinician: Group/Practice; **Setting of Care**: Hospital/Acute Care Facility; **Data Source**: Electronic Clinical Data : Registry

This maintenance measure was endorsed in 2007 and is based on evidence that beta blockers should be prescribed to all coronary artery bypass graft (CABG) patients without contraindication upon discharge. The measure is reported by STS Public Reporting Online and Consumer Health Reports. The Committee

agreed that the evidence has not changed since the prior NQF endorsement review and accepted the prior evaluation. Committee members also continued support of the measure based on the large percentage of providers using the measure. The Committee agreed the measure meets NQF criteria and recommended it for continued endorsement.

0127 Preoperative Beta Blockade (The Society of Thoracic Surgeons): Recommended

Description: Percent of patients aged 18 years and older undergoing isolated CABG who received beta blockers within 24 hours preceding surgery; **Measure Type**: Process; **Level of Analysis**: Facility, Clinician : Group/Practice; **Setting of Care**: Hospital/Acute Care Facility; **Data Source**: Electronic Clinical Data : Registry

This maintenance measure was endorsed in 2007 and is a companion measure to #0117. The measure is based on evidence that beta blockers should be prescribed to clients at least 24 hours prior to isolated CABG. This measure is reported by STS Public Reporting Online and in Centers for Medicare & Medicaid Services' Physician Quality Reporting System (PQRS). The Committee agreed that the evidence has not changed since the prior NQF endorsement review and accepted the prior evaluation. Overall, the Committee continued support of the measure based on use and the percentage of cardiac surgery centers that participate in the database. The Committee agreed the measure meets NQF criteria and recommended it for continued endorsement.

0134 Use of Internal Mammary Artery (IMA) in Coronary Artery Bypass Graft (CABG) (The Society of Thoracic Surgeons): Recommended

Description: Percentage of patients aged 18 years and older undergoing isolated coronary artery bypass graft (CABG) who received an internal mammary artery (IMA) graft; **Measure Type**: Process ; **Level of Analysis**: Facility, Clinician : Group/Practice; **Setting of Care**: Hospital/Acute Care Facility; **Data Source**: Electronic Clinical Data : Registry

This maintenance measure was endorsed in 2007 and is based on evidence that the left internal mammary artery (IMA) should be used in CABG. This measure is reported by STS Public Reporting and in PQRS. The Committee agreed that the evidence has not changed since the prior NQF endorsement review and accepted the prior evaluation. Overall, the Committee continued support of the measure based on use and the percentage of cardiac surgery centers that participate in the database. The Committee agreed the measure meets all NQF criteria and recommended it for continued endorsement.

0351 Death among surgical inpatients with serious, treatable complications (PSI 4) (Agency for Health Care Research and Quality): Recommended

Description: In-hospital deaths per 1,000 surgical discharges, among patients ages 18 through 89 years or obstetric patients, with serious treatable complications (shock/cardiac arrest, sepsis, pneumonia, deep vein thrombosis/ pulmonary embolism or gastrointestinal hemorrhage/acute ulcer). Includes metrics for the number of discharges for each type of complication. Excludes cases transferred to an acute care facility. A risk-adjusted rate is available. The risk-adjusted rate of PSI 04 relies on stratum-specific risk models. The stratum-specific models are combined to calculate an overall risk-adjusted

rate. **Measure Type**: Outcome; **Level of Analysis**: Facility; **Setting of Care**: Hospital/Acute Care Facility; **Data Source**: Administrative claims

NQF #0351 is a facility-level measure originally endorsed in 2008; endorsement was renewed in 2012. This measure is used for quality improvement by health insurance companies and health systems and is publicly reported through a number of sources including Hospital Compare, Consumer Reports, HealthGrades, and several state reporting programs. The Committee agreed that the underlying evidence has remained essentially unchanged since last NQF endorsement review and accepted the prior evaluation. The Committee also agreed there is a gap in care. Discussion of the scientific acceptability of the measure focused on a number of concerns including: claims data cannot accurately capture complications reliably; to improve signal, the risk adjustment strategy includes patients transferred in with complications present on admission, thus, inappropriately penalizing institutions and does not include the transfers out thus providing a potential for "gaming"; and absence of testing data that demonstrates the measure assesses what it is supposed to measure.

During the member and public commenting period, the developer submitted a request for reconsideration on the grounds that the Committee did not appropriately review and evaluate the measure on the Validity criteria; the Committee's discussion included concerns about how the measures might be used rather than focusing solely on scientific acceptability of the measure; and a separate NQF committee reviewed a similar measure and reached a different conclusion than did the Surgery Standing Committee, e.g., inconsistent review of measures across NQF standing committees. The developer also submitted additional information on transfers, risk adjustment, and use of claims data to measure complications. On the post draft report comment call, the Committee reviewed the reconsideration request and the additional testing data submitted by the developer. Ultimately, the Committee agreed to reconsider the measure for endorsement. After a review and discussion of the additional data submitted, the Committee re-voted and passed the measure on the Validity criterion. The Committee agreed the measure was feasible, and in discussion of usability, did not agree that the measure met this criterion, noting that the measure was not specific enough to aid providers in performance improvement and in recognizing patterns. Overall, the Committee recommended the measure for continued endorsement.

0697 Risk Adjusted Case Mix Adjusted Elderly Surgery Outcomes Measure (American College of Surgeons): Recommended

Description: This is a hospital based, risk adjusted, case mix adjusted elderly surgery aggregate clinical outcomes measure of adults 65 years of age and older.; **Measure Type**: Outcome; **Level of Analysis**: Facility; **Setting of Care**: Ambulatory Care: Ambulatory Surgery Center (ASC), Hospital/Acute Care Facility; **Data Source**: Electronic Clinical Data, Electronic Clinical Data: Electronic Health Record, Electronic Clinical Data: Imaging/Diagnostic Study, Electronic Clinical Data: Laboratory, Electronic Clinical Data: Pharmacy, Electronic Clinical Data: Registry, Management Data, Paper Medical Records

This facility-level, outcome measure was endorsed in 2011. It is currently in use for quality improvement through the American College of Surgeons (ACS) National Surgical Quality Improvement

Program (NSQIP) registry for the 600 participating hospitals. It is publicly reported in Hospital Compare. The Committee agreed that, other than new evidence supporting the exclusion of venous thromboembolism (VTE) from the measure on the basis of potential surveillance bias, evidence has not changed since the prior NQF endorsement review and they accepted the prior evaluation. The Committee agreed that the observed to expected ratio range indicates there is room for improvement. The Committee agreed the measure meets NQF criteria and recommended it for continued endorsement.

0706 Risk Adjusted Colon Surgery Outcome Measure (American College of Surgeons): Recommended

Description: This is a hospital based, risk adjusted, case mix adjusted morbidity and mortality aggregate outcome measure of adults 18+ years undergoing colon surgery.; **Measure Type**: Outcome; **Level of Analysis**: Facility, Population: National; **Setting of Care**: Ambulatory Care: Ambulatory Surgery Center (ASC), Hospital/Acute Care Facility; **Data Source**: Electronic Clinical Data: Electronic Health Record, Electronic Clinical Data: Imaging/Diagnostic Study, Electronic Clinical Data: Laboratory, Electronic Clinical Data: Registry, Management Data, Paper Medical Records

This facility-level, outcome measure was endorsed in 2011. It is currently in use for quality improvement through the ACS NSQIP registry for the 600 participating hospitals. One hundred thirty-one hospitals currently voluntarily report surgery outcomes data through Hospital Compare. The Committee agreed that, other than new evidence supporting the exclusion of VTE from the measure on the basis of potential surveillance bias, evidence has not changed since the prior NQF endorsement review and accepted the prior evaluation. The Committee agreed that the observed to expected ratio range and complication rate which it represents indicates there is room for improvement. The Committee agreed the measure meets NQF criteria and recommended it for continued endorsement.

1519 Statin Therapy at Discharge after Lower Extremity Bypass (LEB) (Society for Vascular Surgery): Recommended

Description: Percentage of patients aged 18 years and older undergoing infrainguinal lower extremity bypass who are prescribed a statin medication at discharge. This measure is proposed for both hospitals and individual providers; **Measure Type**: Process; **Level of Analysis**: Facility, Clinician: Group/Practice, Clinician: Individual; **Setting of Care**: Hospital/Acute Care Facility; **Data Source**: Electronic Clinical Data: Registry

This maintenance measure was endorsed in 2012 and is based on evidence that prescription of statin therapy at discharge reduces mortality and morbidity for clients undergoing lower extremity bypass. The data source for this measure is the self-reported Vascular Quality Initiative (VQI) database. The measure is reported in PQRS. The Committee agreed that the evidence has not changed since the prior NQF endorsement review and accepted the prior evaluation. Overall, the Committee agreed the measure meets NQF criteria and recommended it for continued endorsement.

1523 In-hospital mortality following elective open repair of AAAs (Society for Vascular Surgery): Recommended

Description: Percentage of asymptomatic patients undergoing open repair of abdominal aortic aneurysms (AAA) who are discharged alive. This measure is proposed for both hospitals and individual providers; **Measure Type**: Outcome; **Level of Analysis**: Facility, Clinician: Group/Practice, Clinician: Individual; **Setting of Care**: Hospital/Acute Care Facility; **Data Source**: Electronic Clinical Data: Registry

This maintenance measure was endorsed in 2012 and is based on evidence that rupture risk is assessed by abdominal aortic aneurysm (AAA) size, with larger AAA more prone to rupture. The measure specifies that low risk patients should be offered open AAA repair if predicted operative mortality is low. The data source for this measure is the self-reported VQI database and the measure is reported in PQRS. The Committee agreed the underlying evidence for the measure has not changed since the prior NQF endorsement review and accepted the prior evaluation. Committee members also acknowledged that performance varies by geographic area. In terms of measure validity, the Committee requested that the developer provide clinician level testing, to consider risk adjustment to show that risk of death increases with age even in small aneurysms, and to expand the measure to 30-day mortality. Overall, the Committee agreed the measure meets NQF criteria and recommended it for continued endorsement.

1534 In-hospital mortality following elective EVAR of AAAs (Society for Vascular Surgery): Recommended

Description: Percentage of patients undergoing elective endovascular repair of asymptomatic infrarenal abdominal aortic aneurysms (AAA) who die while in hospital. This measure is proposed for both hospitals and individual providers; **Measure Type**: Outcome; **Level of Analysis**: Facility, Clinician: Group/Practice, Clinician: Individual; **Setting of Care**: Hospital/Acute Care Facility; **Data Source**: Electronic Clinical Data: Registry

This maintenance measure was endorsed in 2012 and is based on evidence that rupture risk is assessed by AAA size, with larger AAA more prone to rupture. The measure specifies that low risk patients should be offered endovascular infrarenal AAA repair if predicted operative mortality is low. The data source for this measure is the self-reported VQI database and is reported in CMS PQRS. The Committee agreed the underlying evidence for the measure has not changed since the prior NQF endorsement review and accepted the prior evaluation. Committee members also acknowledged that performance varies by geographic area. The Committee agreed that validity issues raised in the discussion of #1523 related to testing, risk adjustment and 30-day mortality also apply to this measure. Overall, the Committee agreed the measure meets NQF criteria and recommended it for continued endorsement.

1540 Postoperative Stroke or Death in Asymptomatic Patients undergoing Carotid Endarterectomy (Society for Vascular Surgery): Recommended

Description: Percentage of patients age 18 or older without carotid territory neurologic or retinal symptoms within the one year immediately preceding carotid endarterectomy (CEA) who experience stroke or death following surgery while in the hospital. This measure is proposed for both hospitals and individual surgeons; **Measure Type**: Outcome; **Level of Analysis**: Facility, Clinician: Group/Practice,

Clinician: Individual**; Setting of Care**: Hospital/Acute Care Facility; **Data Source**: Electronic Clinical Data: Registry

This maintenance measure was endorsed in 2012 and is based on evidence that carotid endarterectomy is beneficial in stroke prevention for patients who are not at high risk of death or stroke. The data source for this measure is the self-reported VQI database and is reported in PQRS. The Committee agreed the underlying evidence for the measure has not changed since the prior NQF endorsement review and accepted the prior evaluation. The Committee noted that although the performance gap was low, there was still enough variation by facility and region to display an opportunity for improvement. Committee members emphasized the importance of 30-day mortality versus in-hospital mortality. Committee members also discussed the unintended consequence that this measure would have on patient choice, since a patient at moderate risk for rupture could be denied surgery. Overall, the Committee agreed the measure meets all NQF criteria and recommended it for continued endorsement.

1543 Postoperative Stroke or Death in Asymptomatic Patients undergoing Carotid Artery Stenting (CAS) (Society for Vascular Surgery): Recommended

Description: Percentage of patients 18 years of age or older without carotid territory neurologic or retinal symptoms within 120 days immediately preceding carotid angioplasty and stent (CAS) placement who experience stroke or death during their hospitalization for this procedure. This measure is proposed for both hospitals and individual interventionalists; **Measure Type**: Outcome; **Level of Analysis**: Facility, Clinician: Group/Practice, Clinician: Individual; **Setting of Care**: Hospital/Acute Care Facility; **Data Source**: Electronic Clinical Data: Registry

This maintenance measure was endorsed in 2012 and is based on evidence that carotid endarterectomy is a recommended treatment to prevent future stroke if the risk of death or stroke is less than 3%. The data source for this measure is the self-reported VQI database and the measure is reported in CMS PQRS. The Committee noted that there were no published guidelines for carotid artery stenting and that this procedure was not recommended by all of the major medical societies. Committee members also questioned whether the measure should be considered an appropriate use measure due to the increased risk of stroke or death, compared to the risk of stroke or death by surgery. Other Committee members stated that despite indication the procedure is still being done, and therefore it would be important to measure the outcome. Overall, the Committee could not reach consensus on the evidence, validity, and usability and use criteria.

During the post draft report comment call, the Committee discussed that although carotid artery stenting is a controversial procedure, the outcome is important to measure. The Committee did acknowledge that the procedure is still being studied but did not want to delay their vote when this measure presents a well-defined tool for measuring the outcomes of this procedure. On re-vote, the Committee agreed the measure met the Opportunity for Improvement criterion. In the Committee's discussion on Validity, the developer noted they submitted additional data to address the concern of whether the registry captured data at nine months. The Committee again questioned whether the measure should be risk adjusted but ultimately agreed that it should not be risk adjusted due to the

benign natural history of high-grade internal carotid stenosis. Overall, the Committee recommended this measure for continued endorsement.

1550 Hospital-level risk-standardized complication rate (RSCR) following elective primary total hip arthroplasty (THA) and/or total knee arthroplasty (TKA) (Centers for Medicare & Medicaid Services/ Yale CORE): Recommended

Description: The measure estimates a hospital-level risk-standardized complication rate (RSCR) associated with elective primary THA and TKA in Medicare Fee-For-Service beneficiaries who are 65 years and older. The outcome (complication) is defined as any one of the specified complications occurring from the date of index admission to 90 days post date of the index admission (the admission included in the measure cohort). The target population is patients 18 and over. CMS annually reports the measure for patients who are 65 years or older, are enrolled in fee-for-service (FFS) Medicare, and hospitalized in non-federal acute-care hospitals. **Measure Type**: Outcome; **Level of Analysis**: Facility; **Setting of Care**: Hospital/Acute Care Facility; **Data Source**: Administrative claims, Other, Paper Medical Records

This facility-level measure was endorsed in 2012. Adjustments to the measure over time have been made and are detailed in the measure submission documents. The measure is in use in the CMS Hospital Inpatient Quality Reporting (IQR) Program. Evidence for the measure derives from studies of hip and knee arthroplasty morbidity and mortality. The measure has demonstrated progress in reducing the rate of complications; however, as a measure of a complication that should "never" occur, the Committee agreed an opportunity for further improvement exists. The Committee agreed the underlying evidence for the measure has not changed since the prior NQF endorsement review and accepted the prior evaluation. Overall, the Committee agreed the measure meets NQF criteria and recommended it for continued endorsement.

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) (Centers for Medicare & Medicaid Services/ Yale CORE): Recommended

Description: The measure estimates a hospital-level risk-standardized readmission rate (RSRR) following elective primary THA and/or TKA in Medicare Fee-For-Service beneficiaries who are 65 years and older. The outcome (readmission) is defined as unplanned readmission for any cause within 30 days of the discharge date for the index admission (the admission included in the measure cohort). A specified set of planned readmissions do not count in the readmission outcome. The target population is patients 18 and over. CMS annually reports the measure for patients who are 65 years or older, are enrolled in fee-for-service (FFS) Medicare, and hospitalized in non-federal acute-care hospitals. **Measure Type**: Outcome; **Level of Analysis**: Facility; **Setting of Care**: Hospital/Acute Care Facility; **Data Source**: Administrative claims, other

This facility-level measure was endorsed in 2012. Adjustments to the measure over time have been made and are detailed in the measure submission documents. The measure is in use in CMS IQR and is used in the CMS Hospital Readmission Reduction (payment) Program. Evidence for the measure is primarily derived from analyses of discharge data and economic burden. The Committee agreed the

underlying evidence for the measure has not changed since the prior NQF endorsement review and accepted the prior evaluation. The measure has demonstrated some progress in reducing the rate of readmissions that continue to be relatively low; however, the Committee agreed that readmission for these elective procedures should not occur, thus, an opportunity for further improvement exists. Overall, the Committee agreed the measure meets NQF criteria and recommended it for continued endorsement.

3030 Individual Surgeon Composite Measure for Adult Cardiac Surgery (The Society of Thoracic Surgeons): Recommended

Description: The STS Individual Surgeon Composite Measure for Adult Cardiac Surgery includes five major procedures (isolated CABG, isolated AVR, AVR+CABG, MVRR, MVRR+CABG) and comprises the following two domains: Domain 1 Risk-Adjusted Operative Mortality and Domain 2 – Risk-Adjusted Major morbidity; **Measure Type**: Composite; **Level of Analysis**: Clinician: Individual; **Setting of Care**: Hospital/Acute Care Facility; **Data Source**: Electronic Clinical Data: Registry

This new physician level composite measure is based on a combination of 12 NQF-endorsed risk-adjusted measures of operative mortality and major morbidities specified for analysis at the clinician level. Measure results are expected to be available to individual surgeons in late 2016 or early 2017 and, subsequently, to be fully integrated into the STS quality improvement program. Public reporting is expected to follow. Evidence for the measure derives from work around cardiac surgery morbidity and mortality conducted over decades using the Society of Thoracic Surgeons' and other cardiothoracic databases and research/study findings. The Committee agreed that a gap exists, that the evidence base and measure construction are appropriate. The Committee questioned why the measure is reported at the physician level rather than the facility level since surgery requires a team of providers. Overall, the Committee agreed the measure meets NQF criteria and recommends it for endorsement.

3031 STS Mitral Valve Repair/Replacement (MVRR) Composite Score (The Society of Thoracic Surgeons): Recommended

Description: The STS Mitral Valve Repair/Replacement (MVRR) Composite Score measures 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: Domain 1 Absence of Operative Mortality and Domain 2 Absence of Major Morbidity; **Measure Type**: Composite; **Level of Analysis**: Clinician: Group/Practice, Facility; **Setting of Care**: Hospital/Acute Care Facility; **Data Source**: Electronic Clinical Data: Registry

This new composite measure is based on a combination of NQF-endorsed risk-adjusted measures of operative mortality and major morbidities specified for analysis at the group/practice level. STS participant-specific results are expected to be distributed in late 2016 with public reporting to follow within a year. Evidence for the measure derives from work around cardiac surgery morbidity and mortality conducted over decades using the Society of Thoracic Surgeons' and other cardiothoracic databases and research/study findings. The Committee agreed that a gap exists, that evidence and

construction is appropriate. Overall, the Committee agreed the measure meets NQF criteria and recommends it for endorsement.

3032 STS MVRR + Coronary Artery Bypass Graft (CABG) Composite Score (The Society of Thoracic Surgeons): Recommended

Description: The STS Mitral Valve Repair/Replacement (MVRR) + Coronary Artery Bypass Graft (CABG) Composite Score measures surgical performance for MVRR + CABG with or without concomitant Atrial Septal Defect (ASD) and Patient Foramen Ovale (PFO) closures, tricuspid valve repair (TVr), or surgical ablation for atrial fibrillation (AF). To assess overall quality, the STS MVRR +CABG Composite Score comprises two domains consisting of six measures: Domain 1 Absence of Operative Mortality and Domain 2 Absence of Major Morbidity; **Measure Type**: Composite; **Level of Analysis**: Clinician: Group/Practice, Facility; **Setting of Care**: Hospital/Acute Care Facility; **Data Source**: Electronic Clinical Data: Registry

This new composite measure is based on a combination of NQF-endorsed risk-adjusted measures of operative mortality and major morbidities specified for analysis at the group/practice level. STS participant-specific results are expected to be distributed in late 2016 with public reporting to follow within a year. Evidence for the measure derives from work specific to cardiac surgery morbidity and mortality conducted over decades using the Society of Thoracic Surgeons' and other cardiothoracic databases and research/study findings. The Committee agreed that a gap exists, that evidence and construction is appropriate. Overall, the Committee agreed the measure meets NQF criteria and recommends it for endorsement.

Measures Not Recommended for Endorsement

0713 Ventriculoperitoneal (VP) shunt malfunction rate in children (Boston Children's Hospital): Not Recommended

Description: This measure is a 30-day malfunction rate for hospitals that perform cerebrospinal ventriculoperitoneal shunt operations in children between the ages of 0 and 18 years; **Measure Type**: Outcome; **Level of Analysis**: Facility; **Setting of Care**: Hospital/Acute Care Facility; **Data Source**: Electronic Clinical Data

This maintenance measure was endorsed in 2011 and focuses on shunt malfunction rates for hospitals that perform cerebrospinal ventriculoperitoneal shunt operations in children ages 0 to 18 years. The Committee did not reach consensus on whether the measure met the Evidence criterion since it was unclear what constituted a malfunction. Since initial endorsement, performance data had been submitted from just one provider and no disparities data were available. Therefore, the Committee did not agree the measure met the performance gap criterion and did not recommend the measure for endorsement.

2998 Infection rate in bicondylar tibia plateau fractures (Orthopedic Trauma Association): Not Recommended

Description: Percent of patients aged 18 years and older undergoing ORIF of a bicondylar tibial plateau fracture who develop a postoperative deep incisional wound infection based on CDC guidelines for deep

infection associated with implants; **Measure Type**: Outcome; **Level of Analysis**: Facility, Clinician: Group/Practice, Clinician : Individual; **Setting of Care**: Hospital/Acute Care Facility; **Data Source**: Other, Electronic Clinical Data : Registry

The rationale for this new outcome measure is that bicondylar tibial plateau fractures are difficult to treat and often complicated by infection at high volume centers, with experienced surgeons. The lowest infection rate reported for these fractures treated with open reduction and internal fixation (ORIF) is 8%. These surgeries have some of the highest reported infection rates of any operation; and they increase cost of care. The Committee was very enthusiastic about the measure concept and agreed that the evidence was sufficient. However, there were concerns about the lack of data for validity testing and whether or not risk adjustment is needed. The Committee encouraged the developer to continue collecting data and further develop the measure.

3016 ePBM 01 Preoperative Anemia Screening (The Joint Commission): Not Recommended for Approval for Trial Use

Description: This measure assesses the proportion of selected elective surgical patients age 18 and over with documentation of pre-operative anemia screening in the window between 45 and 14 days before the surgery starts date; **Measure Type**: Process; **Level of Analysis**: Facility; **Setting of Care**: Hospital/Acute Care Facility; **Data Source**: Electronic Clinical Data: Electronic Health Record, Laboratory

This new eMeasure was evaluated for approval for trial use status and its planned use in a certification program in Blood Management, which is a voluntary program maintained by The Joint Commission for hospitals to achieve excellence in patient blood management. This facility level measure assesses the proportion of selected elective surgical patients age 18 and over with documentation of pre-operative anemia screening in the window between 45 and 14 days before the surgery date. Committee members agreed that anemia screening is important to perform in certain procedures and certain populations. However, there were concerns that the evidence presented was not sufficient enough to support the specifications of this measure.

3017 ePBM 02 Preoperative Hemoglobin Level (The Joint Commission): Not Recommended for Approval for Trial Use

Description: This measure is designed to allow transfusion/blood use review committees to identify patients undergoing elective surgery with suboptimal, uncorrected hemoglobin levels that may have led to perioperative transfusion. This measure assesses, via stratification, pre-operative hemoglobin levels of selected elective surgical patients age 18 and over who received a perioperative red blood cell transfusion; **Measure Type**: Process; **Level of Analysis**: Facility; **Setting of Care**: Hospital/Acute Care Facility; **Data Source**: Electronic Clinical Data: Electronic Health Record, Laboratory

This new eMeasure was evaluated for approval for trial use status and its planned use in a certification program in Blood Management, which is a voluntary program maintained by The Joint Commission for hospitals to achieve excellence in patient blood management. This facility level measure is designed to allow transfusion/blood use review committees to identify patients undergoing elective surgery with suboptimal, uncorrected hemoglobin levels that may have led to perioperative transfusion. The

Committee agreed that unnecessary blood transfusions are undesirable and perioperative optimization of anemia is preferred, but the evidence is not clear on the hemoglobin threshold of 12 g dl. Committee members also questioned understand the clinical significance of the ratio, particularly, as the numerator is the number of patients and the denominator is the subset of patients who are transfused.

3019 PBM 03 Preoperative Blood Type Testing and Antibody Screening (The Joint Commission): Not Recommended for Approval for Trial Use

Description: This measure assesses the proportion of selected elective surgical patients age 18 and over who had timely preoperative assessment of blood type and crossmatch or type and screening; **Measure Type**: Process; **Level of Analysis**: Facility; **Setting of Care**: Hospital/Acute Care Facility; **Data Source**: Electronic Clinical Data: Electronic Health Record, Laboratory

This new eMeasure was evaluated for approval for trial use status and its planned use in a certification program in Blood Management, which is a voluntary program maintained by The Joint Commission for hospitals to achieve excellence in patient blood management. Committee members agreed that in order for safe and effective utilization of resources, the pre-transfusion testing should be completed prior to the beginning of surgery. However, the desired outcome is that the patients receive an appropriate unit of blood if transfusion is required. Overall, the Committee agreed that the evidence was not sufficient to pass the evidence criterion.

3020 ePBM 04 Initial Transfusion Threshold (The Joint Commission): Not Recommended for Approval for Trial Use

Description: This measure assesses the proportion of various pre-transfusion hemoglobin levels in patients age 18 and over receiving the first unit of a whole blood or packed cell transfusion. Over time, in a patient blood management program, there should be a higher proportion of patients receiving blood at the lower hemoglobin threshold and a lower proportion receiving blood at the higher hemoglobin thresholds. It also identifies patients who receive transfusions that should be reviewed by hospital transfusion/blood usage committees so that appropriate educational programs can be developed as part of a patient blood management program; **Measure Type**: Process; **Level of Analysis**: Facility; **Setting of Care**: Hospital/Acute Care Facility; **Data Source**: Electronic Clinical Data: Electronic Health Record, Laboratory

This new eMeasure was evaluated for approval for trial use status and its planned use is in a certification program in Blood Management, which is a voluntary program maintained by The Joint Commission for hospitals to achieve excellence in patient blood management. The measure assesses the proportion of various pre-transfusion hemoglobin levels in patients age 18 and over receiving the first unit of a whole blood or packed cell transfusion. The measure is supported by clinical guideline recommendations from AABB, Society of Thoracic Surgeons, The Society of Cardiovascular Anesthesiologists and The Society of Critical Care Medicine. The Committee was not able to reach consensus on the scientific acceptability criterion due to several concerns with the specifications.

During the post comment call, the Committee continued to have several concerns about how the evidence is aligned with the specifications of the measure. The Committee did not find the measure as

specified to be a valid indicator of quality. Upon revote, the measure did not pass the scientific acceptability: eMeasure specifications subcriterion.

3021 ePBM 05 Blood Usage in Selected Elective Surgical Patients (The Joint Commission): Not Recommended

Description: This measure assesses the proportion of selected elective surgical patients age 18 and over who had a timely preoperative anemia screening and subsequent perioperative transfusion. Since preoperative anemia is a predictor of perioperative transfusion, this measure can identify records of patients needing further review for uncorrected preoperative anemia or other blood management measures, such as a restrictive transfusion strategy or cell salvage, that should have been taken to avoid transfusion; **Measure Type**: Process; **Level of Analysis**: Facility; **Setting of Care**: Hospital/Acute Care Facility; **Data Source**: Electronic Clinical Data: Electronic Health Record, Laboratory

This new eMeasure was evaluated for approval for trial use status and its planned use in a certification program in Blood Management, which is a voluntary program maintained by The Joint Commission for hospitals to achieve excellence in patient blood management. This process measure is intended to assess the effectiveness of the preoperative anemia screening by identifying those patients who had the appropriate screening but still required a perioperative blood transfusion. Overall, the Committee agreed that the evidence cited was not sufficient to pass the evidence criterion.

3024 Carotid Endarterectomy: Evaluation of Vital Status and NIH Stroke Scale at Follow Up (American College of Cardiology): Not Recommended

Description: Proportion of patients with carotid endarterectomy procedures who had follow up performed for evaluation of vital status and neurological assessment with an NIH Stroke Scale (by an examiner who is certified by the American Stroke Association; **Measure Type**: Process; **Level of Analysis**: Facility, Population: National; **Setting of Care**: Hospital/Acute Care Facility; **Data Source**: Electronic Clinical Data : Registry

This new facility- and population-level measure calculates proportion of patients with carotid endarterectomy procedures who had follow up performed for evaluation of vital status and neurological assessment with an NIH Stroke Scale (by an examiner who is certified by the American Stroke Association). Committee members had concerns about the overall measure construct as it is currently specified and tested. Committee members also had concerns that the evidence cited was not sufficient to pass the evidence criterion.

Appendix A: Details of Measure Evaluation

Measures Recommended

Rating Scale: H=High; M=Moderate; L=Low; I=Insufficient; NA=Not Applicable; Y=Yes; N=No

0117 Beta Blockade at Discharge

Submission | Specifications

Description: Percent of patients aged 18 years and older undergoing isolated CABG who were discharged on beta blockers

Numerator Statement: Number of patients undergoing isolated CABG who were discharged on beta blockers

Denominator Statement: Patients undergoing isolated CABG

Exclusions: Cases are removed from the denominator if there was an in-hospital mortality or if discharge beta blocker was contraindicated.

Adjustment/Stratification: No risk adjustment or risk stratification

Level of Analysis: Facility, Clinician : Group/Practice

Setting of Care: Hospital/Acute Care Facility

Type of Measure: Process

Data Source: Electronic Clinical Data : Registry

Measure Steward: The Society of Thoracic Surgeons

STANDING COMMITTEE MEETING 08/16 - 08/17/16

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

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

1a. Evidence: **Accepted Previous Evaluation**; 1b. Performance Gap: **H-0; M-13; L-8; I-0;**

Rationale:

- This measure is based on Class 1C evidence that beta blockers should be prescribed to all CABG patients without contraindications upon discharge. Updated evidence was submitted for this measure to which the Committee agreed still supported at least one action to a health outcome. The Committee then accepted the previous evaluation on this criterion.
- Performance on this measure was at nearly 98% across a four-year time period among gender, age, race, and insurance groups. The Committee acknowledged that performance at the 10th decile ranged from 73% in 2013-15 and 50% in 2014-15.
- Other Committee members voiced concern that the measure appears to be topped out and suggested data collection efforts and resources should be used in other areas.
- Another Committee member questioned considered the performance gap in terms of the debate on the use of beta blockers, noting that the measure could be passed if beta blockers are contraindicated. Specifically, the member asked whether documentation of contraindication needed to be supported by a reason. The developer confirmed that there needed to be documentation of a reason for not prescribing beta blockers.
- Committee members suggested that should the measure be endorsed in this project; the developer should bring the measure back indicating the number of patients represented in the gap.

2. Scientific Acceptability of Measure Properties: <u>The measure meets the Scientific Acceptability criteria</u>

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

2a. Reliability: **Accepted Previous Evaluation** 2b. Validity: **Accepted Previous Evaluation**

<u>Rationale</u>:

- Measure score testing was completed on a sample of over 1,000 STS participants to indicate the measure is reliable. Sample size needed per participant to attain reliability of 0.50 and 0.70 was calculated; 95% of participants met the minimum required sample size for 0.50 reliability and 76% met required sample size for 0.70 reliability.
- Data element and empirical validity testing of the measure score were used to support the validity of the measure. Data showed overall 96.17% agreement among 82 variables. Predictive validity was used to show stability of measure scores over time may indicate the measure capture an accurate indication of provider performance. Data showed that participants in low, middle, and high groupings for use of beta blocker at discharge in one-time period (10/2013—9/2014) had correspondingly low, middle, and high beta blocker at discharge in the following time period (10/2014-9/2015).
- A Committee member noted that this measure was a companion measure to #0127 Preoperative Beta Blockade and questioned the risk of prescribing a beta blockade at discharge if the patient did not receive it preoperatively. The developer clarified that there is a dose response to any medicine and noted that beta blockers are not typically prescribed at the maximum dosage upon discharge.
- Upon voting, the Committee agreed that this measure met reliability and validity criteria.

3. Feasibility: Accepted Previous Evaluation

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

<u>Rationale</u>:

- The Committee believed that the percentage of adult cardiac surgery centers participating in the database (i.e., 95%) supported the feasibility of this measure and carried over the vote from #0134.

4. Usability and Use: Accepted Previous Evaluation

(Used and useful to the intended audiences for 4a. Accountability and Transparency; 4b. Improvement; and 4c. Benefits outweigh evidence of unintended consequences)

<u>Rationale</u>:

- The measure is currently publically reported and widely used. Without additional discussion, the Committee carried over the vote from #0134.

5. Related and Competing Measures

- Measures 0117 and 0127 are STS measures of beta blocker use that are harmonized.

Standing Committee Recommendation for Endorsement: **Y-21; N-0**

6. Public and Member Comment

- No comments received.

7. Consensus Standards Approval Committee (CSAC) Vote (December 21, 2016): Y-16; N-0; NR-1

- Decision: Approved for continued endorsement

8. Board of Directors Vote: Y-X; N-X

9. Appeals

0127 Preoperative Beta Blockade

Submission | Specifications

Description: Percent of patients aged 18 years and older undergoing isolated CABG who received beta blockers within 24 hours preceding surgery.

Numerator Statement: Number of patients undergoing isolated CABG who received beta blockers within 24 hours preceding surgery

Denominator Statement: Patients undergoing isolated CABG

Exclusions: Cases are removed from the denominator if preoperative beta blocker was contraindicated or if the clinical status of the patient was emergent or emergent salvage prior to entering the operating room.

Adjustment/Stratification: No risk adjustment or risk stratification

Level of Analysis: Facility, Clinician : Group/Practice

Setting of Care: Hospital/Acute Care Facility

Type of Measure: Process

Data Source: Electronic Clinical Data : Registry

Measure Steward: The Society of Thoracic Surgeons

STANDING COMMITTEE MEETING 08/16 - 08/17/16

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

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

1a. Evidence: **Accepted Previous Evaluation**; 1b. Performance Gap: **H-3**; **M-17**; **L-1**; **I-0;**

Rationale:

- This maintenance measure is based on Class 1B evidence that beta blockers should be administered at least 24 hours prior to CABG for patients without contraindications to reduce incidence or clinical sequela of postoperative atrial fibrillation; and that preoperative use of beta blockers can reduce in-hospital mortality. Updated evidence was submitted for this measure to which the Committee agreed still supported at least one action to a health outcome. The Committee then accepted the previous evaluation on this criterion.
- The Committee acknowledged that performance had improved to 93.5% from 84.8% during the 12-month period from October 2014 to September 2015.
- Other Committee members voiced that the measure appears to be topped out and suggested data collection efforts and resources should be used in other areas.
- Upon a vote, the Committee agreed the measure demonstrated a gap 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: **H-7**; **M-12**; **L-2**; **I-0** 2b. Validity: **Accepted Previous Evaluation**

Rationale:

- Measure score testing was completed on a sample of over 1,000 STS participants to indicate the measure is reliable. Sample size needed per participant to attain reliability of 0.50 and 0.70 was calculated; 99% of participants met the minimum required sample size for 0.50 reliability and 97% met required sample size for 0.70 reliability.
- Data element and empirical validity testing of the measure score were used to support the validity of the measure. Data showed overall 96.17% agreement among 82 variables. Predictive validity was used to show stability of measure scores over time may indicate the measure captures an accurate indication of provider performance. Data showed that participants with high performance for use of perioperative beta blockers in one-time period (10/2013-9/2014), 77% were also high performers in the second time period (10/2014-9/2015). Twelve percent of mid-performing participants became high performers in the second time period, and low performers in the first time period were also likely to be low performers in the second time period.

- A Committee member questioned the timeframe of when the patient is given the beta blocker. The member also asked about the likelihood that a patient would receive a beta blocker the morning of surgery or as a first dose and considered the effect on patient safety.
- The developer clarified that the numerator is patients who received a beta blocker within 24 hours of surgery, regardless of whether the patient is already on beta blockers prior to surgery. The developer acknowledged that the difference in benefits between a patient who is already on beta blockers versus a patient who receives their first dose on day of surgery is unclear.
- Upon a vote, the Committee agreed the measure met reliability and validity criteria.

3. Feasibility: H-12; M-8; 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 Committee acknowledged that the percentage of adult cardiac surgery centers participating in the database (i.e., 95%) supported the feasibility of this measure, but one member questioned how many participating institutions have a direct pass-through from the electronic record to the registry.
- The developer did not know how many institutions have a direct pass through but noted that it was probably a low number. The developer also stated that the importance of direct pass-through has not been overlooked and that they continue to work with electronic health record manufacturers.
- The Committee member then noted the cost-benefit of data collection.
- Upon a vote, the Committee agreed the measure met this criterion.

4. Usability and Use: Accepted Previous Evaluation

(Used and useful to the intended audiences for 4a. Accountability and Transparency; 4b. Improvement; and 4c. Benefits outweigh evidence of unintended consequences)

Rationale:

- Committee members discussed the cost of uploading to the registry and the true cost to a hospital for participating. The Committee acknowledged that an estimated 200-250 data fields have to be extracted per case to report the measure.
- Upon a vote, the Committee agreed the measure met this criterion.

5. Related and Competing Measures

- Measures 0117 and 0127 are STS measures of beta blocker use that are harmonized.

Standing Committee Recommendation for Endorsement: **Y-20**; **N-1**

6. Public and Member Comment

- No comments received.

7. Consensus Standards Approval Committee (CSAC) Vote (December 21, 2016): Y-16; N-0; NR-1

- Decision: Approved for continued endorsement

8. Board of Directors Vote: Y-X; N-X

9. Appeals

0134 Use of Internal Mammary Artery (IMA) in Coronary Artery Bypass Graft (CABG)

Submission | Specifications

Description: Percentage of patients aged 18 years and older undergoing isolated coronary artery bypass graft (CABG) who received an internal mammary artery (IMA) graft

Numerator Statement: Number of patients undergoing isolated coronary artery bypass graft (CABG) who received an internal mammary artery (IMA) graft

Denominator Statement: Patients undergoing isolated CABG

Exclusions: Cases are removed from the denominator if the patient had a previous CABG prior to the current admission or if IMA was not used and one of the following reasons was provided:

- Subclavian stenosis
- Previous cardiac or thoracic surgery
- Previous mediastinal radiation
- Emergent or salvage procedure
- No (bypassable) LAD disease

Adjustment/Stratification: No risk adjustment or risk stratification

Level of Analysis: Facility, Clinician : Group/Practice

Setting of Care: Hospital/Acute Care Facility

Type of Measure: Process

Data Source: Electronic Clinical Data : Registry

Measure Steward: The Society of Thoracic Surgeons

STANDING COMMITTEE MEETING 08/16 – 08/17/16

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

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

1a. Evidence: **Accepted Previous Evaluation** 1b. Performance Gap: **H-2**; **M-11**; **L-8**; **I-0**

Rationale:

- The evidence for this maintenance measure is based on Class 1B recommendation that the left internal mammary artery should be used in coronary artery bypass graft. Updated evidence was submitted for this measure to which the Committee agreed still supported at least one action to a health outcome. The Committee then accepted the previous evaluation on this criterion.
- Committee members pointed out that although performance was high on the measure, ranging from 93% to 100%, there was some variability indicating 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: **H-17**; **M-4**; **L-0**; **I-0** 2b. Validity: **H-18**; **M-3**; **L-0**; **I-0**

Rationale:

- Measure score testing was completed on a sample of over 1,000 STS participants to indicate the measure is reliable. Sample size needed per participant to attain reliability of 0.50 and 0.70 was calculated; 80% of participants met the minimum required sample size for 0.50 reliability and 41% met required sample size for 0.70 reliability.
- Data element and empirical validity testing of the measure score were used to support the validity of the measure. Data showed overall 96.17% agreement among 82 variables. Predictive validity was used to show stability of measure scores over time may indicate the measure captures an accurate indication of provider performance. Data showed that participants with high performance for use of IMA in one time period (10/2013-9/2014), 21.1% were also high performers in the second time period (10/2014-9/2015). 1.6% of mid performing participants became high performers in the second time period, and low performers in the first time period were also likely to be low performers in the second time period.

- The Committee noted the auditing standards of the database and the percentage of cardiac surgery centers participating in the database (i.e., 95%). On a vote, the Committee agreed that this measure met reliability and validity criteria.

3. Feasibility: H-14; M-6; 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 Committee believed that the measure was feasible since 95% of cardiac surgery centers participate in the database.

4. Usability and Use: H-14; M-6; L-1; I-0

(Used and useful to the intended audiences for 4a. Accountability and Transparency; 4b. Improvement; and 4c. Benefits outweigh evidence of unintended consequences)

Rationale:

- The measure is currently publically reported and widely used. Without additional discussion, the Committee agreed the measure met this criterion.

5. Related and Competing Measures

- Several other STS measures (listed below) were listed as related to this measure, however, the developer notes the measures are harmonized to the extent possible.
- 0114 Risk-Adjusted Postoperative Renal Failure, 0115 Risk-Adjusted Surgical Re-exploration, 0116 Anti-Platelet Medication at Discharge, 0117 Beta Blockade at Discharge, 0118 Anti-Lipid Treatment Discharge, 0119 Risk-Adjusted Operative Mortality for CABG, 0127 Preoperative Beta Blockade, 0129 Risk-Adjusted Postoperative Prolonged Intubation (Ventilation), 0130 Risk-Adjusted Deep Sternal Wound Infection, 0131 Risk-Adjusted Stroke/Cerebrovascular Accident and 2514 Risk-Adjusted Coronary Artery Bypass Graft (CABG) Readmission Rate

Standing Committee Recommendation for Endorsement: **Y-21**; **N-0**

6. Public and Member Comment

- No comments received.

7. Consensus Standards Approval Committee (CSAC) Vote (December 21, 2016): Y-16; N-0; NR-1

- Decision: Approved for continued endorsement

8. Board of Directors Vote: Y-X; N-X

9. Appeals

0351 Death Rate among Surgical Inpatients with Serious Treatable Complications (PSI 04)

Submission | **Specifications**

Description: In-hospital deaths per 1,000 surgical discharges, among patients ages 18 through 89 years or obstetric patients, with serious treatable complications (shock/cardiac arrest, sepsis, pneumonia, deep vein thrombosis/ pulmonary embolism or gastrointestinal hemorrhage/acute ulcer). Includes metrics for the number of discharges for each type of complication. Excludes cases transferred to an acute care facility. A risk-adjusted rate is available. The risk-adjusted rate of PSI 04 relies on stratum-specific risk models. The stratum-specific models are combined to calculate an overall risk-adjusted rate.

Numerator Statement: Number of deaths (DISP=20) among cases meeting the inclusion and exclusion rules for the denominator.

Denominator Statement: Surgical discharges, for patients ages 18 through 89 years or MDC 14 (pregnancy, childbirth, and puerperium), with all of the following:

- any-listed ICD-9-CM or ICD-10-PCS procedure codes for an operating room procedure; and

- the principal procedure occ

Exclusions: Exclude cases:

- transferred to an acute care facility (DISP = 2)
- with missing discharge disposition (DISP=missing), gender (SEX=missing), age (AGE=missing), quarter (DQTR=missing), year (YEAR=missing), or principal diagnosis (DX1=missing)

Adjustment/Stratification: Statistical risk model

"The predicted value for each case is computed using a hierarchical model (logistic regression with hospital random effect) and covariates for gender, age (in 5-year age groups, except for the youngest age range), Modified Diagnosis Related Groups (ie. MS-DRGs without any distinction for "comorbidity and complications" (CC/MCC), Elixhauser Comorbidity Index (https://www.hcup-us.ahrq.gov/toolssoftware/comorbidity/comorbidity.jsp), Major Diagnosis Categories (MDC) based on the principal diagnosis, and transfer in from another acute care hospital. A parsimonious model was identified using a backward stepwise selection procedure with bootstrapping. The expected rate is computed as the sum of the predicted value for each case divided by the number of cases for the unit of analysis of interest (i.e., hospital). The risk-adjusted rate for the overall PSI 04 is calculated as the observed to expected ratio multiplied by the reference population rate, where the observed and expected values are summed across five strata (categories) of PSI 04 risk. This approach differs from other AHRQ Patient Safety Indicators without strata, in that each discharge-record's expected value is computed using one of five distinct stratum-specific risk adjustment models that correspond to an assigned PSI 04 stratum. The five PSI 04 strata group records together based on secondary diagnoses that represent complications of care, and place the patient at risk of death (which is the numerator of PSI 04).

Additional information on methodology can be found in the Empirical Methods document on the AHRQ Quality Indicator website (www.qualityindicators.ahrq.gov). The Empirical Methods are also attached in the supplemental materials.

The specific covariates for this measure are provided for each Stratum as part of the Technical Specifications attached to section S.2b.

Source: http://www.qualityindicators.ahrq.gov/Modules/psi_resources.aspx"

Level of Analysis: Facility

Setting of Care: Hospital/Acute Care Facility

Type of Measure: Outcome

Data Source: Administrative claims

Measure Steward: Agency for Healthcare Research and Quality

STANDING COMMITTEE MEETING 08/16 - 08/17/16

1. Importance to Measure and Report: <u>The measure meets the Importance criteria</u>

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

1a. Evidence: **Accepted previous evaluation**; 1b. Performance Gap: **H-6**; **M-16**; **L-0**; **I-0**

<u>Rationale</u>:

- The Committee noted that evidence presented with the recent submission is directionally the same as when last considered, at which time the measure passed on evidence, thus the Committee accepted the previous evaluation of evidence without vote.
- A member observed that the performance gap has improved by about 6% per year; however, significant gap remains in that there are some 43,000 deaths/year in 34 states as measured in all payer datasets. Further there are variations in the deaths by age, insurance status and other groupings. The Committee agreed that there is an actionable gap.
- The Committee noted that consideration should be given to including the pediatric population in this measure going forward.

2. Scientific Acceptability of Measure Properties: <u>The measure does not meet the Scientific Acceptability criteria</u>

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

2a. Reliability: **H-1**; **M-15**; **L-5**; **I-2;** 2b. Validity: **H-0**; **M-9**; **L-10**; **I-4**

Rationale:

- In discussing inclusion of conditions that are present on admission (POA), AHRQ staff stated that analyses had shown that excluding patients with conditions POA did not improve validity of the measure but did reduce the number of cases that could be captured.
- The Committee discussed the specification that excludes patients from the denominator who are transferred to an acute care hospital in terms of potential for "gaming" the measure by transferring patients, particularly if patient condition worsens. The developer representative agreed there is a small window for gaming but stated there is not a way to assess the outcome of interest in such cases since hospitalizations cannot now be linked.
- The Committee raised several concerns about transfers, specifically:
    - In addressing the effect of cases where hospitals receive patients in transfer, with complications of interest who then die, the developer stated that these cases are not excluded from the measure because they contribute to detectable signal; rather they are handled with risk adjustment. They further noted that patients received in transfer have lower rates of death.
    - The Committee noted that it did not see specific testing data that the measure assesses what it is supposed to be measuring. Members also noted that, based on the data provided the number of patients transferred out and excluded is not a high number (3% of 300,000).
    - The Committee noted that transferring patients to higher levels of care is often the right thing to do but expressed concern that risk adjustment to handle patients transferred in cannot fully address the issue that the receiving hospital becomes responsible for events it cannot control. Further, the Committee stated that retaining these patients to improve signal is concerning and penalizes the receiving hospital.
    - The Committee also questioned whether the transfer issues were addressed adequately to understand threats to validity and, separately, that the handling of transfers make it impossible to validate that appropriate effort was made to save the patient while in-hospital analysis over time could provide useful information.
    - The Committee suggested that the developers provide sensitivity data around transfers out including facility variability analyzed in terms of such things as rural/urban, high technology/low technology, large/small as well as impact of transfers by looking at hospitals with and without that data. The developers stated they could provide this information.
- The Committee expressed concern that while claims data are a reliable way to identify a population of interest and will provide patient death, it has limitations in its ability to accurately capture complications.
- Members noted that studies comparing clinical to administrative data, false negative and high false positive rates have been found. Committee members acknowledged that coding variability among institutions can occur with clinical as well as administrative data and further noted that, particularly for multifactorial complications, significant discrepancies using administrative data have been found.
- In its discussion of SDS, the Committee agreed that there is no conceptual basis for inclusion of SDS factors in risk adjustment model.

3. Feasibility: H-6; 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:

- On the post-comment call, the Committee agreed the measure was feasible, noting that the measure was straightforward and data sets are readily available.

4. Usability and Use: H-2; M-4; L-9; I-1

(Used and useful to the intended audiences for 4a. Accountability and Transparency; 4b. Improvement; and 4c. Benefits outweigh evidence of unintended consequences)

Rationale:

- On the post-comment call, the Committee discussed that the measure was not specific enough to aid providers in performance improvement and may not be useful in comparing hospital quality. The developer stated the measure should be used to track rates over time and not tracked by individual cases.

Standing Committee Recommendation for Endorsement: **Y-10; N-5**

Rationale:

Since the measure failed on Validity during the in-person meeting, the Committee did not take a vote for overall suitability for endorsement. During the post-comment call, the Committee re-voted and passed the measure on Validity and voted on the remaining criteria. The Committee then voted on overall suitability for endorsement.

6. Public and Member Comment

- The developer submitted a request for reconsideration during the member and public commenting period:

We are writing to request that the National Quality Forum (NQF) Surgery Standing Committee reconsider the decision to remove endorsement of Death Rate Among Surgical Inpatients with Serious Treatable Complications (PSI 04), (NQF 0351). This long-standing Patient Safety Indicator (PSI) has been endorsed by NQF since 2008. Our request for reconsideration is based on concern that NQF's standard review process was not applied properly during the in-person meeting on August 16, 2016, particularly with respect to the following:

1) Appropriate review and evaluation of the measure for Criteria 2. Scientific Acceptability Sub-criteria 2a. Validity
2) Discussion of the use case of the measure prior to full discussion of the scientific acceptability for the measure
3) Consistent evaluation of related (not competing) measures across NQF standing committees

First, according to the NQF's Guidance for Evaluating Validity and as noted by Dr. Karen Johnson during the review, measure developers need only submit validity testing with respect to computed performance measures scores, not data element validity. AHRQ submitted information about construct validity, which should have been the focus of the validity discussion, not the detailed discuss of claims data and data element validity.

Second, although AHRQ acknowledges the difficultly of conducting reviews that are use-agnostic, the reviewers brought up concerns about the use of the measure by CMS during scientific acceptability discussions. It is AHRQ's understanding the NQF seeks to endorse measures that are deemed scientifically rigorous and suitable for not just quality improvement but also general accountability purposes (not specific accountability purposes). The NQF review process is intended to be use-agnostic. Specific use cases of the measure, particularly the appropriate use of the measures in CMS programs, are to be discussed during NQF's Measure Application Project committee meetings.

Third, while acknowledged in the introduction of the measure, NQF's re-endorsement of a related measure by the Patient Safety Standing Committee was not emphasized during the review discussions. In particular, in the course of that re-endorsement discussion for NQF 0352 (Failure to Rescue In-Hospital Mortality, risk adjusted), which was developed and is stewarded by the Children's Hospital of Philadelphia, the Patient Safety Committee carefully evaluated the design of "failure to rescue" measures. This Committee discussed and accepted the developer's evidence-based arguments in favor of including patients who had reported complications present on admission in the measure denominator. When different NQF Standing Committees fail to evaluate similar measures, with similar design features, in a consistent manner, the consequences include confusion across the stakeholder community and mixed messages to measure developers, stewards, and users.

In addition, as noted in the NQF-Endorsed Measures for Surgical Procedures 2015-2017: Draft Report for Comment (September 22, 2016), reviewers wanted additional information about transfers, risk adjustment and use of claims data to measure complications.

AHRQ respectfully requests that NQF ask that the Committee exercise the option to re-vote on the validity of the measure during the post-comment call to preserve the integrity of the NQF process, and consider the additional information being submitted by AHRQ.

NQF Post Comment Call

- On the post draft report comment call, the Committee reviewed the reconsideration request and the additional testing data submitted by the developer. Ultimately, the Committee agreed to reconsider the measure for endorsement.
    - The Committee noted that the issue of transfers was addressed through the additional sensitivity analysis showing that including or excluding transfers would have little effect on the outcome. The developer confirmed that the measure would risk adjust for transfers and whether the patient arrived at the hospital with a complication already present.
    - The Committee also questioned the potential surveillance bias of including deep vein thrombosis (DVT) and pulmonary embolism (PE), since hospitals that detect more DVT or PE will have more cases in the denominator. The developer stated that studies have shown high performing hospitals with effective multi-disciplinary teams can intervene early on and prevent an adverse outcome.
    - In addressing the Committee's concern that some hospitals may game the measure by transferring patients out before they die, the developer acknowledged that the issue was inherent among smaller or rural hospitals that transfer patients to larger, teaching hospitals. The developer also stated events such as post-operative complications that are counted in the denominator for this measure, are also identified in the numerator in other patient safety measures. The developer also stated they have tried to create a severity flag with the administrative data to be able to detect the severity of the patient's condition when transferred to the receiving hospital.
    - The Committee again raised that while administrative data is more useful to track individual hospitals, there are still concerns in terms of hospitals' ability to compare their performance to others, based on how well administrative data are collected. Ultimately, the Committee re-voted and passed the measure on the Validity criterion
    - The Committee agreed the measure was feasible, and in discussion of usability, did not agree that the measure met this criterion, noting that the measure was not specific enough to aid providers in performance improvement and in recognizing patterns. Overall, the Committee recommended the measure for continued endorsement.

Vote Following Consideration of Public and Member Comments:
Validity: H-4; M-10; L-2; I-1

7. Consensus Standards Approval Committee (CSAC) Vote (December 21, 2016): Y-16; N-0; NR-1

- Decision: Approved for continued endorsement

8. Board of Directors Vote: Y-X; N-X

9. Appeals

0697 Risk Adjusted Case Mix Adjusted Elderly Surgery Outcomes Measure

Submission | Specifications

Description: This is a hospital based, risk adjusted, case mix adjusted elderly surgery aggregate clinical outcomes measure of adults 65 years of age and older.

Numerator Statement: The outcome of interest is hospital-specific risk-adjusted mortality, a return to the operating room, or any of the following morbidities as defined by American College of Surgeons National Surgical Quality Improvement Program (ACS NSQIP): Cardiac Arrest requiring CPR, Myocardial Infarction, Sepsis, Septic Shock, Deep Incisional Surgical Site Infection (SSI), Organ/Space SSI, Wound Disruption, Unplanned Reintubation without prior ventilator dependence, Pneumonia without pre-operative pneumonia, progressive Renal Insufficiency or Acute Renal Failure without pre-operative renal failure or dialysis, or urinary

tract infection (UTI) within 30 days of any ACS NSQIP listed (CPT) surgical procedure. The original endorsed measure included venous thromboembolism (VTE) as eligible morbidity events, including deep venous thrombosis requiring therapy and pulmonary embolism.

Denominator Statement: Patients undergoing any ACS NSQIP listed (CPT) surgical procedure who are 65 years of age or older. (See appendix of roughly 2900 ACS NSQIP eligible CPT codes)

Exclusions: Cases must first have ACS NSQIP eligible CPT codes on the submitted list of ~2900 codes. Major/multisystem trauma and transplant surgeries are excluded. Patients who are ASA 6 (brain-death organ donor) are not eligible surgical cases. Surgeries following within 30 d of an index procedure are an outcome (return to OR) and are not eligible to be new index cases. Thus, a patient known to have had a prior surgical operation within 30 days is excluded from having the subsequent surgery considered an index case.

Adjustment/Stratification: Statistical risk model."ACS NSQIP performs hospital-level profiling by reporting case-mix adjusted and risk-adjusted postoperative outcomes. The statistical modeling is performed in three steps, which include case-mix adjustment, variable selection, then risk adjustment, all of which are carried out using the SAS software package (v 9.2).

In the first step, clinically similar procedures (defined by CPT codes) are categorized into established groups. Generalized linear mixed modeling (GLMM, also called hierarchical modeling in this measure) is used to calculate linear predictor values for each procedure group (SAS PROC GLIMMIX). These linear predictors (referred to as “CPT Risk”) rank each procedure group on a continuous scale based on the log probability for outcome, and are risk adjusted for patient factors. The CPT Risk variable provides case-mix adjustment for the hospital profiling.

For variable selection of risk factors, step-wise logistic regression (SAS PROC LOGISTIC) is performed using NSQIP predictors. The NSQIP predictors demonstrating statistical significance ($P<0.05$) are selected for the preliminary predictor list. A subset of this list is chosen based on clinical relevance, statistical importance, and ease of data extraction to create a small, fixed or “parsimonious” predictor set. This composite mortality or any serious morbidity outcome measure was evaluated based on the following three predictors: ASA class, CPT risk and functional status.

In the final step, both case-mix adjustment and risk adjustment are performed for the hospital profiling using the CPT Risk and the parsimonious predictor set, respectively. A GLMM is created (SAS PROC GLIMMIX) which reflects the hierarchical nature of the data, with patients clustered within hospitals (random intercept, fixed slope model with logistic regression). The model incorporates the empirical Bayes method, which optimally combines information from the particular hospital with information from the sample of all hospitals to arrive at a best prediction about each hospital’s performance. Sometimes called a reliability adjustment, but more properly described as smoothing or pooling, this adjustment tends to shrink predicted hospital performance towards the grand mean hospital value, with the effect of shrinkage greatest when the hospital sample size is small and when the hospital’s estimate is extreme compared to other hospitals.

Hospital performance is reported as an odds ratio (the odds for the hospital versus the odds for the statistically constructed average hospital). Hospitals with odds ratios less than 1.0 demonstrate better than average performance; those with odds ratios greater than 1.0 demonstrate worse than average performance. Odds ratios are reported with 95% confidence intervals: the interval does not overlap 1.0, the hospital is designated as a statistically significant high or low outlier, depending on whether the interval is entirely above or below 1.0, respectively.

An outcome was defined as 30-day mortality or any serious morbidity including: cardiac arrest requiring CPR, myocardial infarction, sepsis, septic shock, organ space SSI, deep incisional SSI, wound disruption, unplanned reintubation without prior ventilator dependence, pneumonia without pre-operative pneumonia, progressive renal insufficiency or acute renal failure without pre-operative renal failure or dialysis, urinary tract infection, or return to the operating room, according to ACS NSQIP definitions.

Reliability is used to evaluate the hospital profiling; this metric describes how confidently the performance of one hospital can be distinguished from other hospitals. Reliability was assessed using a standard method (described in: Huffman, Cohen et al. 2015), which uses information provided by a random intercept, fixed slope, hierarchical model (implemented by SAS PROC GLIMMIX). Please see Measure Testing attachment.

Huffman, K.M., Cohen, M.E, Ko, C.Y., Hall, B.L. A comprehensive evaluation of statistical reliability in ACS NSQIP profiling models. Annals of Surgery, 2015, 261, 1108-1113"

Level of Analysis: Facility

Setting of Care: Ambulatory Care : Ambulatory Surgery Center (ASC), Hospital/Acute Care Facility

Type of Measure: Outcome

Data Source: Electronic Clinical Data, Electronic Clinical Data : Electronic Health Record, Electronic Clinical Data : Imaging/Diagnostic Study, Electronic Clinical Data : Laboratory, Management Data, Paper Medical Records, Electronic Clinical Data : Pharmacy, Electro

Measure Steward: American College of Surgeons

STANDING COMMITTEE MEETING 08/16 - 08/17/16

1. Importance to Measure and Report: <u>The measure meets the Importance criteria</u>

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

1a. Evidence: **Accepted Prior Evidence Evaluation**; 1b. Performance Gap: **H-9**; **M-11**; **L-0**; **I-0**

<u>Rationale</u>:

- The Committee noted that the new evidence since approval of the measure is a joint statement from the American College of Surgeons and American Geriatric Society about optimal perioperative case, adds to the evidence that there are processes that can be done to affect quality performance for this measure. Also, recent publications have demonstrated that venous thromboembolism (VTE) is subject to surveillance bias so it has been removed as an eligible morbidity event.
- With evidence that is directionally the same as prior evidence with exception of the VTE report; the prior evaluation of this criterion was accepted without further discussion.
- The Committee discussed evidence of gap in terms of observed to expected (O/E) occurrence ratios and outlier status. Of 460 hospitals that participate in ACS NSQIP, O/E ratios range between 0.59 and 1.69; 49 hospitals are low outliers; and 34 are high.

2. Scientific Acceptability of Measure Properties: <u>The measure meets the Scientific Acceptability criteria</u>

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

2a. Reliability: **H-10**; **M-9**; **L-0**; **I-0** 2b. Validity: **H-0**; **M-13**; **L-6**; **I-0**

<u>Rationale</u>:

- Questions that came to the Committee as preliminary comments focused on the age limitation of the measure (i.e., why the measure is not inclusive of individuals younger than 65) and the potential usefulness of analyzing the population of interest in more granular age ranges to assess potential differences, including cognitive differences. The developer responded that it is looking at patients who are > 80 and that there is good data showing that there is cognitive impact at age 60, so 65 has been deemed acceptable.
- A Committee member asked if the impact of removing pulmonary embolism (PE) from the measure as part of deep vein thrombosis (DVT) had been assessed given the seriousness of the outcome. The developer responded that PE is more rare than DVT and that the impact on its assessments was biased. A committee member noted that identification of sub-clinical PEs has resulted in an impact no different than that of DVT.
- The Committee accepted that data element reliability has been demonstrated. Reliability of ACS modeling programs has been tested and results published in peer-reviewed literature in 2015.
- The developer reported the sample size needed to reach a reliability threshold of 0.4 that it proposes is moderate reliability. Reaching that threshold requires a hospital sample size of 180 cases per year; the developer reported that 85% of participating hospitals meet that threshold.
- Committee discussion of validity reflected issues that are desirable in a geriatric surgery model. For example, while meaningful, post-operative delirium and falls outside of hospital are not captured. Functional status is included as are many other important elements.
- In response to question about validity of data collected in NSQIP versus the medical record, the developer representative reported that data element reliability is assessed through annual program

audits for 5% to 10% (10,000 to 15,000 data fields) of participating programs with consistent inter-rater reliability of 97% to 98%. The developer was asked to include that information in future submissions.
- In response to a question about whether event outcomes are weighted based on frequency of occurrence, the developer reported that the outcomes are not weighted. It was suggested that some approach to patient-graded severity would be worth exploring.
- Death or any of the specified morbidities within 30 days, including those post-hospitalizations that are ascertained are included in the measure. Also, in the event of multiple specified morbidities, one case could count only as one event in the overall model.
- The reported C statistic is 0.75 to 0.77 (depending on whether VTE and SES/SDS are included) and the Committee agreed that data presented regarding inclusion or exclusion of SDS factors and VTE supports removal of VTE from the measure and not including SDS factors at this time.

3. Feasibility: H-4; M-15; 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 Committee agreed that data from well-constructed registries is feasible and has the potential to provide more complete and accurate information than claims data.
- The developer reports the subscription fee for ACS NSQIP participation varies between $10,000 and $25,000 and employees needed vary from 0.25 to 1.0 full time equivalent. That cost covers 200 models across a number of surgical specialties. The developer estimates cost for this measure at less than 1% of the total cost to participate in the registry.
- The Committee noted that number of ACS NSQIP participating organizations and surgeons (approximately 800 and 30,000 respectively) demonstrates feasibility.

4. Usability and Use: H-12; M-9; L-0; I-0

(Used and useful to the intended audiences for 4a. Accountability and Transparency; 4b. Improvement; and 4c. Benefits outweigh evidence of unintended consequences)

Rationale:

- The developer reported that of 460 hospitals in the ACS NSQIP program, 131 publicly report on the measure and all, reportedly, make use of the information for internal quality improvement. In so doing, each participant can access all details of each of their individual cases contained within the database. Also, they can view grouped outcomes to better understand performance and improve quality.
- In response to a question about potential unintended consequences, the developer reported they review time decay function of different outcomes over time. As a result, a determination has been made that the 30-day cutoff is a balance of capturing enough signal to generate good quality improvement against burden of following patients for longer period in outlying settings. Also, JAMA published a study in 2016 (authored by one of the Standing Committee co-chairs) that reports there is no bias in using the 30-day cutoff.

5. Related and Competing Measures

No related or competing measures noted.

Standing Committee Recommendation for Endorsement: **Y-20**; **N-0**

6. Public and Member Comment

- No comments received.

7. Consensus Standards Approval Committee (CSAC) Vote (December 21, 2016): Y-16; N-0; NR-1

- Decision: Approved for continued endorsement

8. Board of Directors Vote: Y-X; N-X

9. Appeals

0706 Risk Adjusted Colon Surgery Outcome Measure

Submission | Specifications

Description: This is a hospital based, risk adjusted, case mix adjusted morbidity and mortality aggregate outcome measure of adults 18+ years undergoing colon surgery.

Numerator Statement: The outcome of interest is 30-day, hospital-specific risk-adjusted (all cause) mortality, unplanned reoperation, or any of the following morbidities as defined by American College of Surgeons National Surgical Quality Improvement Program (ACS NSQIP): cardiac arrest requiring CPR, myocardial Infarction, sepsis, septic shock, deep incisional surgical site infection (SSI), organ space SSI, wound disruption, unplanned reintubation without prior ventilator dependence, pneumonia without pre-operative pneumonia, progressive renal insufficiency or acute renal failure without pre-operative renal failure or dialysis, or urinary tract infection (UTI). All outcomes are definitively resolved within 30 days of any ACS NSQIP listed (CPT) surgical procedure. All variables (fields) are explicitly defined in the tradition of the ACS NSQIP and definitions are also submitted in these materials. The original endorsed measure included venous thromboembolism (VTE) as eligible morbidity events, including deep venous thrombosis requiring therapy and pulmonary embolism.

The current set of mortality and major complications for this measure was chosen based on prior work revealing that these complications are related to other important criteria such as large contributions to excess length of stay, large complication burdens, or correlations with mortality. (Merkow et al. 2013) In addition, the desire to limit the outcomes to significant events (ie- some degree of severity according to certain criteria) is the reason that superficial wound infection is excluded from the measure. The current submission removes VTE from the measure as recent publications have demonstrated it is highly subject to surveillance bias. A recent study of 2,838 hospitals found that increased VTE prophylaxis adherence was associated with worse risk-adjusted VTE event rates. (Bilimoria 2013 JAMA) Paradoxically hospitals with higher quality, identified by number of accreditations and quality initiatives, had worse VTE rates. The explanation for this paradoxical relationship is suggested by the association of higher rates of VTE imaging studies among these hospitals with higher rates of VTE detection. (Bilimoria, Chung et al. 2013, Ju, Chung et al. 2014, Chung, Ju et al. 2015)

Bilimoria, K. Y., J. Chung, M. H. Ju, E. R. Haut, D. J. Bentrem, C. Y. Ko and D. W. Baker (2013). "Evaluation of surveillance bias and the validity of the venous thromboembolism quality measure." Jama 310(14): 1482-1489.

Chung, J. W., M. H. Ju, C. V. Kinnier, M. W. Sohn and K. Y. Bilimoria (2015). "Postoperative venous thromboembolism outcomes measure: analytic exploration of potential misclassification of hospital quality due to surveillance bias." Ann Surg 261(3): 443-444.

Ju, M. H., J. W. Chung, C. V. Kinnier, D. J. Bentrem, D. M. Mahvi, C. Y. Ko and K. Y. Bilimoria (2014). "Association between hospital imaging use and venous thromboembolism events rates based on clinical data." Ann Surg 260(3): 558-564; discussion 564-556.

Merkow RP, Hall BL, Cohen ME, et al. Validity and feasibility of the american college of surgeons colectomy composite outcome quality measure. Ann Surg. 2013;257(3):483-489.

Denominator Statement: Patients undergoing any ACS NSQIP listed (primary CPT) colon procedure. (44140, 44141, 44143, 44144, 44145, 44146, 44147, 44150, 44151, 44160, 44204, 44205, 44206, 44207, 44208, 44210)

Exclusions: As noted above, cases are collected so as to match ACS NSQIP inclusion and exclusion criteria, thereby permitting valid application of ACS NSQIP model-based risk adjustment. Therefore, trauma and transplant surgeries are excluded as are surgeries not on the ACS NSQIP CPT list as eligible for selection (see details in next item). Patients who are ASA 6 (brain-death organ donor) are not eligible surgical cases. Of note, the measure excludes patients identified as having had prior surgical procedures within 30 days of a potential index procedure, since this measure is based on 30 day outcomes. A patient who is identified as having had a prior surgical procedure within 30 days of the index case being considered is excluded from accrual. A patient who has a second surgical procedure performed within 30 days after an index procedure has the second procedure recorded as a "Return to the operating room within 30 days" (one of the outcomes defined), but the second procedure cannot be accrued into the program as a new index procedure.

Adjustment/Stratification: Statistical risk model.

"ACS NSQIP performs hospital-level profiling by reporting case-mix adjusted and risk-adjusted postoperative outcomes. The statistical modeling is performed in three steps, which include case-mix adjustment, variable selection, then risk adjustment, all of which are carried out using the SAS software package (v 9.2).

In the first step, clinically similar procedures (defined by CPT codes) are categorized into established groups. Generalized linear mixed modeling (GLMM, also called hierarchical modeling in this measure) is used to calculate linear predictor values for each procedure group (SAS PROC GLIMMIX). These linear predictors (referred to as "CPT Risk") rank each procedure group on a continuous scale based on the log probability for outcome, and are risk adjusted for patient factors. The CPT Risk variable provides case-mix adjustment for the hospital profiling.

For variable selection of risk factors, step-wise logistic regression (SAS PROC LOGISTIC) is performed using NSQIP predictors. The NSQIP predictors demonstrating statistical significance ($P<0.05$) are selected for the preliminary predictor list. A subset of this list is chosen based on clinical relevance, statistical importance, and ease of data extraction to create a small, fixed or "parsimonious" predictor set (described in: Merkow, Hall et al. 2013) This composite mortality or any serious morbidity outcome measure was evaluated based on the following six predictors: ASA class, CPT risk, functional status, operative indication, emergency case and wound class. Operative indication was categorized into eight separate groups based on ICD-9/ICD-10 codes: cancer, diverticular disease, enteritis/colitis, hemorrhage, volvulus, obstruction/perforation, vascular insufficiency and other.

In the final step, both case-mix adjustment and risk adjustment are performed for the hospital profiling using the CPT Risk and the parsimonious predictor set, respectively. A GLMM is created (SAS PROC GLIMMIX) which reflects the hierarchical nature of the data, with patients clustered within hospitals (random intercept, fixed slope model with logistic regression). The model incorporates the empirical Bayes method, which optimally combines information from the particular hospital with information from the sample of all hospitals to arrive at a best prediction about each hospital's performance. Sometimes called a reliability adjustment, but more properly described as smoothing or pooling, this adjustment tends to shrink predicted hospital performance towards the grand mean hospital value, with the effect of shrinkage greatest when the hospital sample size is small and when the hospital's estimate is extreme compared to other hospitals.

Hospital performance is reported as an odds ratio (the odds for the hospital versus the odds for the statistically constructed average hospital). Hospitals with odds ratios less than 1.0 demonstrate better than average performance; those with odds ratios greater than 1.0 demonstrate worse than average performance. Odds ratios are reported with 95% confidence intervals: if the interval does not overlap 1.0, the hospital is designated as a statistically significant high or low outlier, depending on whether the interval is entirely above or below 1.0, respectively.

An outcome was defined as 30-day mortality or any serious morbidity including: cardiac arrest requiring CPR, myocardial infarction, sepsis, septic shock, organ space SSI, deep incisional SSI, wound disruption, unplanned reintubation without prior ventilator dependence, pneumonia without pre-operative pneumonia, progressive renal insufficiency or acute renal failure without pre-operative renal failure or dialysis, urinary tract infection, or return to the operating room, according to ACS NSQIP definitions.

Reliability was assessed using a standard method (described in: Huffman, Cohen et al. 2015), which uses information provided by a random intercept, fixed slope, hierarchical model (implemented by SAS PROC GLIMMIX). Please see Measure Testing attachment.

Huffman, K.M., Cohen, M.E, Ko, C.Y., Hall, B.L. A comprehensive evaluation of statistical reliability in ACS NSQIP profiling models. Annals of Surgery, 2015, 261, 1108-1113

Merkow RP, Hall BL, Cohen ME, et al. Validity and feasibility of the american college of surgeons colectomy composite outcome quality measure. Ann Surg. 2013;257(3):483-489."

A detailed description of the parsimonious colon surgery outcome measure has been published recently (as described in: Merkow, Hall et al. 2013).

Merkow RP, Hall BL, Cohen ME, et al. Validity and feasibility of the american college of surgeons colectomy composite outcome quality measure. Ann Surg. 2013;257(3):483-489.

Level of Analysis: Facility, Population : National

Setting of Care: Ambulatory Care : Ambulatory Surgery Center (ASC), Hospital/Acute Care Facility

Type of Measure: Outcome

Data Source: Electronic Clinical Data, Electronic Clinical Data : Electronic Health Record, Electronic Clinical Data : Imaging/Diagnostic Study, Electronic Clinical Data : Laboratory, Management Data, Paper Medical Records, Electronic Clinical Data : Registry

Measure Steward: American College of Surgeons

STANDING COMMITTEE MEETING 08/16 - 08/17/16

1. Importance to Measure and Report: <u>The measure meets the Importance criteria</u>

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

1a. Evidence: **Accepted Previous Evaluation**; 1b. Performance Gap: **H-17**; **M-1**; **L-0**; **I-0**

<u>Rationale</u>:

- The Committee noted that new evidence submitted addresses the rationale for excluding VTE from the measure as an eligible morbidity event. Based on the evidence available, the Committee accepted the prior evaluation of this criterion without further discussion.
- The developer reported that O/E ratios range in the last reporting period varied between 0.86 (better than expected outcomes) and 1.17 (worse than expected outcome) at the 10th and 90th percentiles respectively, noting that while improvement has occurred there remains significant variability. The developer noted that this represents a complication rate that varies from 5% to over 30%.
- The Committee concurred that the information provided represents a significant gap.
- Also, a Committee member noted that while appropriate for exclusion from this measure, the high morbidity of colon surgery in children, represents a gap and opportunity for measure development that is/can be addressed by the pediatric NSQIP.

2. Scientific Acceptability of Measure Properties: <u>The measure meets the Scientific Acceptability criteria</u>

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

2a. Reliability: **H-11**; **M-10**; **L-0**; **I-0** 2b. Validity: **H-0**; **M-18**; **L-2**; **I-0**

<u>Rationale</u>:

- The developer reported reliability testing that examined the measure with potential adjustments for inclusion or exclusion of both VTE and SDS factors.
- The Committee noted that reliability testing information reports that a minimum acceptable reliability of 0.4 is estimated to require a sample size of 99, which the developer considers an achievable target. Data provided by the developer indicates that 42.9% of all US hospitals and 68.7% of ACS NSQIP hospitals meet the 0.4 reliability requirement. Further, the developer noted that greater than 40% of US hospitals that meet the reliability requirement perform about 85% of all colectomies performed in the US.
- In response to Committee question, the developer stated that confidence intervals are reported with institutional O/E ratios.
- A Committee member noted that the risk model is proprietary and not available to review. In response, the developer representative noted that the risk elements in the model are provided and that, if the measure were implemented publicly, ACS would provide those specifications to the public.
- It was noted the Committee would like to see an improved standard of measurement with NSQIP in future in that, at present, there is no severity weighting of outcomes; e.g., urinary tract infection and death would result in the same score.
- A Committee member, while noting the clinical rationale for not including patients <18 years of age, asked that ACS note the exclusion with a rationale.
- As noted during discussion of Measure #0697 in response to question about validity of data collected in NSQIP versus the medical record, the developer representative reported that data element reliability

is assessed through annual program audits for 5% to 10% (10,000 to 15,000 data fields) of participating programs with consistent inter-rater reliability of 97% to 98%. The developer was asked to include that information in future submissions.
- The C statistic is reported as 0.72 under 4 conditions related to VTE and SES/SDS inclusion or exclusion. The data were accepted as support for removing VTE from the measure and not including SDS factors at this time.

3. Feasibility: H-7; 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:

- As noted with Measure #0697, the Committee agreed that data from well-constructed registries is feasible and has the potential to provide more complete and accurate information than claims data.
- The Committee noted that number of ACS NSQIP participating organizations and surgeons (approximately 800 and 30,000 respectively) demonstrates feasibility. Subscription fees for ACS NSQIP participation and employee need was addressed in discussion of Measure #0697.

4. Usability and Use: H-10; M-10; L-0; I-0

(Used and useful to the intended audiences for 4a. Accountability and Transparency; 4b. Improvement; and 4c. Benefits outweigh evidence of unintended consequences)

Rationale:

- As noted with Measure #0697, the developer reported that of 460 hospitals in the ACS NSQIP program, 131 publicly report on the measure and all, reportedly, make use of the information for internal quality improvement. In so doing, each participant can access all details of each of their individual cases contained within the database. Also, they can view grouped outcomes to better understand performance and improve quality.
- The Committee noted that both this measure and #0697 represent procedures that are done in critical access hospitals but would be difficult for them to do; however, the developer representative noted that there are critical access hospitals that do participate in the program at a cost reduction. It was also noted that in the future, implementation of the measure will not require NSQIP participation; rather those who desire to use it would be guided on acquisition of required fields.

5. Related and Competing Measures

No related or competing measures noted.

Standing Committee Recommendation for Endorsement: **Y-20**; **N-0**

6. Public and Member Comment

- One NQF member submitted a comment in support of the Committee's recommendation to recommend this measure for endorsement.

7. Consensus Standards Approval Committee (CSAC) Vote (December 21, 2016): Y-16; N-0; NR-1

- Decision: Approved for continued endorsement

8. Board of Directors Vote: Y-X; N-X

9. Appeals

1519 Statin Therapy at Discharge after Lower Extremity Bypass (LEB)

Submission | **Specifications**

Description: Percentage of patients aged 18 years and older undergoing infrainguinal lower extremity bypass who are prescribed a statin medication at discharge. This measure is proposed for both hospitals and individual providers.

Numerator Statement: Patients undergoing infrainguinal lower extremity bypass who are prescribed a statin medication at discharge.

Denominator Statement: All patients aged 18 years and older undergoing lower extremity bypass as defined above who are discharged alive, excluding those patients who are intolerant to statins.

Exclusions: Chart documentation that patient was not an eligible candidate for statin therapy due to known drug intolerance, or patient died before discharge.

Adjustment/Stratification: No risk adjustment or risk stratification

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

Setting of Care: Hospital/Acute Care Facility

Type of Measure: Process

Data Source: Electronic Clinical Data : Registry

Measure Steward: Society for Vascular Surgery

STANDING COMMITTEE MEETING 08/16 - 08/17/16

1. Importance to Measure and Report: <u>The measure meets the Importance criteria</u>

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

1a. Evidence: **Accepted Previous Evaluation** 1b. Performance Gap: **H-16**; **M-5**; **L-0**; **I-0;**

<u>Rationale</u>:

- The evidence base for this measure states that prescription of statin therapy at discharge reduces mortality and morbidity for patients undergoing lower extremity bypass. No new evidence was submitted for this maintenance measure and the Committee accepted the previous evaluation on this criterion.
- Performance data submitted during the initial endorsement of this measure ranged from 69% to 84%.
- Upon a vote, the Committee agreed the measure met the opportunity for improvement criterion.

2. Scientific Acceptability of Measure Properties: <u>The measure meets the Scientific Acceptability criteria</u>

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

2a. Reliability: **H-0**; **M-18**; **L-4**; **I-0** 2b. Validity: **H-0**; **M-15**; **L-5**; **I-2**

<u>Rationale</u>:

- Data element testing was completed on 100 patients in five institutions and showed a kappa statistic of 0.80, meaning there was 80% agreement between the discharge summary and the discharge order as to whether statins were prescribed.
- The Committee questioned the data source and learned that the Vascular Study Group of New England (VSGNE) registry had evolved into the self-reported Vascular Quality Initiative (VQI) database. The developer clarified that VQI covers nearly 400 institutions in the US and nearly a third of vascular surgeons participate in the registry.
- The Committee acknowledged there is less than 2% missing data in the measure. Overall, the Committee agreed the measure met the scientific acceptability criterion.

3. Feasibility: H-2; M-19; 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)

<u>Rationale</u>:

- The Committee acknowledged that this registry measure was feasible for those participating in the registry.

4. Usability and Use: H-7; M-15; L-0; I-0

(Used and useful to the intended audiences for 4a. Accountability and Transparency; 4b. Improvement; and 4c. Benefits outweigh evidence of unintended consequences)

<u>Rationale</u>:

- The Committee acknowledged that the measure is reported through the Centers for Medicare & Medicaid Services, Physician Quality Reporting System (CMS PQRS) program.

- The Committee clarified that measure is reported through the registry and then to CMS.

5. Related and Competing Measures

- This measure is related to #0118 Anti-Lipid Treatment Discharge. During the previous evaluation of this measure, Committee stated that the measures were related in terms of therapy used but involved different procedures and patient populations. Measure #0439 Discharged on Statin Medications was also listed as a related measure, however, the measure has been moved to reserve status by the Neurology Standing Committee.

Standing Committee Recommendation for Endorsement: **Y-22**; **N-0**

6. Public and Member Comment

- NQF Members and members of the public submitted 12 comments all in support of the Committee's recommendation to recommend the measure for endorsement.

7. Consensus Standards Approval Committee (CSAC) Vote (December 21, 2016): Y-16; N-0; NR-1

- Decision: Approved for continued endorsement

8. Board of Directors Vote: Y-X; N-X

9. Appeals

1523 Rate of Open Repair of Abdominal Aortic Aneurysms (AAA) Where Patients Are Discharged Alive

Submission | **Specifications**

Description: Percentage of asymptomatic patients undergoing open repair of abdominal aortic aneurysms (AAA)who are discharged alive. This measure is proposed for both hospitals and individual providers.

Numerator Statement: Patients discharged alive/home following open repair of asymptomatic AAAs in men with < 6 cm diameter and women with < 5.5 cm diameter AAAs.

Denominator Statement: All elective open repairs of asymptomatic AAAs in men with < 6 cm dia and women with < 5.5 cm dia AAAs

Exclusions: = 6 cm minor diameter - men

= 5.5 cm minor diameter - women

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

Adjustment/Stratification: No risk adjustment or risk stratification

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

Setting of Care: Hospital/Acute Care Facility

Type of Measure: Outcome

Data Source: Electronic Clinical Data : Registry

Measure Steward: Society for Vascular Surgery

STANDING COMMITTEE MEETING 08/16 - 08/17/16

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

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

1a. Evidence: **Accepted Previous Evaluation;** 1b. Performance Gap: **H-7**; **M-15**; **L-0**; **I-0;**

Rationale:

- The evidence base for this measure states that rupture risk is assessed by AAA diameter, with larger AAAs more prone to rupture. Based on a trial, the measure specified that low risk patients (<6cm diameter in men and <5.5cm in women) should be offered open AAA repair if the predicted operative mortality is low. Updated evidence was submitted for this maintenance measure to which the

Committee agreed still supported at least one action to a health outcome. The Committee then accepted the previous evaluation on this criterion.

- Performance data showed that the average mortality was low and varied by geographic area. The Committee also discussed that providing feedback on performance to low volume centers that may have increased mortality rates compared to higher volume centers, could reduce the gap in performance.
- Upon a vote, the Committee agreed the measure met the opportunity for improvement criterion.

2. Scientific Acceptability of Measure Properties: <u>The measure meets the Scientific Acceptability criteria</u>

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

2a. Reliability: **H-0**; **M-17**; **L-6**; **I-0** 2b. Validity: **H-0**; **M-14**; **L-7**; **I-2**

<u>Rationale</u>:

- Data element testing was used to support the reliability and validity of this measure. Data showed a kappa statistic of 1 for identification of the correct procedure performed, the diameter of the aneurysm, and elective repair. Hospital mortality showed a kappa statistic of .91.
- Members questioned whether the measure collected length of stay and why the measure is not reported within a longer time frame (e.g., 30 days). The developer noted that length of stay data and up to 9 months' post-operative data are collected in the registry. Committee members then suggested that even if the measure is extended to 30 day follow up that mortality could go un-reported if clients were discharged some place other than home.
- The Committee noted that validity testing was done at the facility level but questioned why testing was not performed at the clinician level.
- The Committee discussed exclusions, noting that long-term acute care facilities could be considered an exclusion since the measures put forth by this developer are always 30 days or in hospital mortality rates.
- The Committee also raised the point that the measure is focused on low volume centers but data were not presented to show that lower volume centers have higher mortality rates. The Committee also pointed out that excluding providers with fewer than 10 cases calls to question the validity of the measure and that just one adverse event in a low volume center would impact the performance rate. Also of note was that the Committee believed it would be difficult to meet the threshold of 10 cases in order to report this measure.
- The Committee also questioned why risk adjustment was not completed, noting that the data showed disparities among age groups, with worse outcomes for older patients. Committee members also noted that there could be a factor beyond patient selection that could impact outcomes since there was no evidence to suggest that high volume surgeons better select their patients. The developer stated that risk adjustment was not justified since small aneurysms have the same low risk of rupture, regardless of the patient's age.
- Other members did not express concern that the measure was not risk adjusted since the measure focuses on elective procedures.
- The Committee made several requests and suggestions to the developer including: additional validity testing at the clinician level if there is sufficient volume to do so; consider risk adjustment to reflect that even in small aneurysms the risk of death does increase with age; and to expand the measure to 30 days and to aneurysms of all sizes.
- Upon vote, the Committee agreed that the measure met the Validity criterion.

3. Feasibility: H-10; 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)

<u>Rationale</u>:

- The Committee acknowledged that the measure is currently measured and that the measure cannot be used in claims since claims data do not contain diameter size. There were no other comments regarding feasibility.

4. Usability and Use: H-5; M-15; L-3; I-0

(Used and useful to the intended audiences for 4a. Accountability and Transparency; 4b. Improvement; and 4c. Benefits outweigh evidence of unintended consequences)

Rationale:

- The Committee acknowledged that the measure is reported every six months in a rolling 12-month period.
- The Committee discussed the unintended consequence of this measure since its use could supersede patient choice. For example, the measure focuses on asymptomatic patients; patients at moderate risk of rupture may want the procedure but could be denied at the surgeon's discretion.
- Other members discussed that surgeons should be making that decision for patients that have increased risk of rupture or mortality and discuss with the patient that the risk of mortality from the procedure on symptomatic patients is greater than the risk of living with the aneurysm.
- Upon a vote, a majority of the Committee agreed the measure met this criterion.

5. Related and Competing Measures

- This measure is related to #0357 Abdominal Aortic Aneurysm Repair Volume (IQI 4) and #0359 Abdominal Aortic Aneurysm Repair Mortality Rate (IQI 11). During the post-comment call, the Committee recalled that this measure was initially endorsed with a recommendation to be harmonized with 0357 and 0359 and to also include claims data. The Committee noted that the 0357 and 0359 are different measures since they do not distinguish by diameter of the aneurysm. The Committee also discussed that the AHRQ measures allow reporting using administrative claims for facilities that are not members of the registry. Another member noted that the AHRQ measures are facility level only measures whereas this measure generates information at the clinician level.

Standing Committee Recommendation for Endorsement: **Y-18**; **N-5**

6. Public and Member Comment

- NQF Members and members of the public submitted 12 comments all in support of the Committee's recommendation to recommend the measure for endorsement.

7. Consensus Standards Approval Committee (CSAC) Vote (December 21, 2016): Y-16; N-0; NR-1

- Decision: Approved for continued endorsement

8. Board of Directors Vote: Y-X; N-X

9. Appeals

1534 In-hospital mortality following elective EVAR of AAAs

Submission | **Specifications**

Description: Percentage of patients undergoing elective endovascular repair of asymptomatic infrarenal abdominal aortic aneurysms (AAA) who die while in hospital. This measure is proposed for both hospitals and individual providers.

Numerator Statement: Mortality following elective endovascular infrarenal AAA repair of asymptomatic AAAs in men with < 6 cm dia and women with < 5.5 cm dia AAAs

Denominator Statement: All elective endovascular repairs of asymptomatic AAAs in men with < 6 cm dia and women with < 5.5 cm dia AAAs

Exclusions: = 6 cm diameter - men

= 5.5 cm diameter – women

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

Adjustment/Stratification: No risk adjustment or risk stratification

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

Setting of Care: Hospital/Acute Care Facility

Type of Measure: Outcome

Data Source: Electronic Clinical Data : Registry

Measure Steward: Society for Vascular Surgery

STANDING COMMITTEE MEETING 08/16 - 08/17/16

1. Importance to Measure and Report: <u>The measure meets the Importance criteria</u>

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

1a. Evidence: **Accepted Previous Evaluation**; 1b. Performance Gap: **H-8**; **M-13**; **L-0**; **I-0**

<u>Rationale</u>:

- The evidence base for this measure states that rupture risk is assessed by AAA diameter, with larger AAAs more prone to rupture. Based on a trial, the measure specified that low risk patients (<6cm diameter in men and <5.5cm in women) should be offered AAA repair if the predicted operative mortality is low. Updated evidence was submitted for this maintenance measure to which the Committee agreed still supported at least one action to a health outcome. The Committee then accepted the previous evaluation on this criterion.
- The Committee acknowledged that the performance gap data were similar to measure #1523 in that mortality was low and varied by geographic area. The Committee noted that a difference between the two measures was that the denominator was larger in this measure than in #1523. Without further discussion, the Committee agreed that the measure met this criterion.

2. Scientific Acceptability of Measure Properties: <u>The measure meets the Scientific Acceptability criteria</u>

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

2a. Reliability: **H-0**; **M-18**; **L-4**; **I-0** 2b. Validity: **H-0**; **M-16**; **L-5**; **I-0**

<u>Rationale</u>:

- Data element testing was used to support the reliability and validity of this measure. Data showed a kappa statistic of 1 for identification of the correct procedure performed, diameter size, and elective repair. Kappa for hospital mortality was 0.91.
- The Committee noted that the validity concerns with this measure had been discussed during the evaluation of #1523.
- Overall, the Committee agreed the measure met this criterion.

3. Feasibility: H-8; 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)

<u>Rationale</u>:

- The Committee noted that the developer reported less than one percent missing data and therefore agreed the measure met this criterion.

4. Usability and Use: H-8; M-11; L-2; I-0

(Used and useful to the intended audiences for 4a. Accountability and Transparency; 4b. Improvement; and 4c. Benefits outweigh evidence of unintended consequences)

<u>Rationale</u>:

- The measure is currently reported in PQRS and the Committee questioned whether the developer planned to combine this measure with #1523. The developer stated that the measures are different and that they preferred to keep the measures separate. Without further discussion, the Committee agreed the measure met this criterion.

5. Related and Competing Measures

- This measure is related to #0357 Abdominal Aortic Aneurysm Repair Volume (IQI 4) and #0359 Abdominal Aortic Aneurysm Repair Mortality Rate (IQI 11). During the post-comment call, the Committee recalled that this measure was initially endorsed with a recommendation to be harmonized with 0357 and 0359 and to also include claims data. The Committee noted that the 0357 and 0359 are different measures since they do not distinguish by diameter of the aneurysm. The Committee also discussed that the AHRQ measures allow reporting using administrative claims for facilities that are not

members of the registry. Another member noted that the AHRQ measures are facility level only measures whereas this measure generates information at the clinician level.

Standing Committee Recommendation for Endorsement: **Y-20**; **N-2**

6. Public and Member Comment

- NQF Members and members of the public submitted 13 comments all in support of the Committee's recommendation to recommend the measure for endorsement.

7. Consensus Standards Approval Committee (CSAC) Vote (December 21, 2016): Y-16; N-0; NR-1

- Decision: Approved for continued endorsement

8. Board of Directors Vote: Y-X; N-X

9. Appeals

1540 Postoperative Stroke or Death in Asymptomatic Patients undergoing Carotid Endarterectomy

Submission | Specifications

Description: Percentage of patients age 18 or older without carotid territory neurologic or retinal symptoms within the one year immediately preceding carotid endarterectomy (CEA) who experience stroke or death following surgery while in the hospital. This measure is proposed for both hospitals and individual surgeons.

Numerator Statement: Patients age 18 or older without preoperative carotid territory neurologic or retinal symptoms within the one year immediately preceding CEA who experience stroke or death during their hospitalization following carotid endarterectomy

Denominator Statement: Asymptomatic patients (based on NASCET criteria) within one year of CEA

Exclusions: DENOMINATOR EXCLUSIONS:

Symptomatic carotid stenosis: Ipsilateral carotid territory TIA or stroke less than 120 days prior to procedure: 9006F OR Other carotid stenosis: Ipsilateral TIA or stroke 120 days or greater prior to procedure or any prior contralateral carotid territory or vertebrobasilar TIA or stroke: 9007F

Adjustment/Stratification: No risk adjustment or risk stratification

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

Setting of Care: Hospital/Acute Care Facility

Type of Measure: Outcome

Data Source: Electronic Clinical Data : Registry

Measure Steward: Society for Vascular Surgery

STANDING COMMITTEE MEETING 08/16 - 08/17/16

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

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

1a. Evidence: **Accepted Previous Evaluation**; 1b. Performance Gap: **H-1**; **M-18**; **L-3**; **I-0**

Rationale:

- The evidence base for this measure states that carotid endarterectomy is beneficial in stroke prevention in patients who are not at high risk of death or stroke. Updated evidence was submitted for this maintenance measure to which the Committee agreed still supported at least one action to a health outcome. The Committee then accepted the previous evaluation on this criterion.
- A Committee member questioned whether the developer had data on disparities among gender and age group. Another member noted that providers do not have screening guidelines for asymptomatic carotid disease so providers may not know about groups of people that do or do not have the disease and were thus not treated. Other Committee members expressed that there were variations in healthcare utilization in general that are not explained by disparity but by hospital region.

- The Committee acknowledged that although the performance gap is low, that there is enough variation by facility and region.
- Upon a vote, the Committee agreed the measure met this criterion.

2. Scientific Acceptability of Measure Properties: <u>The measure meets the Scientific Acceptability criteria</u>

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

2a. Reliability: **H-0**; **M-19**; **L-3**; **I-0** 2b. Validity: **H-2**; **M-13**; **L-6**; **I-2**

<u>Rationale</u>:

- Data element testing was used to support the reliability and validity of this measure. Data showed a Kappa statistic of 1 for correct procedure performed and hospital stroke. Kappa was 0.91 for hospital mortality and 0.90 for asymptomatic 120 days before treatment.
- The Committee noted that this outcome measure is a construct of two different outcomes that are reasonable and of important for both the patient and the provider. The Committee also discussed that the Rankin score is recorded by the provider and the coder enters that data.
- As with other SVS measures discussed, the Committee again debated the merits of in hospital mortality versus an extended window of time (e.g., 30 days) to capture mortality. Some Committee members stated that in hospital mortality allows for greater specificity of the measure and lesser data collection burden. The Committee also stated that the same predictors are present regardless of where the death takes place. Other Committee members believed that eventually patients would want to see an extended window of time since the measure is reported at a low rate.
- The Committee requested that the developer update the measure specifications, indicating that to use the measure, a facility must be part of the registry.
- Upon a vote, a majority of the Committee believed this measure met this criterion.

3. Feasibility: H-6; M-15; 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)

<u>Rationale</u>:

- The developer reported less than 1% missing data for this measure. The Committee expressed no concerns regarding the feasibility of this measure.

4. Usability and Use: H-3; M-15; L-5; I-0

(Used and useful to the intended audiences for 4a. Accountability and Transparency; 4b. Improvement; and 4c. Benefits outweigh evidence of unintended consequences)

<u>Rationale</u>:

- The Committee acknowledged the unintended consequence of this measure since its use could supersede patient choice in that some patients (i.e., at moderate risk of rupture) may be denied surgery.
- The Committee questioned if the measure was publicly reported. The developer noted the measure is reported through PQRS and will be reported on Physician Compare.

5. Related and Competing Measures

- No related or competing measures noted.

Standing Committee Recommendation for Endorsement: **Y-19**; **N-4**

6. Public and Member Comment

- NQF Members and members of the public submitted 10 comments all in support of the
- Committee's recommendation to recommend the measure for endorsement.

7. Consensus Standards Approval Committee (CSAC) Vote (December 21, 2016): Y-16; N-0; NR-1

- Decision: Approved for continued endorsement

8. Board of Directors Vote: Y-X; N-X

9. Appeals

1543 Postoperative Stroke or Death in Asymptomatic Patients undergoing Carotid Artery Stenting (CAS)

Submission | Specifications

Description: Percentage of patients 18 years of age or older without carotid territory neurologic or retinal symptoms within 120 days immediately proceeding carotid angioplasty and stent (CAS) placement who experience stroke or death during their hospitalization for this procedure. This measure is proposed for both hospitals and individual interventionalists.

Numerator Statement: Patients over age 18 without preoperative carotid territory neurologic or retinal symptoms within one year of their procedure who experience stroke or death during their hospitalization following elective carotid artery angioplasty and stent placement.

Denominator Statement: Patients over age 18 without preoperative carotid territory neurologic or retinal symptoms within one year immediately preceding carotid artery stenting.

Exclusions: Per PQRS Specifications for 2016:

DENOMINATOR EXCLUSIONS:

Symptomatic carotid stenosis: Ipsilateral carotid territory TIA or stroke less than 120 days prior to procedure: 9006F OR Other carotid stenosis: Ipsilateral TIA or stroke 120 days or greater prior to procedure or any prior contralateral carotid territory or vertebrobasilar TIA or stroke: 9007F

Adjustment/Stratification: No risk adjustment or risk stratification

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

Setting of Care: Hospital/Acute Care Facility

Type of Measure: Outcome

Data Source: Electronic Clinical Data : Registry

Measure Steward: Society for Vascular Surgery

STANDING COMMITTEE MEETING 08/16 - 08/17/16

1. Importance to Measure and Report: Consensus not reached

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

1a. Evidence: **Y-12; N-10**; 1b. Performance Gap: **H-7**; **M-12**; **L-3**; **I-0**

Rationale:

- The evidence base for this measure is carotid stenting can decrease the risk of and prevent stroke. The Committee expressed concern that there are no published guidelines for carotid stenting in asymptomatic patients, pointing out that three of the four medical societies do not recommend the procedure. The Committee also noted that new evidence presented by the developer suggests stenting has an increased risk of stroke and death, compared to surgery for asymptomatic carotid disease.
- The developer stated that the indication for carotid stenting can be different than in endarterectomy and acknowledged that stenting carries a higher perioperative risk of stroke or mortality. Developers also clarified to the Committee that experienced surgeons in high volume centers are able to perform the procedure with outcomes similar to endarterectomy.
- The Committee questioned, in light of the increased risk of stroke or death with stenting, how this information would be shared with the various specialists who may also be performing the procedure.
- Committee members also considered whether the measure should be an appropriateness measure, while others members questioned whether the procedure is appropriate underscoring the importance to measure its outcome.
- Upon a vote, the Committee could not reach consensus on the Evidence criterion.
- Following the vote, the Committee acknowledged the American Heart Association's recommendation for carotid revascularization and that a randomized trial was interpreted in two ways (i.e., one found that stenting and endarterectomy have equal outcomes and the other favored endarterectomy), but did not definitively denounce stenting. The Committee indicated they would like additional comment from medical societies and the public to help them reach consensus.

- In discussion of performance gap, the Committee noted low variability in performance among providers. Another member pointed out that data presented in the measure are within a 30-day time window and not at discharge, as the measure states. Without further discussion, the Committee agreed the measure met this criterion.

2. Scientific Acceptability of Measure Properties: <u>Consensus not reached</u>

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

2a. Reliability: **H-0**; **M-14**; **L-8**; **I-0** 2b. Validity: **H-0**; **M-13**; **L-9**; **I-0**

<u>Rationale</u>:

- Data element testing was used to support the reliability and validity of this measure. Data showed a Kappa statistic of 1 for correct procedure performed and hospital stroke. Kappa was 0.91 for hospital mortality and 0.90 for asymptomatic 120 days before treatment.
- The Committee questioned how patients were excluded from the measure. The developer clarified patients could be excluded if they have stroke like symptoms within one year before the procedure and based on PQRS specifications that include two codes for whether symptoms occur within or beyond 120 days.
- As discussed in #1540, Committee members debated whether the measure should be risk adjusted even though the measure focuses on elective procedures.
- On a vote, the Committee agreed the measure met the reliability criterion but could not reach consensus on validity.

3. Feasibility: H-1; M-15; L-5; 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)

<u>Rationale</u>:

- The Committee agreed that the measure is feasible to collect in a registry but noted that the measure would not be easily transferrable to claims or eMeasure collection due to the specific definition of stroke diagnosis. Upon a vote, the Committee agreed the measure met this criterion.

4. Usability and Use: H-2; M-9; L-9; I-0

(Used and useful to the intended audiences for 4a. Accountability and Transparency; 4b. Improvement; and 4c. Benefits outweigh evidence of unintended consequences)

<u>Rationale</u>:

- Committee members agreed that it is appropriate to continue to look at the outcomes of carotid stenting for quality improvement purposes. Given the controversy over the procedure, the Committee did not recommend that the measure be used for public reporting or accountability.
- The Committee also debated whether they should endorse a measure that is not reimbursable by CMS unless the procedure is performed in a trial and the data are in a carotid specific stenting registry.

5. Related and Competing Measures

- No related or competing measures noted.

Standing Committee Recommendation for Endorsement: **Y – 13; N – 2**

<u>Rationale</u>

- Since the Committee did not reach consensus on the Evidence and Validity criteria during the in-person meeting, the Committee did not take a vote for overall suitability for endorsement. During the post-comment call, the Committee re-voted on and passed the measure on evidence and validity. The Committee then voted on overall suitability for endorsement.

6. Public and Member Comment

- NQF Members and members of the public submitted 14 comments, many of which stated that the measure should be recommended for endorsement.
- During the post- comment call, the Committee re-discussed whether the measure met the evidence and validity criteria.
- In their discussion on subcriterion Opportunity for improvement, the Committee agreed that although carotid artery stenting is a controversial procedure, this measure currently provides a method to

measure outcomes of the procedure. The Committee acknowledged that the procedure is still undergoing study in the CREST-2 trial but did not believe that should prevent them from recommending the measure for endorsement.

- In the Committee's discussion on Validity, the developer noted they submitted additional data to address the concern of whether the registry captured patient data at nine months. The Committee again questioned whether the measure should be risk adjusted but ultimately agreed that it should not be risk adjusted due to the benign natural history of high-grade internal carotid stenosis. Overall, the Committee recommended this measure for continued endorsement.

Vote Following Consideration of Public and Member Comments:

Evidence: Y-12; N-3

Validity: H-0; M-13; L-3; I-0

7. Consensus Standards Approval Committee (CSAC) Vote (December 21, 2016): Y-16; N-0; NR-1

- Decision: Approved for continued endorsement

8. Board of Directors Vote: Y-X; N-X

9. Appeals

1550 Hospital-level risk-standardized complication rate (RSCR) following elective primary total hip arthroplasty (THA) and/or total knee arthroplasty (TKA)

Submission | Specifications

Description: The measure estimates a hospital-level risk-standardized complication rate (RSCR) associated with elective primary THA and TKA in Medicare Fee-For-Service beneficiaries who are 65 years and older. The outcome (complication) is defined as any one of the specified complications occurring from the date of index admission to 90 days post date of the index admission (the admission included in the measure cohort). The target population is patients 18 and over. CMS annually reports the measure for patients who are 65 years or older, are enrolled in fee-for-service (FFS) Medicare, and hospitalized in non-federal acute-care hospitals.

Numerator Statement: The outcome for this measure is any complication occurring during the index admission (not coded present on arrival) to 90 days post-date of the index admission. Complications are counted in the measure only if they occur during the index hospital admission or during a readmission. The complication outcome is a dichotomous (yes/no) outcome. If a patient experiences one or more of these complications in the applicable time period, the complication outcome for that patient is counted in the measure as a "yes".

Denominator Statement: The target population for the publically reported measure includes admissions for Medicare FFS beneficiaries who are at least 65 years of age undergoing elective primary THA and/or TKA procedures. Additional details are provided in S.9 Denominator Detail

Exclusions: This measure excludes index admissions for patients:

1. Without at least 90 days post-discharge enrollment in FFS Medicare;

2. Who were discharged against medical advice (AMA); or,

3. Who had more than two THA/TKA procedure codes during the index hospitalization.

After applying these exclusion criteria, we randomly select one index admission for patients with multiple index admissions in a calendar year. We therefore exclude the other eligible index admissions in that year.

Adjustment/Stratification: Statistical risk model.

"Our approach to risk adjustment is tailored to and appropriate for a publicly reported outcome measure, as articulated in the American Heart Association (AHA) Scientific Statement, "Standards for Statistical Models Used for Public Reporting of Health Outcomes" (Krumholz et al., 2006).

The measure employs a hierarchical logistic regression model to create a hospital-level RSCR. In brief, the approach simultaneously models data at the patient and hospital levels to account for the variance in patient

outcomes within and between hospitals (Normand & Shahian, 2007). At the patient level, the model adjusts the log-odds of complications occurring within 90 days of the index admission using age, sex, selected clinical covariates, and a hospital-specific intercept. At the hospital level, the approach models the hospital-specific intercepts as arising from a normal distribution. The hospital intercept represents the underlying risk of complication at the hospital, after accounting for patient risk. If there were no differences among hospitals, then after adjusting for patient risk, the hospital intercepts should be identical across all hospitals.

Candidate and Final Risk-adjustment Variables: Candidate variables were patient-level risk-adjustors that were expected to be predictive of complication, based on empirical analysis, prior literature, and clinical judgment, including age and indicators of comorbidity and disease severity. For each patient, covariates are obtained from claims records extending 12 months prior to and including the index admission. For the measure currently implemented by CMS, these risk adjusters are identified using both inpatient and outpatient Medicare FFS claims data. However, in the all-payer hospital discharge database measure, the risk-adjustment variables can be obtained only from inpatient claims in the prior 12 months and the index admission.

The model adjusts for case-mix differences based on the clinical status of patients at the time of admission. We use condition categories (CCs), which are clinically meaningful groupings of more than 15,000 ICD-9-CM diagnosis codes (Pope et al., 2000). A file that contains a list of the ICD-9-CM codes and their groupings into CCs is attached in data field S.2b (Data Dictionary or Code Table). In addition, only comorbidities that convey information about the patient at admission or in the 12 months prior, and not complications that arise during the course of the index hospitalization, are included in the risk adjustment. Hence, we do not risk adjust for CCs that may represent adverse events of care when they are only recorded in the index admission.

The final set of risk-adjustment variables is:

Demographics

Age-65 (years, continuous) for patients aged 65 or over cohorts; or Age (years, continuous) for patients aged 18 and over cohorts

Male (%)

THA/TKA Procedure

Index admissions with an elective THA procedure

Number of procedures (two vs. one)

Clinical Risk Factors

Other congenital deformity of hip (joint) (ICD-9 code 755.63)

Post traumatic osteoarthritis (ICD-9 codes 716.15, 716.16)

Morbid obesity (ICD-9 code 278.01)

Metastatic cancer or acute leukemia (CC 7)

Cancer (CC 8-12)

Respiratory/heart/digestive/urinary/other neoplasms (CC 11-13)

Diabetes mellitus (DM) or DM complications (CC 15-20, 119, 120)

Protein-calorie malnutrition (CC 21)

Bone/joint/muscle infections/necrosis (CC 37)

Rheumatoid arthritis and inflammatory connective tissue disease (CC 38)

Osteoarthritis of hip or knee (CC 40)

Osteoporosis and other bone/cartilage disorders (CC 41)

Dementia or other specific brain disorders (CC 49-50)

Major psychiatric disorders (CC 54-56)

1550 Hospital-level risk-standardized complication rate (RSCR) following elective primary total hip arthroplasty (THA) and/or total knee arthroplasty (TKA)

Hemiplegia, paraplegia, paralysis, function disability (CC 67-69, 100-102, 177-178)
Cardio-respiratory failure and shock (CC 79)
Coronary atherosclerosis or angina (CC 83-84)
Stroke (CC 95-96)
Vascular or circulatory disease (CC 104-106)
Chronic obstructive pulmonary disease (COPD) (CC 108)
Pneumonia (CC 111-113)
Pleural effusion/pneumothorax (CC 114)
Dialysis status (CC 130)
Renal failure (CC 131)
Decubitus ulcer or chronic skin ulcer (CC 148-149)
Trauma (CC 154-156, 158-161)
Vertebral fractures (CC 157)
Other injuries (CC 162)
Major complications of medical care and trauma (CC 164)

References:

Krumholz HM, Brindis RG, Brush JE, et al. 2006. Standards for Statistical Models Used for Public Reporting of Health Outcomes: An American Heart Association Scientific Statement From the Quality of Care and Outcomes Research Interdisciplinary Writing Group: Cosponsored by the Council on Epidemiology and Prevention and the Stroke Council Endorsed by the American College of Cardiology Foundation. Circulation 113: 456-462.

Normand S-LT, Shahian DM. 2007. Statistical and Clinical Aspects of Hospital Outcomes Profiling. Stat Sci 22 (2): 206-226.

Pope G,Ellis R,Ash A, et al. Principal Inpatient Diagnostic Cost Group Models for Medicare Risk Adjustment. Health Care Financing Review. 2000;21(3):26."

Level of Analysis: Facility
Setting of Care: Hospital/Acute Care Facility
Type of Measure: Outcome
Data Source: Administrative claims, Other, Paper Medical Records
Measure Steward: Centers for Medicare & Medicaid Services

STANDING COMMITTEE MEETING 08/16 - 08/17/16

1. Importance to Measure and Report: <u>The measure meets the Importance criteria</u>

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

1a. Evidence: **Accepted Previous Evaluation**; 1b. Performance Gap: **H-8**; **M-15**; **L-0**; **I-0;**

<u>Rationale</u>:

- The Committee noted that there is no new evidence for this measure and accepted the prior evaluation of this criterion without further discussion.
- Performance data for analysis of over 3,000 hospitals over the period 2011 – 2014 shows, while there has been performance improvement, a risk standardized complication rate (RSCR) of 3.2 at the mean and a range of 1.4 to 6.9. The Committee agreed that for a procedure for which the goal should be 0%, this represents a continuing opportunity for improvement.

1550 Hospital-level risk-standardized complication rate (RSCR) following elective primary total hip arthroplasty (THA) and/or total knee arthroplasty (TKA)

- A Committee member suggested that, in the future, the developer consider weighting of the complications.

2. Scientific Acceptability of Measure Properties: <u>The measure meets the Scientific Acceptability criteria</u>

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

2a. Reliability: **H-3**; **M-19**; **L-1**; **I-0** 2b. Validity: **H-3**; **M-19**; **L-1**; **I-0**

<u>Rationale</u>:

- The developer reported that the data are patient-specific, capturing every event for a patient regardless of the institution at which it occurs.
- The Committee expressed concern about whether the intraclass correlation coefficient of 0.45 reported for reliability, while considered moderate agreement in comparing hospital performance values, demonstrated sufficient reliability in identifying performance differences such that it is useful to potential patients in making hospital selections.
- When questioned about specifying the measure only for patients over 65, the developer noted that it has been validated in all-payer data but has been specifically tested and used with Medicare beneficiaries. They further noted that those Medicare beneficiaries under 65 usually have additional confounding issues, such as diagnosed disabilities or dialysis.
- In responding to a Committee question, the developer noted that the technical advisory panel that reviewed the measure agreed that it measures what they believe it should measure.
- The Committee noted that the data source is administrative data and that the reported validity study was done with 6 hospitals in which an initial 30% discrepancy was reduced to 10% with refinement of outcomes and complications. This was addressed in terms of adjustments made over time based on feedback from users as well as NQF committees and analyses of fracture identification.
- It was noted that the reported validity test result could be raised by 0.5 to the 7.0 level by adding specific orthopedic-specific risk factors to the risk adjustment.
- The developer reported that a number of additional factors were analyzed and that every variable examined, including dual eligible status, was statistically significant in the multivariable model but are attenuated by combining them in the clinical model noting that none changed the c-statistic from 0.65. It was also noted that while there are other meaningful risk variables such as patient reported outcomes, functional status, lower extremity disability or pain these are not adequately coded in claims data so cannot be included in the model used.
- Disparities have remained essentially unchanged at 2.2% since 2013.
- The Committee debated whether this measure should include SDS factors in the risk model.
    - A Committee member stated that the entire population cared for by a hospital influences the outcome but the data presented did not counter this argument. The Committee member noted that patients with AHRQ scores below 42.7 and dual eligible patients do not solely define a hospital's patient population.
    - The developer reported the three SDS factors (i.e., AA race, dual eligibility, and low AHRQ scores) were statistically significant in the model. Using decomposition analysis, developers reported increased complication rates were due to hospital factors and not due to patient factors. The developers stated that inclusion of these factors would hide a component of hospital quality.
    - The Committee then noted that hospitals providing high quality care in economically disadvantaged areas may not perform well on the measure because of the exclusion of SDS factors. The developer stated that hospitals that care for non-minority, non-vulnerable patients could also perform poorly on the measure.
    - Other Committee members noted that they would not recommend risk adjustment for SDS, since finding disparities among groups is something that should be reported and followed.

1550 Hospital-level risk-standardized complication rate (RSCR) following elective primary total hip arthroplasty (THA) and/or total knee arthroplasty (TKA)

- The Committee stressed that scientific assessment of the measure should be kept separate from any consideration about payment. Members also noted that such a measure at the surgeon level would be useful.

3. Feasibility: H-19; M-2; 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 Committee agreed that use of the measure over the past several years demonstrates its feasibility.

4. Usability and Use: H-9; M-13; L-1; I-0

(Used and useful to the intended audiences for 4a. Accountability and Transparency; 4b. Improvement; and 4c. Benefits outweigh evidence of unintended consequences)

Rationale:

- The measure is publicly reported.
- No unintended consequences were brought forward though a Committee member noted that, as an elective procedure, there might be temptation to avoid care of patients with slightly higher or marginal risk of complication.
- A Committee member noted that joint replacements are increasingly being done in outpatient surgery settings that will not be captured by the measure.
- In response to a question about the data provided to hospitals, the developer reported that hospitals receive detail that includes the complication that occurred.

5. Related and Competing Measures

- Related measures identified by the developer include 0534 Hospital specific risk-adjusted measure of mortality or one or more major complications within 30 days of a lower extremity bypass (LEB); 0564 Cataracts: Complications within 30 Days Following Cataract Surgery Requiring Additional Surgical Procedures; 1551 Hospital-level 30-day risk-standardized readmission rate (RSRR) following elective primary total hip arthroplasty (THA) and/or total knee arthroplasty (TKA); and 2052 Reduction of Complications through the use of Cystoscopy during Surgery for Stress Urinary Incontinence. The Committee noted that while the measures address complications they are otherwise unrelated and that all are separately needed.

Standing Committee Recommendation for Endorsement: **Y-23**; **N-0**

6. Public and Member Comment

Comments received:

- One comment was received expressing concern related to the "lack of rigor and robustness of the risk adjustment reviews" and suggested that other SDS factors must be considered "to understand the potential impact on a hospital's performance".

Developer response:

- "CMS and Yale/CORE share the FAH's concern for the scientific rigor and robustness of the risk adjustment analyses. A risk adjustment model that is scientifically sound hinges to a large part on the use of data sources that are scrutinized, vetted, and representative of the population of interest. The process of variable selection must be done thoughtfully, as the inclusion of highly-correlated variables in a model often yields spurious results. In the context of socioeconomic status (SES) and quality reporting, there are questions that every developer and user must ask: If changes in the models result in changes in the findings, are these changes methodological artifacts? Do they alter the big picture of the overall ranking of the hospitals? Are these changes clinically meaningful? In order to identify relevant SES variables that can be used in a national measure of hospital quality, we have identified all available data sources assessing SES as patient-level variables, or proxies for patient-level variables, and can be linked to Medicare Fee-for-Service claims for all, or nearly all, over 65 year-old Medicare patients. We also performed a thorough review of relevant literature to identify SES variables that had

a conceptual relationship with the measures' outcomes. The only SES variables that met the criteria above and were supported by evidence linking the variable to measure outcomes including mortality, readmission and complications were:

- Dual eligible status (meaning enrolled in both Medicare and Medicaid)
- Agency for Healthcare Research and Quality (AHRQ)-validated SES Index score (composite of 7 different variables found in census data: percentage of people in the labor force who are unemployed, percentage of people living below poverty level, median household income, median value of owner-occupied dwellings, percentage of people ≥25 years of age with less than a 12th-grade education, percentage of people ≥25 years of age completing ≥4 years of college, and percentage of households that average ≥1 people per room)

In selecting variables for analyses across all measures, our intent was to be responsive to the NQF guidelines for measure developers in the context of the SES Trial Period, and to identify variables that are feasible to test and use in the near term. We examined patient-level indicators of both SES and race or ethnicity that are reliably available for all Medicare beneficiaries. We aimed to select those variables that are most valid and available. The variables used are aligned with what the National Academy of Medicine committee identified as available for use in outcome measures."

NQF response:

- The SDS trial period is a temporary change to NQF's policy. During this 2-year trial period, NQF is gathering information about the feasibility, limitations and challenges of including SDS factors in the risk-adjustment approach. Consideration of sociodemographic factors in risk adjustment models is a critical issue in measurement science. The Committee was charged with evaluating the submitted measure specifications and testing by the measure developer. Given the constraints on the currently available data elements, the Committee relied on the methods used by the developer to test the conceptual and empirical relationship between SDS factors and readmissions and complications.
  The developer stated there was a conceptual relationship between the SDS variables. Specifically, the developer reported socially disadvantaged patients had a higher disease burden or receive worse or disparate care, and that there is a source unrelated to hospital quality of care which could hinder patient adherence to things like post-discharge instructions. Using decomposition analysis to measure effects at the patient level and at the hospital level, the hospital effect had greater impact than patient level factors. These results were in contrast to the clinical data elements, where the patient effect tended to dominate. Due to the dominant hospital effect, the developer reported that they risk adjust away a component of hospital quality when the variables are included in the model. The developer reported that the three SDS factors were statistically significant in the model and inclusion of the variables in the model did not change the c-statistic. Ultimately, the Committee agreed that they would not recommend risk adjustment for SDS since finding disparities among groups on these measures is something that should be reported and followed.
  NQF has maintained a non-prescriptive approach to the selection and testing of variables in risk adjustment models. NQF has not required that certain SDS variables be tested and does not set requirements around the inclusion of any specific variables. Similarly, NQF does not set "cut-points" for the statistical testing of a risk adjustment model. The evaluation of the model is left to the Standing Committee reviewing the measure. This approach applies to both clinical and SDS variables.

Committee response:

- After a full discussion on SDS risk adjustment, the Committee accepted the developer's rationale not to include the SDS variables in the risk adjustment model. The Committee recognizes that risk adjustment for SDS factors is a rapidly progressing area and that more work is needed to appreciate the effects of social risk, understand the most relevant patient and community level factors, collect data on these risk factors, and determine the best methods to incorporate these risk factors into performance measures. The Committee looks forward to continued deliberations on these issues and to reexamining these measures as better data emerges.

1550 Hospital-level risk-standardized complication rate (RSCR) following elective primary total hip arthroplasty (THA) and/or total knee arthroplasty (TKA)

7. Consensus Standards Approval Committee (CSAC) Vote (December 21, 2016): Y-16; N-0; NR-1

- Decision: Approved for continued endorsement

8. Board of Directors Vote: Y-X; N-X

9. Appeals

1551 Hospital-level 30-day risk-standardized readmission rate (RSRR) following elective primary total hip arthroplasty (THA) and/or total knee arthroplasty (TKA)

Submission | Specifications

Description: The measure estimates a hospital-level risk-standardized readmission rate (RSRR) following elective primary THA and/or TKA in Medicare Fee-For-Service beneficiaries who are 65 years and older. The outcome (readmission) is defined as unplanned readmission for any cause within 30 days of the discharge date for the index admission (the admission included in the measure cohort). A specified set of planned readmissions do not count in the readmission outcome. The target population is patients 18 and over. CMS annually reports the measure for patients who are 65 years or older, are enrolled in fee-for-service (FFS) Medicare, and hospitalized in non-federal acute-care hospitals.

Numerator Statement: The outcome for this measure is 30-day readmission. We define readmission as an inpatient admission for any cause, with the exception of certain planned readmissions, within 30 days from the date of discharge of the index hospitalization. If a patient has more than one unplanned admissions (for any reason) within 30 days after discharge from the index admission, only one is counted as a readmission. The measure looks for a dichotomous yes or no outcome of whether each admitted patient has an unplanned readmission within 30 days. However, if the first readmission after discharge is considered planned, any subsequent unplanned readmission is not counted as an outcome for that index admission, because the unplanned readmission could be related to care provided during the intervening planned readmission rather than during the index admission.

Denominator Statement: The target population for the publicly reported measure includes admissions for Medicare FFS beneficiaries who are at least 65 years of age undergoing elective primary THA and/or TKA procedures. Additional details are provided in S.9 Denominator Details.

Exclusions: This measure excludes admissions for patients:

1) Without at least 30 days post-discharge enrollment in FFS Medicare;
2) Who were discharged against medical advice (AMA);
3) Admitted for the index procedure and subsequently transferred to another acute care facility;
4) Who had more than two THA/TKA procedure codes during the index hospitalization; or
5) Who had THA/TKA admissions within 30 days of a prior THA/TKA index admission.

Adjustment/Stratification: Statistical risk model.

"Our approach to risk adjustment is tailored to and appropriate for a publicly reported outcome measure, as articulated in the American Heart Association (AHA) Scientific Statement, “Standards for Statistical Models Used for Public Reporting of Health Outcomes” (Krumholz et al., 2006).

The measure employs a hierarchical logistic regression model to create a hospital-level 30-day RSRR. In brief, the approach simultaneously models data at the patient and hospital levels to account for the variance in patient outcomes within and between hospitals (Normand & Shahian, 2007). At the patient level, the model adjusts the log-odds of readmission within 30 days of discharge for age and selected clinical covariates. At the hospital level, the approach models the hospital-specific intercepts as arising from a normal distribution. The hospital intercept represents the underlying risk of readmission at the hospital, after accounting for patient risk.

1551 Hospital-level 30-day risk-standardized readmission rate (RSRR) following elective primary total hip arthroplasty (THA) and/or total knee arthroplasty (TKA)

If there were no differences among hospitals, then after adjusting for patient risk, the hospital intercepts should be identical across all hospitals.

Candidate and Final Risk-adjustment Variables: Candidate variables were patient-level risk-adjustors that were expected to be predictive of readmission, based on empirical analysis, prior literature, and clinical judgment, including age and indicators of comorbidity and disease severity. For each patient, covariates are obtained from claims records extending 12 months prior to and including the index admission. For the measure currently implemented by CMS, these risk adjusters are identified using both inpatient and outpatient Medicare FFS claims data. However, in the all-payer hospital discharge database measure, the risk-adjustment variables can be obtained only from inpatient claims in the prior 12 months and the index admission.

The model adjusts for case-mix differences based on the clinical status of patients at the time of admission. We use condition categories (CCs), which are clinically meaningful groupings of more than 15,000 ICD-9-CM diagnosis codes (Pope et al., 2000). A file that contains a list of the ICD-9-CM codes and their groupings into CCs is attached in data field S.2b (Data Dictionary or Code Table). In addition, only comorbidities that convey information about the patient at admission or in the 12 months prior, and not complications that arise during the course of the index hospitalization, are included in the risk adjustment. Hence, we do not risk adjust for CCs that may represent adverse events of care when they are only recorded in the index admission.

The final set of risk-adjustment variables is:

Demographics

Age-65 (years, continuous) for patients aged 65 or over cohorts; or Age (years, continuous) for patients aged 18 and over cohorts

Male (%)

THA/TKA Procedure

Index admissions with an elective THA procedure

Number of procedures (two vs. one)

Clinical Risk Factors

Other congenital deformity of hip (joint) (ICD-9 code 755.63)

Post traumatic osteoarthritis (ICD-9 codes 716.15, 716.16)

Morbid obesity (ICD-9 code 278.01)

History of infection (CC 1, 3-6)

Metastatic cancer or acute leukemia (CC 7)

Cancer (CC 8-12)

Diabetes mellitus (DM) or DM complications (CC 15-20, 119-120)

Protein-calorie malnutrition (CC 21)

Disorders of fluid/electrolyte/acid-base (CC 22-23)

Rheumatoid arthritis and inflammatory connective tissue disease (CC 38)

Severe hematological disorders (CC 44)

Dementia or other specified brain disorders (CC 49, 50)

Major psychiatric disorders (CC 54-56)

Hemiplegia, paraplegia, paralysis, functional disability (CC 67-69, 100-102, 177-178)

Polyneuropathy (CC 71)

Congestive heart failure (CC 80)

Coronary atherosclerosis or angina (CC 83-84)

1551 Hospital-level 30-day risk-standardized readmission rate (RSRR) following elective primary total hip arthroplasty (THA) and/or total knee arthroplasty (TKA)

Hypertension (CC 89, 91)
Specified arrhythmias and other heart rhythm disorders (CC 92-93)
Stroke (CC 95-96)
Vascular or circulatory disease (CC 104-106)
Chronic obstructive pulmonary disease (COPD) (CC 108)
Pneumonia (CC 111-113)
Dialysis status (CC 130)
Renal failure (CC 131)
Decubitus ulcer or chronic skin ulcer (CC 148-149)
Cellulitis, local skin infection (CC 152)
Other injures (CC 162)
Major symptoms, abnormalities (CC 166)

References:

Krumholz HM, Brindis RG, Brush JE, et al. 2006. Standards for Statistical Models Used for Public Reporting of Health Outcomes: An American Heart Association Scientific Statement From the Quality of Care and Outcomes Research Interdisciplinary Writing Group: Cosponsored by the Council on Epidemiology and Prevention and the Stroke Council Endorsed by the American College of Cardiology Foundation. Circulation 113: 456-462.

Normand S-LT, Shahian DM. 2007. Statistical and Clinical Aspects of Hospital Outcomes Profiling. Stat Sci 22 (2): 206-226."

Level of Analysis: Facility
Setting of Care: Hospital/Acute Care Facility
Type of Measure: Outcome
Data Source: Administrative claims, Other
Measure Steward: Centers for Medicare & Medicaid Services

STANDING COMMITTEE MEETING 08/16 - 08/17/16

1. Importance to Measure and Report: <u>The measure meets the Importance criteria</u>

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

1a. Evidence: **Accepted Previous Evaluation**; 1b. Performance Gap: **H-8**; **M-13**; **L-0**; **I-0;**

<u>Rationale</u>:

- The Committee noted that there is no new evidence for this measure and accepted the prior evaluation of this criterion without further discussion.
- The Committee agreed the performance data from analysis of over 3,000 hospitals over the period 2011 – 2014 shows, while there has been some performance improvement, the overall risk standardized readmission rate (RSRR) for the period of 4.9 at the mean with a range of 5.3 in 2011-2012 to 4.4 in 2013-2014 represents a continued opportunity for improvement.

2. Scientific Acceptability of Measure Properties: <u>The measure meets the Scientific Acceptability criteria</u>

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

2a. Reliability: **H-5**; **M-17**; **L-0**; **I-0** 2b. Validity: **H-2**; **M-18**; **L-2**; **I-1**

<u>Rationale</u>:

- The Committee noted that the intraclass correlation coefficient of 0.49 reported for reliability is accepted as moderate agreement in comparing hospital performance values.

1551 Hospital-level 30-day risk-standardized readmission rate (RSRR) following elective primary total hip arthroplasty (THA) and/or total knee arthroplasty (TKA)

- In response to a question about effect of transfers out including those to rehab, the developer commented that transfers to rehab are not included and that the outcome of readmission is assigned to the hospital that discharges the patient.
- The developer also noted that information about the hospital to which a patient is readmitted, including outlying institutions, is provided to the hospital at which the surgery was performed so that hospital has the information about its complications.
- A Committee member noted that the technical advisory panel that reviewed the measure agreed that it has face validity.
- It was noted that reported validity test result can be accepted on the basis of the dichotomous endpoint. The developer then clarified that validity of the outcome assessments was performed through medical record review that has been vetted by admission and readmission committees that have investigated other readmission measures.
- The Committee also debated whether this measure should include SDS factors in the risk model. The discussion is detailed in measure 1550.

3. Feasibility: H-20; M-3; 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 Committee agreed that broad use of the measure over several years has demonstrated its feasibility.

4. Usability and Use: H-13; M-9; L-1; I-0

(Used and useful to the intended audiences for 4a. Accountability and Transparency; 4b. Improvement; and 4c. Benefits outweigh evidence of unintended consequences)

Rationale:

- The Committee noted that the measure is publicly reported through Hospital Compare and is used in the Readmission Reduction Program from CMS.
- No unintended consequences were brought forward though a Committee member noted that, as an elective procedure, there might be temptation to avoid care of patients with slightly higher or marginal risk of complication.

5. Related and Competing Measures

- Related measures include Measure 1550 Hospital-level risk-standardized complication rate (RSCR) following elective primary total hip arthroplasty (THA) and/or total knee arthroplasty (TKA) that is related and harmonized and 0330 Hospital 30-day, all-cause, risk-standardized readmission rate (RSRR) following heart failure (HF) hospitalization; 0505 Hospital 30-day all-cause risk-standardized readmission rate (RSRR) following acute myocardial infarction (AMI) hospitalization; 0506 Hospital 30-day, all-cause, risk-standardized readmission rate (RSRR) following pneumonia hospitalization; 1789 Hospital-Wide All-Cause Unplanned Readmission Measure (HWR); and 1891 Hospital 30-day, all-cause, risk-standardized readmission rate (RSRR) following chronic obstructive pulmonary disease (COPD) hospitalization
- The Committee noted that while the last 5 measures address readmission they are otherwise unrelated and that all are separately needed.

Standing Committee Recommendation for Endorsement: **Y-21**; **N-1**

6. Public and Member Comment

Comments received:

- One comment was received expressing concern related to the “lack of rigor and robustness of the risk adjustment reviews” and suggested that other SDS factors must be considered “to understand the potential impact on a hospital’s performance”.

1551 Hospital-level 30-day risk-standardized readmission rate (RSRR) following elective primary total hip arthroplasty (THA) and/or total knee arthroplasty (TKA)

Developer response:

- "CMS and Yale/CORE share the FAH's concern for the scientific rigor and robustness of the risk adjustment analyses. A risk adjustment model that is scientifically sound hinges to a large part on the use of data sources that are scrutinized, vetted, and representative of the population of interest. The process of variable selection must be done thoughtfully, as the inclusion of highly-correlated variables in a model often yields spurious results. In the context of socioeconomic status (SES) and quality reporting, there are questions that every developer and user must ask: If changes in the models result in changes in the findings, are these changes methodological artifacts? Do they alter the big picture of the overall ranking of the hospitals? Are these changes clinically meaningful? In order to identify relevant SES variables that can be used in a national measure of hospital quality, we have identified all available data sources assessing SES as patient-level variables, or proxies for patient-level variables, and can be linked to Medicare Fee-for-Service claims for all, or nearly all, over 65 year-old Medicare patients. We also performed a thorough review of relevant literature to identify SES variables that had a conceptual relationship with the measures' outcomes. The only SES variables that met the criteria above and were supported by evidence linking the variable to measure outcomes including mortality, readmission and complications were:
    - Dual eligible status (meaning enrolled in both Medicare and Medicaid)
    - Agency for Healthcare Research and Quality (AHRQ)-validated SES Index score (composite of 7 different variables found in census data: percentage of people in the labor force who are unemployed, percentage of people living below poverty level, median household income, median value of owner-occupied dwellings, percentage of people ≥25 years of age with less than a 12th-grade education, percentage of people ≥25 years of age completing ≥4 years of college, and percentage of households that average ≥1 people per room)

  In selecting variables for analyses across all measures, our intent was to be responsive to the NQF guidelines for measure developers in the context of the SES Trial Period, and to identify variables that are feasible to test and use in the near term. We examined patient-level indicators of both SES and race or ethnicity that are reliably available for all Medicare beneficiaries. We aimed to select those variables that are most valid and available. The variables used are aligned with what the National Academy of Medicine committee identified as available for use in outcome measures."

NQF response:

- The SDS trial period is a temporary change to NQF's policy. During this 2-year trial period, NQF is gathering information about the feasibility, limitations and challenges of including SDS factors in the risk-adjustment approach. Consideration of sociodemographic factors in risk adjustment models is a critical issue in measurement science. The Committee was charged with evaluating the submitted measure specifications and testing by the measure developer. Given the constraints on the current, available data elements, the Committee relied on the methods used by the developer to test the conceptual and empirical relationship between SDS factors and readmissions and complications.
  The developer stated there was a conceptual relationship between the SDS variables. Specifically, the developer reported socially disadvantaged patients had a higher disease burden or receive worse or disparate care, and that there is a source unrelated to hospital quality of care which could hinder patient adherence to things like post-discharge instructions. Using decomposition analysis to measure effects at the patient level and at the hospital level, the hospital effect had greater impact than patient level factors. These results were in contrast to the clinical data elements, where the patient effect tended to dominate. Due to the dominant hospital effect, the developer reported that they risk adjust away a component of hospital quality when the variables are included in the model. The developer reported that the three SDS factors were statistically significant in the model and inclusion of the variables in the model did not change the c-statistic. Ultimately, the Committee agreed that they would not recommend risk adjustment for SDS since finding disparities among groups on these measures is something that should be reported and followed.
  NQF has maintained a non-prescriptive approach to the selection and testing of variables in risk

1551 Hospital-level 30-day risk-standardized readmission rate (RSRR) following elective primary total hip arthroplasty (THA) and/or total knee arthroplasty (TKA)

adjustment models. NQF has not required that certain SDS variables be tested and does not set requirements around the inclusion of any specific variables. Similarly, NQF does not set "cut-points" for the statistical testing of a risk adjustment model. The evaluation of the model is left to the Standing Committee reviewing the measure. This approach applies to both clinical and SDS variables.

Committee response:

- After a full discussion on SDS risk adjustment, the Committee accepted the developer's rationale not to include the SDS variables in the risk adjustment model. The Committee recognizes that risk adjustment for SDS factors is a rapidly progressing area and that more work is needed to appreciate the effects of social risk, understand the most relevant patient and community level factors, collect data on these risk factors, and determine the best methods to incorporate these risk factors into performance measures. The Committee looks forward to continued deliberations on these issues and to reexamining these measures as better data emerges.

7. Consensus Standards Approval Committee (CSAC) Vote (December 21, 2016): Y-16; N-0; NR-1

- Decision: Approved for continued endorsement

8. Board of Directors Vote: Y-X; N-X

9. Appeals

3030 STS Individual Surgeon Composite Measure for Adult Cardiac Surgery

Submission | Specifications

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

Domain 1 – Risk-Adjusted Operative Mortality

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

Domain 2 – Risk-Adjusted Major Morbidity

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

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

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

1 star – lower-than-expected performance

2 stars – as-expected performance

3 stars – higher-than-expected performance

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

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

Domain 1 – Risk-Adjusted Operative Mortality

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

Domain 2 – Risk-Adjusted Major Morbidity

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

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

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

1 star – lower-than-expected performance

2 stars – as-expected performance

3 stars – higher-than-expected performance

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

Time Window: 3 years

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

Final Composite Score:

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

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

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

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

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

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

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

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

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

Adjustment/Stratification: Statistical risk model

Level of Analysis: Clinician : Individual

Setting of Care: Hospital/Acute Care Facility

Type of Measure: Composite

Data Source: Electronic Clinical Data : Registry

Measure Steward: The Society of Thoracic Surgeons

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1. Importance to Measure and Report: <u>The measure meets the Importance criteria</u>

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

1a. Evidence: **Y-21; N-0**; 1b. Performance Gap: **H-12**; **M-8**; **L-0**; **I-0;** 1c. Composite – Quality Construct and Rationale: **H-17; M-3; L-0; I-0**

<u>Rationale</u>:

- The Committee noted that the measures upon which this composite is based are NQF endorsed; complication rates remain significant and evidence is provided that action can be taken to reduce or prevent complications and mortality is provided.
- Performance gap was discussed in terms of the variability represented by data that 9% of surgeons perform worse than expected and the 18% perform better.
- In terms of reporting at the surgeon level, the developer stated that, although cardiac surgery is a "team sport," surgeon-level reporting using data from claims is occurring and it was the aim of the developer to provide clinical data through use of the registry as a more accurate way of measurement.
- In support of a surgeon-specific measure, a committee member noted that patients select individual surgeons, rather than institutions or teams and performance among individuals does vary.
- In terms of quality construct, the Committee noted that at 80% of a surgeon's practice, the measure gives a comprehensive view of an individual surgeon's practice; and the weighting and approach to measure construction is clearly described and has been vetted by an expert panel.

2. Scientific Acceptability of Measure Properties: <u>The measure meets the Scientific Acceptability criteria</u>

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

2a. Reliability: **H-18**; **M-3**; **L-0**; **I-0** 2b. Validity: **H-11**; **M-10**; **L-0**; **I-0** 2d. Composite Construction: **H-15; M-6; L-0; I-0**

<u>Rationale</u>:

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- The developer states that this measure encompasses about 80% of a cardiac surgeon's workload by encompassing 5 procedures in 2 domains with 3 years of data, thus, provides high reliability.
- The Committee noted that the measure is well and clearly specified; audited and tested with reliability with surgeons with 100 or more cases at 0.81.
- Validity was discussed in terms of differences in performance among providers, missing data (0.4%) and related analyses (0.99% with and without missing data) as well as level of testing. Preliminary assessment was that testing of stability over time was provided, demonstrating face validity. The Committee determined that additional testing data presented made it eligible for higher rating.
- In response to a Committee question about SDS, the developer stated that it believes that the relationship of morbidity and mortality to SDS factors is questionable and that much of the analytic work for the measure was done prior to NQF's position on SDS; thus the developer did not have data it could use in that regard. Also, the developer noted that granularity of the data it has for sociodemographic factors is likely inadequate to demonstrate a difference and that what would likely be required is not now available to them.
- A Committee member states that theoretically, risk adjustment for clinical factors should correct for differences.
- With respect to composite construction, information was presented that correlations between morbidity and mortality were appropriately considered, including how much each drove the overall score. Weighting, done empirically and validated by an expert panel, was deemed acceptable.

3. Feasibility: H-10; M-10; 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:

- Data for the measure is captured in a standardized way through the STS database of which most surgeons and programs in the US are members.
- The Committee discussed resources required to collect the needed data from STS participant records and, after receiving information about average cases per year per abstractor, noted it would like to see more detail in this regard going forward.

4. Usability and Use: H-9; M-11; L-1; I-0

(Used and useful to the intended audiences for 4a. Accountability and Transparency; 4b. Improvement; and 4c. Benefits outweigh evidence of unintended consequences)

Rationale:

- The measure is not yet in use. It will be put into use later in 2016 and first reported to individual surgeons to determine whether there are issues that were not considered by the developer. The developer anticipates that public reporting will be required, likely within a year.

5. Related and Competing Measures

- No competing measures noted. Related measures are harmonized.

Standing Committee Recommendation for Endorsement: Y-18; N-1

6. Public and Member Comment

- No comments received.

7. Consensus Standards Approval Committee (CSAC) Vote (December 21, 2016): Y-16; N-0; NR -1

- Decision: Approved for endorsement

8. Board of Directors Vote: Y-X; N-X

9. Appeals

3031 STS Mitral Valve Repair/Replacement (MVRR) Composite Score

Submission | **Specifications**

Description: The STS Mitral Valve Repair/Replacement (MVRR) Composite Score measures 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:

Domain 1 – Absence of Operative Mortality

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

Domain 2 – Absence of Major Morbidity

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

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

Outcome data are collected on all patients and from all participants. For optimal measure reliability, participants meeting a volume threshold of at least 36 cases over 3 years (i.e., approximately one mitral case per month) receive a score for each of the two domains, plus an overall composite score. The overall composite score is created by "rolling up" the domain scores into a single number. In addition to receiving a numeric score, participants are assigned to rating categories designated by the following:

1 star – lower-than-expected performance

2 stars – as-expected performance

3 stars – higher-than-expected performance

Numerator Statement: Due to the complex methodology used to construct the composite measure, it is impractical to separately discuss the numerator and denominator. The following discussion describes how each domain score is calculated and how these are combined into an overall composite score.

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

Domain 1 – Absence of Operative Mortality

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

Domain 2 – Absence of Major Morbidity

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

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

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

1 star – lower-than-expected performance

2 stars – as-expected performance

3 stars – higher-than-expected performance

Patient Population: The analysis population consists of patients aged 18 years or older who undergo isolated MVRR with or without concomitant tricuspid valve repair (TVr), surgical ablation for atrial fibrillation (AF), or repair of atrial septal defect (ASD).

Time Window: 3 years

Data Completeness Requirement: Participants are excluded from the analysis if they have fewer than 36 isolated MVRR procedures in the patient population.

Estimation of Composite Scores and Star Ratings: The statistical methodology used to estimate the STS

MVRR composite score and star rating for each participant site was similar to that used for the STS isolated CABG, isolated AVR, and AVR+CABG measures. As with previous composite scores, we first translated risk-standardized event rates into risk-standardized absence of event rates so that a higher score indicated better performance. We then rescaled the morbidity and mortality domains by dividing by their respective standard deviations and then added the two domains together.

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

Patient Population: The analysis population consists of patients aged 18 years or older who undergo isolated MVRR with or without concomitant tricuspid valve repair (TVr), surgical ablation for atrial fibrillation (AF), or repair of atrial septal defect (ASD).

Exclusions: Data Completeness Requirement: Participants are excluded from the analysis if they have fewer than 36 isolated MVRR procedures in the patient population.

Adjustment/Stratification: Statistical risk model

Level of Analysis: Facility, Clinician : Group/Practice

Setting of Care: Hospital/Acute Care Facility

Type of Measure: Composite

Data Source: Electronic Clinical Data : Registry

Measure Steward: The Society of Thoracic Surgeons

STANDING COMMITTEE MEETING 08/16 – 08/17/16

1. Importance to Measure and Report: <u>The measure meets the Importance criteria</u>

(1a. Evidence, 1b. Performance Gap, 1c. Composite – Quality Construct and Rationale)

1a. Evidence: **Y-18; N-0**; 1b. Performance Gap: **H-9**; **M-9**; **L-0**; **I-0;** 1c. Composite – Quality Construct and Rationale: **H-16; M-3; L-0; I-0**

<u>Rationale</u>:

- The developer reported that the procedures of interest are frequently performed and further noted that over 62,000 patients had procedures within the area of interest of this measure during a 3-year period ending in June 2014.
- The Committee acknowledged that evidence supports the measure.
- The Committee agreed that there is a gap to be addressed. It was reported in terms of a) expected performance (mortality = 3.2%; morbidity = 16.9%); b) lower than expected, which was double that of each expected performance rate; and c) higher than expected, which was about half of the expected performance rates.
- In terms of quality construct, the Committee agreed it was high quality noting that, while mortality with mitral valve surgery is low, the addition of morbidity in the composite provides a potentially more variable and actionable picture of the surgical experience.

2. Scientific Acceptability of Measure Properties: <u>The measure meets the Scientific Acceptability criteria</u>

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

2a. Reliability: **H-15; M-4; L-0; I-0** 2b. Validity: **H-11; M-8; L-0; I-0** 2d. Composite Construction: **H-14; M-4; L-0; I-0** Rationale:

- The Committee agreed that reliability was high at 0.58 with 3 years of data tested for participants that had the required 36 cases over the 3 years.
- The Committee agreed that analysis of relatively consistent performance over two 3-year time periods (2011 – 2014 and 2012 – 2015) for which there was a 2-year overlap satisfied its expectation regarding validity. While this was initially assessed as stability over time; i.e., face validity, the Committee determined that additional testing data presented made it eligible for a higher rating.
- The developer indicated that conceptually the relationship of SDS factors to morbidity and mortality is open to question and has not been used these measures.
- With respect to composite construction, the Committee affirmed that its assessment of the measure was consistent with that of #3030, i.e., correlations between morbidity and mortality were appropriately considered, including how much each drove the overall score. Weighting, done empirically and validated by an expert panel, was deemed acceptable.

3. Feasibility: H-12; M-5; 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:

- Feasibility was addressed in terms of its similarity across STS measures; i.e. data for the measures is captured in a standardized way through the STS database of which most surgeons and programs in the US are members.
- As previously noted in measure #3030, resources required to collect data should be reported in more detail going forward.

4. Usability and Use: H-11; M-8; L-0; I-0

(Used and useful to the intended audiences for 4a. Accountability and Transparency; 4b. Improvement; and 4c. Benefits outweigh evidence of unintended consequences)

Rationale:

- The Committee accepted the plan for implementation of the measure in 2016 with subsequent public reporting as put forth in the submission.

5. Related and Competing Measures

- No competing measures noted. Related measures are harmonized.

Standing Committee Recommendation for Endorsement: **Y-19**; **N-0**

6. Public and Member Comment

- No comments received.

7. Consensus Standards Approval Committee (CSAC) Vote (December 21, 2016): Y-16; N-0; NR -1

- Decision: Approved for endorsement

8. Board of Directors Vote: Y-X; N-X

9. Appeals

3032 STS Mitral Valve Repair/Replacement (MVRR) + Coronary Artery Bypass Graft (CABG) Composite Score

Submission | **Specifications**

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

3032 STS Mitral Valve Repair/Replacement (MVRR) + Coronary Artery Bypass Graft (CABG) Composite Score

Domain 1 – Absence of Operative Mortality

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

Domain 2 – Absence of Major Morbidity

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

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

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

1 star – lower-than-expected performance

2 stars – as-expected performance

3 stars – higher-than-expected performance

Numerator Statement: Due to the complex methodology used to construct the composite measure, it is impractical to separately discuss the numerator and denominator. The following discussion describes how each domain score is calculated and how these are combined into an overall composite score.

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

Domain 1 – Absence of Operative Mortality

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

Domain 2 – Absence of Major Morbidity

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

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

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

1 star – lower-than-expected performance

2 stars – as-expected performance

3 stars – higher-than-expected performance

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

3032 STS Mitral Valve Repair/Replacement (MVRR) + Coronary Artery Bypass Graft (CABG) Composite Score

Time Window: 3 years

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

Estimation of Composite Scores and Star Ratings:

To be consistent with the conventions of previous composite measures, risk-adjusted event rates were first converted into risk-adjusted absence-of-event rates. To calculate the composite, participant-specific absence of mortality rates and absence of morbidity rates were weighted inversely by their respective standard deviations across participants. This procedure was equivalent to first rescaling the absence of mortality rates and absence of morbidity rates by their respective standard deviations across participants, and then assigning equal weighting to the rescaled rates. Finally, in order to draw statistical inferences about participant performance, a Bayesian credible interval surrounding each participant's composite score was calculated. Unlike frequentist confidence intervals, Bayesian credible intervals have an intuitively direct interpretation as an interval containing the true value of the composite score with a specified probability (e.g., 95%). To determine star ratings for each participant, the credible interval of its composite score was compared with the STS average. Participants whose intervals were entirely above the STS average were classified as 3-star (higher than expected performance), and participants whose intervals were entirely below the STS average were classified as1-star (lower than expected performance). Credible intervals based on different probability levels (90%, 95%, 98%) were explored, and the resulting percentages of 1, 2, and 3-star programs were calculated.

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

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

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

Adjustment/Stratification: Statistical risk model

Level of Analysis: Facility, Clinician : Group/Practice

Setting of Care: Hospital/Acute Care Facility

Type of Measure: Composite

Data Source: Electronic Clinical Data : Registry

Measure Steward: The Society of Thoracic Surgeons

STANDING COMMITTEE MEETING 08/16 – 08/17/16

1. Importance to Measure and Report: <u>The measure meets the Importance criteria</u>

(1a. Evidence, 1b. Performance Gap, 1c. Composite – Quality Construct and Rationale)

1a. Evidence: **Y-18; N-0**; 1b. Performance Gap: **H-12; M-7; L-0; I-0** 1c. Composite – Quality Construct and Rationale: **H-14; M-5; L-0; I-0**

<u>Rationale</u>:

- The developer reported that the procedures of interest in this measure are common operative procedures and that over 26,000 cases had procedures within the area of interest of this measure during a 3-year period ending in June 2014.
- The Committee stated that the evidence presented supports the measure.
- The Committee agreed there is a gap to be addressed based on the developer report that STS participants who had "as-expected" performance had 6.5% mortality and 29.7% morbidity whereas for those performing lower than expected, the rates were near double the expected rates and for those performing higher than expected, the rates were 4.3% and 19.8%.

3032 STS Mitral Valve Repair/Replacement (MVRR) + Coronary Artery Bypass Graft (CABG) Composite Score

- In terms of quality construct, the Committee agreed it was of high quality noting that mortality for the procedures of interest is low, the addition of morbidity provides a more actionable picture of the surgical experience.

2. Scientific Acceptability of Measure Properties: <u>The measure meets the Scientific Acceptability criteria</u>

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

2a. Reliability: **H-11; M-9; L-0; I-0** 2b. Validity: **H-12; M-8; L-0; I-0** 2d. Composite Construction: **H-14; M-4; L-0; I-0** <u>Rationale</u>:

- The Committee agreed that reliability, using 3 years of data tested for participants that had a required 25 eligible cases over the 3 years was acceptable at 0.50. The developer had reported that it could opt for a higher reliability; (e.g., 0.62) but that doing so would reduce the number of eligible programs from 341 to 143.
- The Committee agreed that analysis of relatively consistent performance over two 3-year time periods (2011-2014 and 2012 – 2015) for which there was a 2-year overlap satisfied its expectation regarding validity. While this was initially assessed as stability over time; i.e., face validity, the Committee determined that additional testing data presented made it eligible for higher rating.
- The developer indicated that conceptually the relationship of SDS factors to morbidity and mortality is open to question and has not been used these measures.
- With respect to composite construction, the Committee affirmed that its assessment of the measure was consistent with that of #3030 and #3031, i.e., correlations between morbidity and mortality were appropriately considered, including how much each drove the overall score. Weighting, done empirically and validated by an expert panel, was deemed acceptable.

3. Feasibility: H-12; M-5; 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)

<u>Rationale</u>:

- Feasibility was address in terms of its similarity across STS measures; i.e., data for the measures is captured in a standardized way through the STS database of which most surgeons and programs in the US are members.
- As previously noted, resources required to collect data should be reported in more detail going forward.

4. Usability and Use: H-12; M-7; L-0; I-0

(Used and useful to the intended audiences for 4a. Accountability and Transparency; 4b. Improvement; and 4c. Benefits outweigh evidence of unintended consequences)

<u>Rationale</u>:

- The Committee accepted the plan for implementation of the measure in 2016 with subsequent public reporting as put forth in the submission.

5. Related and Competing Measures

- No competing measures noted. Related measures are harmonized.

Standing Committee Recommendation for Endorsement: **Y-18**; **N-0**

6. Public and Member Comment

- No comments received.

7. Consensus Standards Approval Committee (CSAC) Vote (December 21, 2016): Y-16; N-0; NR -1

- Decision: Approved for endorsement

8. Board of Directors Vote: Y-X; N-X

9. Appeals

Measures Not Recommended for Endorsement

0713 Ventriculoperitoneal (VP) shunt malfunction rate in children

Submission | Specifications

Description: This measure is a 30-day malfunction rate for hospitals that perform cerebrospinal ventriculoperitoneal shunt operations in children between the ages of 0 and 18 years.

Numerator Statement: The number of initial ventriculoperitoneal (VP) shunt placement procedures performed on children between the ages of 0 and 18 years of age that malfunction and result in shunt revision within 30 days of initial placement.

Denominator Statement: The total number of initial cerebrospinal VP shunt procedures performed on children between the ages of 0 and 18 years.

Exclusions: Patients with evidence of VP shunt placement or removal in the year prior to their index procedure are excluded.

Adjustment/Stratification: Statistical risk model

"We used logistic regression models to determine the risk adjustment variables. The predicted value for each case is computed using a logistic regression model with covariates for with age at insertion (0-30 d, 31-365 d, and 1 y), congenital anomalies, intraventricular hemorrhage, low birth weight, prematurity and spina bifida. The reference population used in the regression is the PHIS database from 2008-2010."

Level of Analysis: Facility

Setting of Care: Hospital/Acute Care Facility

Type of Measure: Outcome

Data Source: Electronic Clinical Data

Measure Steward: Boston Children's Hospital, Center for Patient Safety and Quality Research

STANDING COMMITTEE MEETING 08/16 - 08/17/16

1. Importance to Measure and Report: The measure does not meet the Importance criteria

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

1a. Evidence: **Y-11; N-9**; 1b. Performance Gap: **H-1**; **M-3**; **L-8**; **I-8**

Rationale:

- New evidence for this measure included a retrospective study to identify risk factors for shunt malfunction or failure. None of the risk factors that were examined in the study were statistically significant in determining shunt failure.
- The Committee questioned why the measure was specified for 30 days rather than a longer time frame since the study cited in the evidence showed an increased complication rate after 90 days.
- Committee members also requested clarity on the definition of a shunt malfunction (e.g., device malfunction or clogging of the shunt).
- The Committee could not reach consensus that prompt treatment of shunt malfunctions would impact the outcome.
- The Committee expressed concern that this measure had been endorsed since 2011 but the developers did not provide performance data from more than one institution and did not submit disparities data.
- The Committee did not agree the measure met the criterion for opportunity for improvement. Therefore this measure was not recommended for endorsement.
- Several suggestions for improvement were made to the developer including extending the measure specifications beyond 30 days; providing data from more than one institution; collect data on the shunt malfunction device and better define what counts as a malfunction; and finally, to look at other factors that impact the outcome such as shunt infections.

Standing Committee Recommendation for Endorsement: **No votes taken.**

0713 Ventriculoperitoneal (VP) shunt malfunction rate in children

6. Public and Member Comment

- No comments received.

2998 Infection rate of bicondylar tibia plateau fractures

Submission | Specifications

Description: Percent of patients aged 18 years and older undergoing ORIF of a bicondylar tibial plateau fracture who develop a postoperative deep incisional wound infection based on CDC guidelines for deep infection associated with implants

Numerator Statement: Number of patients aged 18 years and older undergoing ORIF of a bicondylar tibial plateau fracture who develop a postoperative deep incisional infection associated with an implant within 1 year of fracture fixation. We do not have adequate data to provide adequate risk stratification at this time.

Denominator Statement: All patients undergoing ORIF of a closed bicondylar tibial plateau fracture aged 18 years or older. Patients can be identified with either an ICD-10 code (S82.141, S82.142) or by CPT billing codes. (27536). Risk calculation can be added once adequate volume of patients are enrolled.

Exclusions: N/A

Adjustment/Stratification: No risk adjustment or risk stratification

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

Setting of Care: Hospital/Acute Care Facility

Type of Measure: Outcome

Data Source: Other, Electronic Clinical Data : Registry

Measure Steward: Orthopedic Trauma Association

STANDING COMMITTEE MEETING 08/16 - 08/17/16

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

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

1a. Evidence: **Y-17; N-2**; 1b. Performance Gap: **H-10**; **M-7**; **L-0**; **I-1**

Rationale:

- The developer reported that the rationale for this measure is that bicondylar tibial plateau fractures are difficult to treat and often complicated by infection at high volume centers, with experienced surgeons. The lowest infection rate reported for these fractures treated with open reduction and internal fixation (ORIF) is 8%. These surgeries have some of the highest reported infection rates of any operation; and they increase cost of care. The Committee expressed that this is an important measure concept and agreed that the evidence was sufficient.
- The developer provided information that the infection rate for these fractures ranges from 20 – 30% and provided literature that reports a high rate of deep infection when treating bicondylar tibial plateau fractures. The Committee agreed that the information presented suggests there is a performance gap.

2. Scientific Acceptability of Measure Properties: The measure does meet the Scientific Acceptability criteria

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

2a. Reliability: **H-1**; **M-18**; **L-1**; **I-0** 2b. Validity: **H-0**; **M-0**; **L-3**; **I-16**

Rationale:

- To demonstrate reliability of the measure, the developer presented information from a secondary evaluation of bicondylar tibial plateau fractures from two large studies for which it had access to patient data. Of the 440 patients in these studies, 77 were selected for further review based on the fact that the patients (23.6% of one study and 14.2% of the second study) were diagnosed with

2998 Infection rate of bicondylar tibia plateau fractures

infected bicondylar tibial plateau fracture. Through radiographs and CT scans, all 77 were confirmed to be bicondylar tibial plateau fractures. Through review of operative reports for irrigation and debridement and organism positive laboratory data, 76 of the 77 fractures were confirmed to be infected for an agreement rate of 99.42%. The remaining patient from this group had a debridement of a fluid collection with negative culture. Additionally, of those patients identified as having closed bicondylar tibia plateau fractures on x-ray with no evidence of deep infection, 95 were randomly selected and evaluated. All 95 patients were confirmed as having closed bicondylar tibial plateau fractures without infection based on lack of operative reports for irrigation and debridement and no laboratory data indicating presence of infection. Agreement was found in 171 of 172 cases reviewed or 99.42% of observations with a Kappa of 0.988. Sensitivity = 100%; Specificity = 99%; Positive Predictive Value = 98.7%. The Committee found the reliability testing results to be sufficient.

- The developer stated that patient factors, injury factors and socioeconomic status have not been consistently associated with differences in surgical site infection (SSI) in patients with this surgery. Characteristics of the 43 patients with deep wound infection from one institution were further analyzed and a conclusion reached that there was no reason to believe that the demographics would be different in other institutions.
- While the Committee acknowledged the clinical importance of this measure, members expressed concern that they could not sufficiently evaluate validity due to the lack of data available. They strongly encouraged the developer to continue collecting data to determine the need for risk adjustment as members were in support of the measure concept.

Standing Committee Recommendation for Endorsement: **No votes taken.**

6. Public and Member Comment

- No comments received.

3016 PBM-01: Preoperative Anemia Screening

Submission | Specifications

Description: This measure assesses the proportion of selected elective surgical patients age 18 and over with documentation of pre-operative anemia screening in the window between 45 and 14 days before the surgery start date

Numerator Statement: Patients with preoperative anemia screening done in the window between 45 and 14 days prior to the surgery start date.

Denominator Statement: Patients age 18 and older with a length of stay less than or equal to 120 days who undergo selected elective surgical procedures

Exclusions: • Patients whose surgical procedure is performed to address a traumatic injury • * Patients with a solid organ transplant recorded <=48 hours prior to the encounter or during the encounter

Adjustment/Stratification: No risk adjustment or risk stratification

Level of Analysis: Facility

Setting of Care: Hospital/Acute Care Facility

Type of Measure: Process

Data Source: Electronic Clinical Data, Electronic Clinical Data : Electronic Health Record, Electronic Clinical Data : Laboratory

Measure Steward: The Joint Commission

STANDING COMMITTEE MEETING 08/16 - 08/17/16

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

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

3016 PBM-01: Preoperative Anemia Screening

1a. Evidence: **H-0**; **M-3**; **L-10**; **I-8**; 1b. Performance Gap: **No votes taken**

Rationale:

- Committee members agreed that anemia screening is important to perform in certain procedures and certain populations. However, there were concerns that the evidence presented was not sufficient enough to support the specifications of this measure. Committee members noted that there was not specific evidence to support the 14-45 day prior to surgery timeframe for preoperative anemia screening and also expressed concerns about potential unintended consequences of unnecessary preoperative testing.

Standing Committee Recommendation for Endorsement: **No votes taken.**

6. Public and Member Comment

- One comment was submitted in support of the Committee's concern with the underlying evidence for this measure. The comment supported the Committee's decision to not recommend the measure for endorsement.

3017 PBM-02: Preoperative Hemoglobin Level

Submission | Specifications

Description: This measure is designed to allow transfusion/blood use review committees to identify patients undergoing elective surgery with suboptimal, uncorrected hemoglobin levels that may have led to perioperative transfusion. This measure assesses, via stratification, pre-operative hemoglobin levels of selected elective surgical patients age 18 and over who received a perioperative red blood cell transfusion.

Numerator Statement: Patients whose hemoglobin level measured on the most recent pre-operative hemoglobin level was:

12.0 grams or above

>=11.0 and <12.0 grams (mild anemia)

>=8.0 and <11.0 grams (moderate anemia)

Below 8.0 grams (severe anemia)

Denominator Statement: Selected elective surgical patients age 18 and over, who received a transfusion of whole blood or packed cells in the time window from anytime during the surgical procedure to 5 days after the surgical procedure or to discharge, whichever is sooner.

Exclusions: • Patients under age 18

- Patients whose surgical procedure is performed to address a traumatic injury
- Patients who have a solid organ transplant
- Patients who are pregnant during the hospitalization, including those who delivered and those who did not deliver during this hospitalization
- Patients who undergo extra-corporeal membrane oxygenation procedures (ECMO) prior to the elective surgical procedure.
- Patients with sickle cell disease or hereditary hemoglobinopathy

Adjustment/Stratification: No risk adjustment or risk stratification

Level of Analysis: Facility

Setting of Care: Hospital/Acute Care Facility

Type of Measure: Process

Data Source: Electronic Clinical Data, Electronic Clinical Data : Electronic Health Record, Electronic Clinical Data : Laboratory

3017 PBM-02: Preoperative Hemoglobin Level

Measure Steward: The Joint Commission

STANDING COMMITTEE MEETING 08/16 - 08/17/16

1. Importance to Measure and Report: <u>The measure does not meet the Importance criteria</u>

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

1a. Evidence: **H-0**; **M-3**; **L-12**; **I-6**; 1b. Performance Gap: **No votes taken**

<u>Rationale</u>:

- This measure is designed to identify patients who could have benefited from pre-surgical treatment to enhance iron stores and reverse anemia. Identified in the measure are the numbers of patients who are anemic (hemoglobin levels lower than 12 g/dL prior to elective surgery) of the elective surgical patients receiving a transfusion during or within 5 days after transfusion. The Committee agreed that unnecessary blood transfusions are undesirable and perioperative optimization of anemia is preferred, but the evidence is not clear on the hemoglobin threshold of 12 g/dl.
- Committee members also questioned understand the clinical significance of the ratio, particularly, as the numerator is the number of patients and the denominator is the subset of patients who are transfused. It was suggested to the developers that the denominator could be patients with selected surgical and the numerator could be those that received transfusion and to then stratify by pre-operative hemoglobin.

Standing Committee Recommendation for Endorsement: **No votes taken.**

<u>Rationale</u>

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6. Public and Member Comment

- One comment was submitted in support of the Committee's concern with the underlying evidence for this measure. The comment supported the Committee's decision to not recommend the measure for endorsement.

3019 PBM-03: Preoperative Blood Type Testing and Antibody Screening

<u>Submission</u> | **<u>Specifications</u>**

Description: This measure assesses the proportion of selected elective surgical patients age 18 and over who had timely preoperative assessment of blood type and crossmatch or type and screening.

Numerator Statement: Patients who had a type and crossmatch or type and screen completed within 45 days prior to the surgery start date and time.

Denominator Statement: Selected elective surgical patients age 18 and over

Exclusions: • Patients under age 18

• Patients whose surgical procedure is performed to address a traumatic injury

• Patients who have a solid organ transplant

• Patients who refuse transfusion

Adjustment/Stratification: No risk adjustment or risk stratification

Level of Analysis: Facility

Setting of Care: Hospital/Acute Care Facility

Type of Measure: Process

Data Source: Electronic Clinical Data, Electronic Clinical Data : Electronic Health Record, Electronic Clinical Data : Laboratory

3019 PBM-03: Preoperative Blood Type Testing and Antibody Screening

Measure Steward: The Joint Commission

STANDING COMMITTEE MEETING 08/16 - 08/17/16

1. Importance to Measure and Report: The measure does not meet the Importance criteria

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

1a. Evidence: **H-0; M-5; L-10; I-6**; 1b. Performance Gap: **No votes taken**

Rationale:

- Committee members noted that there is no graded evidence or systematic review to support this measure. AABB Standards state that a blood sample shall be obtained from a patient with 3 days of a transfusion if the patient has been exposed to foreign red blood cell (RBC) antigens by means of transfusion or pregnancy within the prior 3 months. Otherwise, there is not a limit on the timing of the pre-surgical specimen. Committee members agreed that in order for safe and effective utilization of resources, the pre-transfusion testing should be completed prior to the beginning of surgery. However, the desired outcome is that the patients receive an appropriate unit of blood if transfusion is required. It was suggested that the numerator could be changed to number of elective surgery patients receiving un-cross matched blood.

Standing Committee Recommendation for Endorsement: **No votes taken.**

6. Public and Member Comment

- One comment was submitted in support of the Committee's concern with the underlying evidence for this measure. The comment supported the Committee's decision to not recommend the measure for endorsement.

3020 PBM-04: Initial Transfusion Threshold

Submission | **Specifications**

Description: This measure assesses the proportion of various pre-transfusion hemoglobin levels in patients age 18 and over receiving the first unit of a whole blood or packed cell transfusion. Over time, in a patient blood management program, there should be a higher proportion of patients receiving blood at the lower hemoglobin threshold and a lower proportion receiving blood at the higher hemoglobin thresholds. It also identifies patients who receive transfusions that should be reviewed by hospital transfusion/blood usage committees so that appropriate educational programs can be developed as part of a patient blood management program.

Numerator Statement: Patients whose hemoglobin level measured prior to the transfusion and closest to the transfusion was:

• less than 7.0 grams

• >=7.0 and <8.0 grams

• >=8.0 and <9.0 grams

• >=9.0 and <10.0 grams

• 10.0 grams or greater

Denominator Statement: Patients age 18 and over receiving the first unit of a whole blood or packed cell transfusion

Exclusions: • Patients who have a surgical procedure performed to address a traumatic injury

• Patients who have a solid organ transplant

• Patients undergoing extracorporeal membrane oxygenation (ECMO) treatment at the time of initial transfusion.

• Patients whose first unit of whole blood or packed red blood cells was given while an Emergency Department patient.

3020 PBM-04: Initial Transfusion Threshold

• Patients with sickle cell disease or hereditary hemoglobinopathy

Adjustment/Stratification: No risk adjustment or risk stratification

Level of Analysis: Facility

Setting of Care: Hospital/Acute Care Facility

Type of Measure: Process

Data Source: Electronic Clinical Data, Electronic Clinical Data : Electronic Health Record, Electronic Clinical Data : Laboratory

Measure Steward: The Joint Commission

STANDING COMMITTEE MEETING 08/16 - 08/17/16

1. Importance to Measure and Report: <u>The measure meets the Importance criteria</u>

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

1a. Evidence: **H-1**; **M-11**; **L-5**; **I-2**; 1b. Performance Gap: **H-2**; **M-13**; **L-0**; **I-5; ;** Evidence Exception: **Y-X; N-X**

<u>Rationale</u>:

- The focus of this measure is to monitor the proportions of patients transfused at initial hemoglobin levels from <7 to >10 g/dL. The developer presented clinical guideline recommendations to support this measure from the following organizations: AABB, Society of Thoracic Surgeons, The Society of Cardiovascular Anesthesiologists and The Society of Critical Care Medicine. Most Committee members agreed that the evidence is sufficiently strong to introduce a program of monitoring with the intent of having more transfusions occur at the lower restrictive end of the spectrum than at the higher liberal end.
- Although there is no performance data on the measure as specified, the developer provided data on blood transfusion appropriateness and rate of hospitalization with blood transfusion that indicates opportunity for improvement.

2. Scientific Acceptability of Measure Properties: <u>This e-measure is a candidate for eMeasure Approval for Trial Use; therefore, testing for the measure will be submitted at a later time</u>**.** (2b1. Specifications consistent with evidence): **<u>Consensus not reached</u>**

eMeasure Trial Measure Specifications: H-1; **M-7**; **L-9**; **I-2**

<u>Rationale</u>:

- The Committee expressed several concerns over the specifications of this measure. Members noted that there are other indications for a transfusion besides a hemoglobin measurement, such as hemorrhagic shock, bleeding, and current active bleeding, which are not reported as part of the measure.
- A Committee member suggested expanding the numerator to include a category for patients whose hemoglobin levels were not measured prior to a transfusion. It was also suggested that that the measure be expanded to include pediatric patients, as patients under the age of 18 can benefit from hemoglobin optimization.
- A Committee member suggested that pregnant patients undergoing postpartum hemorrhage should be excluded from the measure.
- The Committee did not reach consensus on the Scientific Acceptability of Measure Properties: eMeasure Trial Measure Specifications criterion due to concerns about the specifications.

3. Feasibility: H-3; M-6; L-6; I-2

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

<u>Rationale</u>:

- The feasibility analysis submitted by the measure developer met the requirements to be considered for eMeasure Trial Approval.

3020 PBM-04: Initial Transfusion Threshold

4. Usability and Use: H-0; M-5; L-6; I-6

(Used and useful to the intended audiences for 4a. Accountability and Transparency; 4b. Improvement; and 4c. Benefits outweigh evidence of unintended consequences)

Rationale:

- The Committee agreed that the numbers in the various hemoglobin thresholds are not sufficient to determine if a transfusion could have been avoided, and need to be evaluated by a clinician in relationship to the clinical signs and symptoms.
- The measure will trigger review by hospital transfusion or blood usage committees. The developer noted plans for the measure to be made available within a year for hospitals to use in fulfilling the requirements for a blood management certification program.
- A Committee member noted the value of having an eMeasure for this concept to establish the infrastructure to be able to monitor and report internally.

5. Related and Competing Measures

- No related or competing measures noted.

Standing Committee Recommendation for Approval for Trial Use: **No votes taken.**

6. Public and Member Comment

Comments received:

- One commenter was not in support of the measure being recommended for Approval for Trial Use.
- One comment was submitted by the developer stating concerns with the NQF processes for evaluating eMeasure submitted for Approval for Trial Use. The commenter stated that the Committee's perceived issues with validity, a component of Scientific Acceptability, should have been outside the scope of Approval for Trial Use review.

NQF response:

- The Approval for Trial Use program was designed by NQF to facilitate the development of innovative quality eMeasures that could fill existing gaps in clinical care. The NQF requirements for endorsement with respect to an eMeasure require testing in at least two separate electronic health record (EHR) systems. This is in addition to the measures being specified according to the Health Quality Measures Format (HQMF) and aligning with the Quality Data Model (QDM) as well as having value sets published within the Value Set Authority Center (VSAC). NQF recognizes that for some measures, these requirements, particularly in identifying two EHRs to test in, may be challenging. However, NQF does not want to impede the progress of needed measures and thus the Trial Use program allows for the measure to be implemented into the field in which data can be collected and evaluated. Once enough data have been gathered, the measure can then be properly assessed and submitted to a committee for endorsement consideration.
  However, a measure for Trial Use consideration is evaluated in the same way as a measure being considered for endorsement. The measure must be scientifically acceptable, and must have a strong evidence base for consideration. The only difference is in the testing itself, in that a measure for Trial Use consideration only has to submit BONNIE results to demonstrate that the measure logic works as intended and that the metric produced by the measure match its objective. A committee that is evaluating a Trial Use measure will still consider its scientific acceptability and importance to measure. If the measure passes those criteria, and the BONNIE testing indicates that the measure functions as it should, then it would be considered as part of the Trial Use program. However, if the committee does not feel that the measure demonstrates importance to measure and collect; and/or does not meet the scientific acceptability criteria, then it may be rejected, as any other measure would. A measure for Trial Use is evaluated in the same manner as a measure for endorsement, with the exception being on the testing of the measure and, if the committee accepts the measure, it is placed into the Trial Use program instead of being endorsed. A eMeausure for Trial Use consideration is not evaluated solely on the basis of its technical specifications.

3020 PBM-04: Initial Transfusion Threshold

Committee response:

- After review of the comments, the Committee continued to express concerns about how the evidence is aligned with the specifications of the measure. The Committee did not find the measure as specified to be a valid indicator of quality. The Committee then revoted, and the measure did not pass the eMeasure Trial Measure Specifications subcriterion.
- Because the measure did not pass the Validity subcriterion upon re-vote, the Committee did not pursue further discussion of the measure and did not recommend it for Approval for Trial Use status.

Vote Following Consideration of Public and Member Comments:

eMeasure Trial Measure Specifications: H-0; **M-3**; **L-12**; **I-1**

3021 PBM-05: Blood Usage, Selected Elective Surgical Patients

Submission | Specifications

Description: This measure assesses the proportion of selected elective surgical patients age 18 and over who had a timely preoperative anemia screening and subsequent perioperative transfusion. Since preoperative anemia is a predictor of perioperative transfusion, this measure can identify records of patients needing further review for uncorrected preoperative anemia or other blood management measures, such as a restrictive transfusion strategy or cell salvage, that should have been taken to avoid transfusion.

Numerator Statement: Patients who had a non-autologous whole blood or non-autologous packed red blood cell transfusion administered in the time window from anytime during the surgical procedure to 5 days after the surgical procedure or to discharge, whichever is sooner.

Denominator Statement: Selected elective surgical patients age 18 and older who had a preoperative anemia screening in the time window between 45 and 14 days before surgery start date.

Exclusions: • Patients under age 18

- Patients whose surgical procedure is performed to address a traumatic injury
- Patients who have a solid organ transplant
- Patients with sickle cell disease or hereditary hemoglobinopathy
- Patients who refuse blood transfusion.
- Patients who receive an autologous blood transfusion

Adjustment/Stratification: No risk adjustment or risk stratification

Level of Analysis: Facility

Setting of Care: Hospital/Acute Care Facility

Type of Measure: Process

Data Source: Electronic Clinical Data, Electronic Clinical Data : Electronic Health Record, Electronic Clinical Data : Laboratory

Measure Steward: The Joint Commission

STANDING COMMITTEE MEETING 08/16 - 08/17/16

1. Importance to Measure and Report: <u>The measure does not meet the Importance criteria</u>

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

1a. Evidence: **H-0**; **M-4**; **L-7**; **I-5**; 1b. Performance Gap: **No votes taken**

<u>Rationale</u>:

- This measure is intended to assess the effectiveness of the preoperative anemia screening by identifying those patients who had the appropriate screening but still required a perioperative blood

3021 PBM-05: Blood Usage, Selected Elective Surgical Patients

transfusion. A Committee member noted that once most patients are appropriately screened for anemia at a stage when results allow preoperative anemia management, then this measure would likely be of greater value. There was concern that, at this time, implementation of this measure is premature. Committee members were also concerned about the potential unintended consequence of hospitals deciding that they would have to do a type and screen or a type and crossmatch for a large proportion of patients unnecessarily.

Standing Committee Recommendation for Endorsement: **No votes taken.**

6. Public and Member Comment

- One comment was submitted in support of the Committee's concern with the underlying evidence for this measure. The comment supported the Committee's decision to not recommend the measure for endorsement.

3024 Carotid Endarterectomy: Evaluation of Vital Status and NIH Stroke Scale at Follow Up

Submission | **Specifications**

Description: Proportion of patients with carotid endarterectomy procedures who had follow up performed for evaluation of vital status and neurological assessment with an NIH Stroke Scale (by an examiner who is certified by the American Stroke Association

Numerator Statement: Patient Status (alive or Deceased) at follow-up AND neurologic status with an assessment using the NIH Stroke Scale (by an examiner who is certified by the American Stroke Association)

Denominator Statement: CARE Registry patients that underwent carotid endarterectomy

Exclusions: Patients with a discharge status of deceased.

Patients with was an acute, evolving stroke and dissection during the episode of care.

Adjustment/Stratification: No risk adjustment or risk stratification

Level of Analysis: Facility, Population : National

Setting of Care: Hospital/Acute Care Facility

Type of Measure: Process

Data Source: Electronic Clinical Data : Registry

Measure Steward: American College of Cardiology

STANDING COMMITTEE MEETING 08/16 - 08/17/16

1. Importance to Measure and Report: The measure does not meet the Importance criteria

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

1a. Evidence: **H-0**; **M-0**; **L-12**; **I-8**; 1b. Performance Gap: **No votes taken**

Rationale:

- This is facility- and population-level measure calculates proportion of patients with carotid endarterectomy procedures who had follow up performed for evaluation of vital status and neurological assessment with an NIH Stroke Scale (by an examiner who is certified by the American Stroke Association). Committee members had concerns about the overall measure construct as it is currently specified and tested.
- The Committee agreed that the evidence presented by the developer is insufficient, noting that the first citation provided relates to an ungraded general guideline recommendation to monitor neurological outcomes and the second relates to non-invasive imaging which is not a part of this measure. Committee members also suggested that the measure would be stronger if was using the NIH stroke scale to measure an actual outcome within 30 or 60 days post discharge as opposed to the process of administering the tool.

3024 Carotid Endarterectomy: Evaluation of Vital Status and NIH Stroke Scale at Follow Up
Standing Committee Recommendation for Endorsement: **No votes taken**
6. Public and Member Comment • One comment submitted did not support the Committee's recommendation to not recommend the measure for endorsement, noting the importance of process measures in measure physician performance and advancing quality of care. • One other comment received after the commenting period closed, expressed support of the Committee's recommendation not to recommend the measure for endorsement.

Measures Withdrawn from Consideration

Seven measures previously endorsed by NQF have not been re-submitted for maintenance of endorsement or have been withdrawn during the endorsement evaluation process. Endorsement for these measures will be removed.

Measure	Reason for withdrawal
0218 Surgery Patients Who Received Appropriate Venous Thromboembolism Prophylaxis Within 24 Hours Prior to Surgery to 24 Hours After Surgery	Developer did not provide rationale
0284 Surgery Patients on Beta-Blocker Therapy Prior to Arrival Who Received a Beta-Blocker During the Perioperative Period	Developer did not provide rationale
0300 Cardiac Surgery Patients With Controlled Postoperative Blood Glucose	Developer did not provide rationale
0361 Esophageal Resection Volume (IQI 1)	Developer reports resource constraints.
0534 Hospital specific risk-adjusted measure of mortality or one or more major complications within 30 days of a lower extremity bypass (LEB)	Submission not received before submission deadline
0714 Standardized mortality ratio for neonates undergoing non-cardiac surgery	Developer is revamping the measure to redefine the scope, incorporate ICD-10 codes, and complete additional testing.
2750 Proportion of Patients undergoing Coronary Artery Bypass Graft Surgery (CABG) that have a Potentially Avoidable Complication (during the episode time window)	Developer did not provide rationale

Appendix B: NQF Surgery Portfolio and Related Measures

Although there are more than 100 surgery related measures, the Surgery Standing Committee is responsible for overseeing 65 measures. The remaining measures have been assigned, for various reasons, to other Standing Committees, including Patient Safety (adverse outcomes), EENT (eye surgery measures), Care Coordination (discharge planning measures), and Cardiovascular (pre-operative stress testing measures), among other Committees.

The measures listed below represent the portfolio of endorsed measures overseen by the Surgery Standing Committee. Please note that measures with an asterisk (*) were flagged by the Committee to indicate that the measure should include the pediatric population or should provide a rationale for excluding the pediatric population.

Three measures in red (and with a † dagger symbol) were newly submitted for consideration and recommended for endorsement by the Surgery Standing Committee in 2016.

Cross-Cutting (Inpatient)

- 0351 Death among surgical inpatients with serious, treatable complications (PSI 4)*
- 0527 Prophylactic Antibiotic Received Within One Hour Prior to Surgical Incision*
- 0528 Prophylactic Antibiotic Selection for Surgical Patients*
- 0529 Prophylactic Antibiotics Discontinued Within 24 Hours After Surgery End Time*
- 0533 Postoperative Respiratory Failure Rate (PSI 11)*

Cross-Cutting (Outpatient)

- 0178 Improvement in status of surgical wounds
- 0268 Perioperative Care: Selection of Prophylactic Antibiotic: First OR Second Generation Cephalosporin
- 2687 Hospital Visits after Hospital Outpatient Surgery

Cross-Cutting (Inpatient and Outpatient)

- 0271 Perioperative Care: Discontinuation of Prophylactic Parenteral Antibiotics (Non-Cardiac Procedures)*
- 0697 Risk Adjusted Case Mix Adjusted Elderly Surgery Outcomes Measure

General Surgery

- 0273 Perforated Appendix Admission Rate (PQI 2)*
- 0365 Pancreatic Resection Mortality Rate (IQI 9)
- 0366 Pancreatic Resection Volume (IQI 2)

  In addition to including a pediatric component to *0273 Perforated Appendix Admission Rate (PQI 2)*, the Committee noted that measures that address the complication rate of central venous catheter insertion and laparotomy/laparoscopy rate in intussusception in children are needed.

Anesthesia

- 0269 Timing of Prophylactic Antibiotics - Administering Physician
- 2681 Perioperative Temperature Management

  The Committee noted a need for measures that address perioperative euthermia in neonatal and pediatric patients.

Cardiac Surgery

- 0113 Participation in a Systematic Database for Cardiac Surgery
- 0114 Risk-Adjusted Postoperative Renal Failure
- 0115 Risk-Adjusted Surgical Re-exploration
- 0116 Anti-Platelet Medication at Discharge
- 0117 Beta Blockade at Discharge
- 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 MV Replacement + CABG Surgery
- 0123 Risk-Adjusted Operative Mortality for Aortic Valve Replacement (AVR) + CABG Surgery
- 0126 Selection of Antibiotic Prophylaxis for Cardiac Surgery Patients
- 0127 Preoperative Beta Blockade
- 0128 Duration of Antibiotic Prophylaxis for Cardiac Surgery Patients
- 0129 Risk-Adjusted Postoperative Prolonged Intubation (Ventilation)
- 0130 Risk-Adjusted Deep Sternal Wound Infection Rate
- 0131 Risk-Adjusted Stroke/Cerebrovascular Accident
- 0134 Use of Internal Mammary Artery (IMA) in Coronary Artery Bypass Graft (CABG)
- 0236 Coronary Artery Bypass Graft (CABG): Preoperative Beta-Blocker in Patients with Isolated CABG Surgery
- 0696 The STS CABG Composite Score
- 1501 Risk-Adjusted Operative Mortality for Mitral Valve (MV) Repair
- 1502 Risk-Adjusted Operative Mortality for MV Repair + CABG Surgery
- 2558 Hospital 30-day All-Cause Risk-Standardized Mortality Rate Following CABG
- 2561 STS Aortic Valve Replacement (AVR) Composite Score
- 2563 STS Aortic Valve Replacement (AVR) + Coronary Artery Bypass Graft (CABG) Composite Score
- 3030 Individual Surgeon Composite Measure for Adult Cardiac Surgery†
- 3031 STS Mitral Valve Repair Replacement (MVRR) Composite Score†
- 3032 STS MVRR Coronary Artery Bypass Graft (CABG) Composite Score†

Cardiac Surgery (Pediatric and Congenital)

- 0339 RACHS-1 Pediatric Heart Surgery Mortality
- 0340 Pediatric Heart Surgery Volume (PDI 7)
- 0713 Ventriculoperitoneal (VP) shunt malfunction rate in children

- 0732 Surgical Volume for Pediatric and Congenital Heart Surgery: Total Programmatic Volume and Programmatic Volume Stratified by the Five STS-EACTS Mortality Categories
- 0733 Operative Mortality Stratified by the Five STS-EACTS Mortality Categories
- 0734 Participation in a National Database for Pediatric and Congenital Heart Surgery
- 2683 Risk-Adjusted Operative Mortality for Pediatric and Congenital Heart Surgery

Colorectal Surgery

- 0706 Risk Adjusted Colon Surgery Outcome Measure*

The Committee noted a need for measures that address continence rate after repair of anorectal malformations.

OB/Gyn - Gynecology

- 2038 Performing vaginal apical suspension at the time of hysterectomy to address pelvic organ prolapse
- 2677 Preoperative evaluation for stress urinary incontinence prior to hysterectomy for pelvic organ prolapse

The Committee noted a need for measures that address ovarian preservation rate in resection of ovarian masses in girls under 18 years of age.

Pediatric Surgery

- 0713 Ventriculoperitoneal (VP) shunt malfunction rate in children

Orthopedic Surgery

- 0354 Hip Fracture Mortality Rate (IQI 19)
- 1550 Hospital-level risk-standardized complication rate (RSCR) following elective primary total hip arthroplasty (THA) and/or total knee arthroplasty (TKA)
- 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)

The Committee noted a need for measures that address blood loss and/or transfusion rate associated with surgery for scoliosis in patients under 18 years of age.

Thoracic Surgery (Non-Cardiac)

- 0456 Participation in a Systematic National Database for General Thoracic Surgery

Urology

- 2052 Reduction of Complications through the use of Cystoscopy during Surgery for Stress Urinary Incontinence
- 2063 Performing cystoscopy at the time of hysterectomy for pelvic organ prolapse to detect lower urinary tract injury

Vascular Surgery

- 0357 Abdominal Aortic Aneurysm (AAA) Repair Volume (IQI 4)
- 0359 Abdominal Aortic Aneurysm (AAA) Repair Mortality Rate (IQI 11)
- 0465 Perioperative Anti-platelet Therapy for Patients undergoing Carotid Endarterectomy
- 1519 Statin Therapy at Discharge after Lower Extremity Bypass (LEB)
- 1523 In-hospital mortality following elective open repair of AAAs
- 1534 In-hospital mortality following elective EVAR of AAAs
- 1540 Postoperative Stroke or Death in Asymptomatic Patients undergoing Carotid Endarterectomy
- 1543 Postoperative Stroke or Death in Asymptomatic Patients undergoing Carotid Artery Stenting (CAS)

Appendix C: Surgery Portfolio—Use in Federal Programs

NQF #	Title	Federal Programs
0113	Participation in a Systematic Database for Cardiac Surgery	Hospital Inpatient Quality Reporting
0114	Risk-Adjusted Postoperative Renal Failure	Physician Quality Reporting System (PQRS), Physician Compare, Physician Value-Based Payment Modifier (VBM)
0115	Risk-Adjusted Surgical Re-exploration	Physician Quality Reporting System (PQRS), Physician Compare, Physician Value-Based Payment Modifier (VBM)
0116	Anti-platelet Medication at Discharge	Physician Quality Reporting System (PQRS), Physician Compare, Physician Value-Based Payment Modifier (VBM)
0117	Beta Blockade at Discharge	Physician Quality Reporting System (PQRS), Physician Compare, Physician Value-Based Payment Modifier (VBM)
0118	Anti-Lipid Treatment Discharge	Physician Quality Reporting System (PQRS), Physician Compare, Physician Value-Based Payment Modifier (VBM)
0129	Risk-Adjusted Postoperative Prolonged Intubation (Ventilation)	Physician Quality Reporting System (PQRS), Physician Compare, Physician Value-Based Payment Modifier (VBM)
0130	Risk-Adjusted Deep Sternal Wound Infection Rate	Physician Quality Reporting System (PQRS), Physician Compare, Physician Value-Based Payment Modifier (VBM)
0131	Risk-Adjusted Stroke/Cerebrovascular Accident	Physician Quality Reporting System (PQRS), Physician Compare, Physician Value-Based Payment Modifier (VBM)
0134	Use of Internal Mammary Artery (IMA) in Coronary Artery Bypass Graft (CABG)	Physician Quality Reporting System (PQRS), Physician Compare, Physician Value-Based Payment Modifier (VBM)
0178	Improvement in Status of Surgical Wounds	Home Health Compare, Home Health Quality Reporting
0236	Coronary Artery Bypass Graft (CABG): Preoperative Beta-Blocker in Patients with Isolated CABG Surgery	Physician Quality Reporting System (PQRS), Physician Compare, Value-Based Payment Modifier (VBPM)
0268	Perioperative Care: Selection of Prophylactic Antibiotic – First OR Second Generation Cephalosporin	Physician Quality Reporting System (PQRS), Hospital Outpatient Quality Reporting, Physician Compare, Physician Value-Based Payment Modifier (VBPM)
0269	Timing of Prophylactic Antibiotics – Administering Clinician	Physician Compare, Physician Value-Based Payment Modifier (VBPM), Physician Quality Reporting System
0271	Perioperative Care: Discontinuation of Prophylactic Parenteral Antibiotics (Non-Cardiac Procedures)	Physician Quality Reporting System (PQRS), Physician Compare, Physician Value-Based Payment Modifier (VBM)

NQF #	Title	Federal Programs
0351	Death among surgical inpatients with serious, treatable complications (PSI 4)	Hospital Compare, Hospital Inpatient Quality Reporting, Hospital Value-Based Purchasing
0359	Abdominal aortic aneurysm (AAA) repair mortality rate (with or without volume) (IQI 11)	Hospital Compare, Hospital Inpatient Quality Reporting
0465	Perioperative Anti-platelet Therapy for Patients undergoing Carotid Endarterectomy	Physician Quality Reporting System, Value Based Payment Modifier (VBM), Physician Feedback, Medicare Shared Savings Program (MSSP), Physician Compare
0527	Prophylactic antibiotic received within 1 hour prior to surgical incision	Meaningful Use, Stage 2: Eligible Hospitals or Critical Access Hospitals (CAH), Hospital Inpatient Quality Reporting, Hospital Value Based Purchasing, PPS-Exempt Cancer Hospital Quality Reporting
0528	Prophylactic Antibiotic Selection for Surgical Patients	Meaningful Use, Stage 2: Eligible Hospitals or Critical Access Hospitals (CAH), Prospective Payment System (PPS)-Exempt Cancer Hospital Quality Reporting, Hospital Inpatient Quality Reporting, Hospital Value Based Purchasing
0529	Prophylactic Antibiotics Discontinued Within 24 Hours After Surgery End Time	Prospective Payment System (PPS)-Exempt Cancer Hospital Quality Reporting, Meaningful Use, Stage 2: Eligible Hospitals or Critical Access Hospitals (CAH)
0533	Post Operative Respiratory Failure (PSI 11)	Hospital-Acquired Condition Reduction Program
1519	Statin Therapy at Discharge after Lower Extremity Bypass (LEB)	Physician Compare, Physician Value-Based Payment Modifier (VBPM)
1523	Rate of Open Repair of Abdominal Aortic Aneurysms (AAA) Where Patients are Discharged Alive	Medicare Shared Savings Program (MSSP), Physician Compare, Physician Feedback, Physician Quality Reporting System (PQRS), Physician Value-Based Payment Modifier (VBM)
1534	In-hospital mortality following elective EVAR of AAAs	Physician Compare, Physician Value-Based Payment Modifier (VBPM)
1540	Postoperative Stroke or Death in Asymptomatic Patients undergoing Carotid Endarterectomy	Physician Quality Reporting System (PQRS), Physician Feedback/Quality and Resource Use Reports (QRUR), Physician Value-Based Payment Modifier (VBPM)
1543	Postoperative Stroke or Death in Asymptomatic Patients undergoing Carotid Artery Stenting (CAS)	Physician Quality Reporting System (PQRS)

NQF #	Title	Federal Programs
1550	Hospital-level risk-standardized complication rate (RSCR) following elective primary total hip arthroplasty (THA) and total knee arthroplasty (TKA)	Hospital Inpatient Quality Reporting, Hospital Value-Based Purchasing
1551	Hospital-level 30 day, all-cause, risk-standardized readmission rate (RSSR) following elective primary total hip arthroplasty (THA) and/or total knee arthroplasty (TKA)	Inpatient Prospective Payment System (IPPS), Hospital Readmission Reduction Program (HRRP)
2052	Reduction of Complications through the use of Cystoscopy during Surgery for Stress Urinary Incontinence	Physician Compare, Physician Quality Reporting System (PQRS), Physician Value-Based Payment Modifier (VBPM)
2063	Performing cystoscopy at the time of hysterectomy for pelvic organ prolapse to detect lower urinary tract injury	Physician Compare, Medicaid Shared Savings Program (MSPP), Physician Feedback, Physician Quality Reporting System (PQRS), Physician Value-Based Payment Modifier (VBPM)
2558	Hospital 30-Day, All-Cause, Risk-Standardized Mortality Rate (RSMR) Following Coronary Artery Bypass Graft (CABG) Surgery	Hospital Inpatient Quality Reporting
2677	Preoperative evaluation for stress urinary incontinence prior to hysterectomy for pelvic organ prolapse	Medicaid Shared Savings Program (MSPP), Physician Compare, Physician Feedback, Physician Feedback, Physician Quality Reporting System (PQRS), Physician Value-Based Payment Modifier (VBPM)
2681	Perioperative Temperature Management	Medicaid Shared Savings Program (MSPP), Physician Compare, Physician Feedback, Physician Quality Reporting System (PQRS), Physician Value-Based Payment Modifier (VBPM)
2687	Hospital Visits after Hospital Outpatient Surgery	Hospital Outpatient Quality Reporting

Appendix D: Project Standing Committee and NQF Staff

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Appendix E: Measure Specifications

	0117 Beta Blockade at Discharge
Steward	The Society of Thoracic Surgeons
Description	Percent of patients aged 18 years and older undergoing isolated CABG who were discharged on beta blockers
Type	Process
Data Source	Electronic Clinical Data : Registry STS Adult Cardiac Surgery Database Version 2.81 Available at measure-specific web page URL identified in S.1 No data dictionary
Level	Facility, Clinician : Group/Practice
Setting	Hospital/Acute Care Facility
Numerator Statement	Number of patients undergoing isolated CABG who were discharged on beta blockers
Numerator Details	Number of isolated CABG procedures in which discharge beta blockers [DCBeta (STS Adult Cardiac Surgery Database Version 2.81)] is marked "yes"
Denominator Statement	Patients undergoing isolated CABG
Denominator Details	Number of isolated CABG procedures excluding cases with an in-hospital mortality or cases for which discharge beta blocker 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 beta blocker was contraindicated.
Exclusion details	Mortality Discharge Status (MtDCStat), Mortality Date (MtDate), and Discharge Date (DischDt) indicate an in-hospital mortality; discharge beta blocker (DCBeta) marked as “Contraindicated”
Risk Adjustment	No risk adjustment or risk stratification N/A Provided in response box S.15a
Stratification	N/A
Type Score	Rate/proportion better quality = higher score
Algorithm	Please refer to numerator and denominator sections for detailed information. No diagram provided
Copyright / Disclaimer	N/A

	0127 Preoperative Beta Blockade
Steward	The Society of Thoracic Surgeons
Description	Percent of patients aged 18 years and older undergoing isolated CABG who received beta blockers within 24 hours preceding surgery.
Type	Process
Data Source	Electronic Clinical Data : Registry STS Adult Cardiac Surgery Database Version 2.81 Available at measure-specific web page URL identified in S.1 No data dictionary
Level	Facility, Clinician : Group/Practice

	0127 Preoperative Beta Blockade
Setting	Hospital/Acute Care Facility
Numerator Statement	Number of patients undergoing isolated CABG who received beta blockers within 24 hours preceding surgery
Numerator Details	Number of isolated CABG procedures in which preoperative beta blockers [MedBeta (STS Adult Cardiac Surgery Database Version 2.81)] is marked "yes"
Denominator Statement	Patients undergoing isolated CABG
Denominator Details	Number of isolated CABG procedures excluding cases for which preoperative beta blockers were contraindicated or if the clinical status of the patient was emergent or emergent salvage prior to entering the operating room. 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 preoperative beta blocker was contraindicated or if the clinical status of the patient was emergent or emergent salvage prior to entering the operating room.
Exclusion details	Procedures with preoperative beta blockers [MedBeta (STS Adult Cardiac Surgery Database Version 2.81)] marked as "Contraindicated" or procedures with Status [Status(STS Adult Cardiac Surgery Database Version 2.81)] marked "Emergent" or "Emergent Salvage"
Risk Adjustment	No risk adjustment or risk stratification N/A
Stratification	N/A
Type Score	Rate/proportion better quality = higher score
Algorithm	Please refer to numerator and denominator sections for detailed information. No diagram provided
Copyright / Disclaimer	N/A

	0134 Use of Internal Mammary Artery (IMA) in Coronary Artery Bypass Graft (CABG)
Steward	The Society of Thoracic Surgeons
Description	Percentage of patients aged 18 years and older undergoing isolated coronary artery bypass graft (CABG) who received an internal mammary artery (IMA) graft
Type	Process
Data Source	Electronic Clinical Data : Registry STS Adult Cardiac Surgery Database Version 2.81 Available at measure-specific web page URL identified in S.1 No data dictionary
Level	Facility, Clinician : Group/Practice
Setting	Hospital/Acute Care Facility
Numerator Statement	Number of patients undergoing isolated coronary artery bypass graft (CABG) who received an internal mammary artery (IMA) graft
Numerator Details	Number of isolated CABG procedures in which IMA Artery Used [IMAArtUs (STS Adult Cardiac Surgery Database Version 2.81] is marked "Left IMA," "Right IMA," or "Both IMAs"
Denominator Statement	Patients undergoing isolated CABG
Denominator Details	Number of isolated CABG procedures excluding cases that were a previous CABG prior to the current admission or if IMA was not used and one of the acceptable reasons was

	0134 Use of Internal Mammary Artery (IMA) in Coronary Artery Bypass Graft (CABG)
	provided. 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 the patient had a previous CABG prior to the current admission or if IMA was not used and one of the following reasons was provided: - Subclavian stenosis - Previous cardiac or thoracic surgery - Previous mediastinal radiation - Emergent or salvage procedure - No (bypassable) LAD disease
Exclusion details	Patients with previous CABG, identified where PrCAB is marked "yes" or IMA Artery Used (IMAArtUs) is marked “no IMA” and primary reason for no IMA (NoIMARsn) is marked as any of the following: - Subclavian stenosis - Previous cardiac or thoracic surgery - Previous mediastinal radiation - Emergent or salvage procedure - No (bypassable) LAD disease
Risk Adjustment	No risk adjustment or risk stratification N/A Provided in response box S.15a
Stratification	N/A
Type Score	Rate/proportion better quality = higher score
Algorithm	Please refer to numerator and denominator sections for detailed information. No diagram provided
Copyright / Disclaimer	N/A

	0351 Death Rate among Surgical Inpatients with Serious Treatable Complications (PSI 04)
Steward	Agency for Healthcare Research and Quality
Description	In-hospital deaths per 1,000 surgical discharges, among patients ages 18 through 89 years or obstetric patients, with serious treatable complications (shock/cardiac arrest, sepsis, pneumonia, deep vein thrombosis/ pulmonary embolism or gastrointestinal hemorrhage/acute ulcer). Includes metrics for the number of discharges for each type of complication. Excludes cases transferred to an acute care facility. A risk-adjusted rate is available. The risk-adjusted rate of PSI 04 relies on stratum-specific risk models. The stratum-specific models are combined to calculate an overall risk-adjusted rate.
Type	Outcome
Data Source	Administrative claims While the measure is tested and specified using data from the Healthcare Cost and Utilization Project (HCUP) (see section 1.1 and 1.2 of the measure testing form), the measure specifications for numerators, denominators and observed rates and software are Available at measure-specific web page URL identified in S.1 Attachment PSI04_Technical_Specifications_v6.0_160527.xlsx

	0351 Death Rate among Surgical Inpatients with Serious Treatable Complications (PSI 04)
Level	Facility
Setting	Hospital/Acute Care Facility
Numerator Statement	Number of deaths (DISP=20) among cases meeting the inclusion and exclusion rules for the denominator.
Numerator Details	Please see attached excel file in S.2b. for version 6.0 specifications.
Denominator Statement	Surgical discharges, for patients ages 18 through 89 years or MDC 14 (pregnancy, childbirth, and puerperium), with all of the following: • any-listed ICD-9-CM or ICD-10-PCS procedure codes for an operating room procedure; and • the principal procedure occurring within 2 days of admission or an admission type of elective (ATYPE=3); and • meet the inclusion and exclusion criteria for STRATUM_SHOCK (shock or cardiac arrest), STRATUM_SEPSIS (sepsis), STRATUM_PNEUMONIA (pneumonia), STRATUM_DVT (deep vein thrombosis or pulmonary embolism), or STRATUM_GI_HEM (gastrointestinal hemorrhage or acute ulcer) STRATUM_SHOCK (shock or cardiac arrest) • any secondary ICD-9-CM or ICD-10-CM diagnosis codes or any-listed ICD-9-CM or ICD-10-PCS procedure codes for shock or cardiac arrest STRATUM_SEPSIS (sepsis) • any secondary ICD-9-CM or ICD-10-CM diagnosis codes for sepsis. STRATUM_PNEUMONIA (pneumonia) • any secondary ICD-9-CM or ICD-10-CM diagnosis codes for pneumonia or pneumonitis. STRATUM_DVT (deep vein thrombosis or pulmonary embolism) • any secondary ICD-9-CM or ICD-10-CM diagnosis codes for deep vein thrombosis or pulmonary embolism. STRATUM_GI_HEM (gastrointestinal hemorrhage or acute ulcer) • any secondary ICD-9-CM or ICD-10-CM diagnosis codes for gastrointestinal hemorrhage or acute ulcer. Surgical discharges are defined by specific MS-DRG codes and ICD-9-CM/ICD-10-PCS codes indicating “major operating room procedures.”
Denominator Details	Please see attached excel file in S.2b. for v6.0 specifications.
Exclusions	Exclude cases: • transferred to an acute care facility (DISP = 2) • with missing discharge disposition (DISP=missing), gender (SEX=missing), age (AGE=missing), quarter (DQTR=missing), year (YEAR=missing), or principal diagnosis (DX1=missing)
Exclusion details	Please see attached excel file in S.2b. for v6.0 specifications.

	0351 Death Rate among Surgical Inpatients with Serious Treatable Complications (PSI 04)
Risk Adjustment	Statistical risk model The predicted value for each case is computed using a hierarchical model (logistic regression with hospital random effect) and covariates for gender, age (in 5-year age groups, except for the youngest age range), Modified Diagnosis Related Groups (ie. MS- Available in attached Excel or csv file at S.2b
Stratification	Please see attached excel file in S.2b. for v6.0 specifications.
Type Score	Rate/proportion better quality = lower score
Algorithm	The observed rate is the number of discharge records where the patient experienced the PSI adverse event divided by the number of discharge records at risk for the event. The expected rate is a comparative rate that incorporates information about a reference population that is not part of the user's input dataset – what rate would be observed if the expected level of care observed in the reference population and estimated with risk adjustment regression models, were applied to the mix of patients with demographic and comorbidity distributions observed in the user's dataset. The expected rate is calculated only for risk-adjusted indicators. The following descriptions are for the expected rate and risk-adjusted rate. These rates are calculated using models for each individual stratum. The expected rate is estimated using the stratum specific model for each record using a generalized estimating equations (GEE) approach to account for correlation at the hospital or provider level. Records are assigned to the stratum for which they qualify with the highest observed mortality rate. The risk-adjusted rate is a comparative rate that also incorporates information about a reference population that is not part of the input dataset – what rate would be observed if the level of care observed in the user's dataset were applied to a mix of patients with demographics and comorbidities distributed like the reference population? The risk-adjusted rate for the overall PSI 04 is calculated as the observed to expected ratio multiplied by the reference population rate, where the observed and expected values are summed across five strata (categories) of PSI 04 risk. This approach differs from other AHRQ Patient Safety Indicators without strata, in that each discharge-record's expected value is computed using one of five distinct stratum-specific risk adjustment models that correspond to an assigned PSI 04 stratum. The five PSI 04 strata group records together based on secondary diagnoses that represent complications of care, and place the patient at risk of death (which is the numerator of PSI 04). The smoothed rate is the weighted average of the risk-adjusted rate from the user's input dataset and the rate observed in the reference population; the smoothed rate is calculated with a shrinkage estimator to result in a rate near that from the user's dataset if the provider's rate is estimated in a stable fashion with minimal noise, or to result in a rate near that of the reference population if the variance of the estimated rate from the input dataset is large compared with the hospital-to-hospital variance estimated from the reference population. Thus, the smoothed rate is a weighted average of the risk-adjusted rate and the reference population rate, where the weight is the signal-to-noise ratio. In practice, the smoothed rate brings rates toward the mean, and tends to do this more so for outliers (such as rural hospitals).

	0351 Death Rate among Surgical Inpatients with Serious Treatable Complications (PSI 04)
	For additional information, please see the supplemental materials for the AHRQ QI Empirical Methods. No diagram provided
Copyright / Disclaimer	The AHRQ QI software is publicly available. We have no copyright disclaimers.

	0697 Risk Adjusted Case Mix Adjusted Elderly Surgery Outcomes Measure
Steward	American College of Surgeons
Description	This is a hospital based, risk adjusted, case mix adjusted elderly surgery aggregate clinical outcomes measure of adults 65 years of age and older.
Type	Outcome
Data Source	Electronic Clinical Data, Electronic Clinical Data : Electronic Health Record, Electronic Clinical Data : Imaging/Diagnostic Study, Electronic Clinical Data : Laboratory, Management Data, Paper Medical Records, Electronic Clinical Data : Pharmacy, Electro The modeling presented herein is based on ACS NSQIP Data files for the last several years. As a measure, data are collected and reported on an annual basis. Hospitals are not required to participate in ACS NSQIP- they would simply submit their data to the URL No data dictionary
Level	Facility
Setting	Ambulatory Care : Ambulatory Surgery Center (ASC), Hospital/Acute Care Facility
Numerator Statement	The outcome of interest is hospital-specific risk-adjusted mortality, a return to the operating room, or any of the following morbidities as defined by American College of Surgeons National Surgical Quality Improvement Program (ACS NSQIP): Cardiac Arrest
Numerator Details	Mortality- "All cause" death within the 30-day follow-up period: Any death occurring through midnight on the 30th day after the date of the procedure, regardless of cause, in or out of the hospital. All other outcome fields also defined explicitly in the tradition of ACS NSQIP: Unplanned reoperation: Patient had an unplanned return to the operating room for a surgical procedure related to either the index or concurrent procedure performed. This return must be within the 30 day postoperative period. The return to the OR may occur at any hospital or surgical facility (i.e. original index hospital or at an outside hospital). Cardiac Arrest Requiring CPR: The absence of cardiac rhythm or presence of chaotic cardiac rhythm that results in loss of consciousness requiring the initiation of any component of basic and/or advanced cardiac life support. Patients with automatic implantable cardioverter defibrillator (AICD) that fire but the patient has no loss of consciousness should be excluded. Myocardial Infarction: An acute myocardial infarction occurring within 30 days following surgery as manifested by one of the following three criteria: a. Documentation of ECG changes indicative of acute MI (one or more of the following): • ST elevation > 1 mm in two or more contiguous leads • New left bundle branch • New q-wave in two of more contiguous leads

	0697 Risk Adjusted Case Mix Adjusted Elderly Surgery Outcomes Measure
	b. New elevation in troponin greater than 3 times upper level of the reference range in the setting of suspected myocardial ischemia c. Physician diagnosis of myocardial infarction. Sepsis: Sepsis is the systemic response to infection. Report this variable if the patient has TWO OR MORE of the following five clinical signs and symptoms of Systemic Inflammatory Response Syndrome (SIRS): a. Temp >38 degrees C (100.4 degrees F) or < 36 degrees C (96.8 degrees F) b. HR >90 bpm c. RR >20 breaths/min or PaCO2 <32 mmHg(<4.3 kPa) d. WBC >12,000 cell/mm3, <4000 cells/mm3, or >10% immature (band) forms e. Anion gap acidosis: this is defined by either: • [Na + K] – [Cl + HCO3 (or serum CO2)]. If this number is greater than 16, then an anion gap acidosis is present. • Na – [Cl + HCO3 (or serum CO2)]. If this number is greater than 12, then an anion gap acidosis is present. AND one of the following: a. positive blood culture b. clinical documentation of purulence or positive culture from any site thought to be causative In addition, a patient with a suspected post-operative clinical condition of infection, or bowel infarction, (which leads to the surgical procedure and meets the criteria for SIRS above), the findings at operation must confirm the diagnosis with one of more of the following: • Confirmed infarcted bowel requiring resection • Purulence in the operative site • Enteric contents in the operative site, or • Positive intra-operative cultures Severe Sepsis/Septic Shock: Sepsis is considered severe when it is associated with organ and/or circulatory dysfunction. Report this variable if the patient has sepsis AND documented organ and/or circulatory dysfunction. Examples of organ dysfunction include: oliguria, acute alteration in mental status, acute respiratory distress. Examples of circulatory dysfunction include: hypotension, requirement of inotropic or vasopressor agents. Severe Sepsis/Septic Shock is assigned when it appears to be related to Sepsis and not a Cardiogenic or Hypovolemic etiology. Deep Incisional SSI: Deep Incision SSI is an infection that occurs within 30 days after the operation and the infection appears to be related to the operation and infection involved deep soft tissues (for example, fascial and muscle layers) of the incision and at least one of the following: • Purulent drainage from the deep incision but not from the organ/space component of the surgical site. • A deep incision spontaneously dehisces or is deliberately opened by a surgeon when the patient has at least one of the following signs or symptoms: fever (> 38 C), localized pain, or tenderness, unless site is culture-negative. • An abscess or other evidence of infection involving the deep incision is found on direct examination, during reoperation, or by histopathologic or radiologic examination. • Diagnosis of a deep incision SSI by a surgeon or attending physician. Organ/Space SSI: is an infection that occurs within 30 days after the operation and the infection appears to be related to the operation and the infection involves any part of the

	0697 Risk Adjusted Case Mix Adjusted Elderly Surgery Outcomes Measure
	anatomy (for example, organs or spaces), other than the incision, which was opened or manipulated during an operation and at least one of the following: • Purulent drainage from a drain that is placed through a stab wound into the organ/space. • Organisms isolated from an aseptically obtained culture of fluid or tissue in the organ/space. • An abscess or other evidence of infection involving the organ/space that is found on direct examination, during reoperation, or by histopathologic or radiologic examination. • Diagnosis of an organ/space SSI by a surgeon or attending physician. Wound Disruption: Separation of the layers of a surgical wound, which may be partial or complete, with disruption of the fascia. Unplanned Intubation for Respiratory/Cardiac Failure: Patient required placement of an endotracheal tube and mechanical or assisted ventilation because of the onset of respiratory or cardiac failure manifested by severe respiratory distress, hypoxia, hypercarbia, or respiratory acidosis. In patients who were intubated for their surgery, unplanned intubation occurs after they have been extubated after surgery. In patients who were not intubated during surgery, intubation at any time after their surgery is considered unplanned. Pneumonia (without preoperative pneumonia): Enter "Yes" if the patient has pneumonia meeting the definition below. Patients with pneumonia must meet criteria from both Radiology and Signs/Symptoms/Laboratory sections listed as follows: Radiology: One definitive chest radiological exam (x-ray or CT)* with at least one of the following: • New or progressive and persistent infiltrate • Consolidation or opacity • Cavitation *Note: In patients with underlying pulmonary or cardiac disease (e.g. respiratory distress syndrome, bronchopulmonary dysplasia, pulmonary edema, or chronic obstructive pulmonary disease), two or more serial chest radiological exams (x-ray or CT) are required. (Serial radiological exams should be taken no less than 12 hours apart, but not more than 7 days apart. The occurrence should be assigned on the date the patient first met all of the criteria of the definition i.e, if the patient meets all PNA criteria on the day of the first xray, assign this date to the occurrence. Do not assign the date of the occurrence to when the second serial xray was performed). Signs/Symptoms/Laboratory: FOR ANY PATIENT, at least one of the following: • Fever (>380C or >100.40F) with no other recognized cause • Leukopenia (<4000 WBC/mm3) or leukocytosis(=12,000 WBC/mm3) • For adults = 70 years old, altered mental status with no other recognized cause And At least one of the following: • 5% Bronchoalveolar lavage (BAL) -obtained cells contain intracellular bacteria on direct microscopic exam (e.g., Gram stain) • Positive growth in blood culture not related to another source of infection • Positive growth in culture of pleural fluid • Positive quantitative culture from minimally contaminated lower respiratory tract (LRT) specimen (e.g. BAL or protected specimen brushing)

	0697 Risk Adjusted Case Mix Adjusted Elderly Surgery Outcomes Measure
	OR At least two of the following: • New onset of purulent sputum, or change in character of sputum, or increased respiratory secretions, or increased suctioning requirements • New onset or worsening cough, or dyspnea, or tachypnea • Rales or rhonchi • Worsening gas exchange (e.g. O2 desaturations (e.g., PaO2/FiO2 = 240), increased oxygen requirements, or increased ventilator demand) Progressive Renal Insufficiency (without preoperative renal failure or dialysis): The reduced capacity of the kidney to perform its function as evidenced by a rise in creatinine of >2 mg/dl from preoperative value, but with no requirement for dialysis. Acute Renal Failure Requiring Dialysis (without preoperative renal failure or dialysis): In a patient who did not require dialysis preoperatively, worsening of renal dysfunction postoperatively requiring hemodialysis, peritoneal dialysis, hemofiltration, hemodiafiltration, or ultrafiltration. Urinary Tract Infection: Postoperative symptomatic urinary tract infection must meet ONE of the following TWO criteria: Criterion One. One of the following five: a. fever (>38 degrees C), b. urgency, c. frequency, d. dysuria, e. suprapubic tenderness AND a urine culture of > 100,000 colonies/ml urine with no more than two species of organisms. OR Criterion Two. Two of the following five: a. fever (>38 degrees C), b. urgency, c. frequency, d. dysuria, e. suprapubic tenderness AND ANY ONE or MORE of the following seven: a. Dipstick test positive for leukocyte esterase and/or nitrate, b. Pyuria (>10 WBCs/mm3 or > 3 WBC/hpf of unspun urine), c. Organisms seen on Gram stain of unspun urine, d. Two urine cultures with repeated isolation of the same uropathogen with >100 colonies/ml urine in non-voided specimen, e. Urine culture with < 100,000 colonies/ml urine of single uropathogen in patient being treated with appropriate antimicrobial therapy, f. Physician´s diagnosis, g. Physician institutes appropriate antimicrobial therapy.
Denominator Statement	Patients undergoing any ACS NSQIP listed (CPT) surgical procedure who are 65 years of age or older. (See appendix of roughly 2900 ACS NSQIP eligible CPT codes)
Denominator Details	Cases are collected so as to match ACS NSQIP inclusion and exclusion criteria, thereby permitting valid application of ACS NSQIP model-based risk adjustment.

	0697 Risk Adjusted Case Mix Adjusted Elderly Surgery Outcomes Measure
Exclusions	Cases must first have ACS NSQIP eligible CPT codes on the submitted list of ~2900 codes. Major/multisystem trauma and transplant surgeries are excluded. Patients who are ASA 6 (brain-death organ donor) are not eligible surgical cases. Surgeries following within 30 d of an index procedure are an outcome (return to OR) and are not eligible to be new index cases. Thus, a patient known to have had a prior surgical operation within 30 days is excluded from having the subsequent surgery considered an index case.
Exclusion details	NOT ON ELIGIBLE CPT LIST: Approximately 2900 codes are eligible. MAJOR TRAUMA: A patient who is admitted to the hospital with acute major or multisystem trauma and has surgery for that trauma is excluded, though any operation performed after the patient has been discharged from that trauma admission can be included. Exclusion of trauma cases does consider magnitude of injuries. If there are multiple severe injuries and the situation is emergent, the case would be excluded. If the patient has minor injuries, they are not excluded. For instance, ground level falls or low-velocity / low-impact injury mechanism may produce a single bone fracture (single system injury) and would be included. In contrast, a fall from a ladder (or a fall from height) would be excluded due to high-velocity / high-impact mechanism and the resulting injuries would be considered multisystem trauma. Any emergent, major or multisystem trauma case is excluded. These algorithms are communicated to the data collectors via educational tools. TRANSPLANT: A patient who is admitted to the hospital for a transplant and has a transplant procedure and any additional surgical procedures during the transplant hospitalization will be excluded, tough any operation performed after the patient has been discharged from the transplant stay is eligible for selection. ASA 6: A patient classified as ASA Class 6 is not eligible for inclusion.
Risk Adjustment	Statistical risk model ACS NSQIP performs hospital-level profiling by reporting case-mix adjusted and risk-adjusted postoperative outcomes. The statistical modeling is performed in three steps, which include case-mix adjustment, variable selection, then risk adjustment, all of Provided in response box S.15a
Stratification	The measure is risk adjusted and case mix adjusted.
Type Score	Ratio better quality = lower score
Algorithm	For data collected during the one year time interval at each hospital: (a) O = the number of observed adverse events at the hospital; (b) using parameters from the applicable model derived logistic equation, compute predicted event probabilities for each patient in the hospital's data set; (c) the sum of these predicted probabilities defines E; (d) compute the hospital's O/E ratio and applicable confidence intervals.
Copyright / Disclaimer	N/A

	0706 Risk Adjusted Colon Surgery Outcome Measure
Steward	American College of Surgeons
Description	This is a hospital based, risk adjusted, case mix adjusted morbidity and mortality aggregate outcome measure of adults 18+ years undergoing colon surgery.
Type	Outcome
Data Source	Electronic Clinical Data, Electronic Clinical Data : Electronic Health Record, Electronic Clinical Data : Imaging/Diagnostic Study, Electronic Clinical Data : Laboratory, Management Data, Paper Medical Records, Electronic Clinical Data : Registry Model is based on historical ACS

	0706 Risk Adjusted Colon Surgery Outcome Measure
	NSQIP Data file. Data sources are as above- collection is consistent with historical ACS NSQIP approaches to data collection. Model is based on ACS NSQIP but measure would not require participation in ACS NSQIP. URL No data dictionary
Level	Facility, Population : National
Setting	Ambulatory Care : Ambulatory Surgery Center (ASC), Hospital/Acute Care Facility
Numerator Statement	The outcome of interest is 30-day, hospital-specific risk-adjusted (all cause) mortality, unplanned reoperation, or any of the following morbidities as defined by American College of Surgeons National Surgical Quality Improvement Program (ACS NSQIP): card
Numerator Details	Mortality- "All cause" Death within the 30-day follow-up period: Any death occurring through midnight on the 30th day after the date of the procedure, regardless of cause, in or out of the hospital. All other outcome fields also defined explicitly in the tradition of ACS NSQIP: Unplanned reoperation: Patient had an unplanned return to the operating room for a surgical procedure related to either the index or concurrent procedure performed. This return must be within the 30 day postoperative period. The return to the OR may occur at any hospital or surgical facility (i.e. your hospital or at an outside hospital). Cardiac Arrest Requiring CPR: The absence of cardiac rhythm or presence of chaotic cardiac rhythm that results in loss of consciousness requiring the initiation of any component of basic and/or advanced cardiac life support. Patients with automatic implantable cardioverter defibrillator (AICD) that fire but the patient has no loss of consciousness should be excluded. Myocardial Infarction: An acute myocardial infarction occurring within 30 days following surgery as manifested by one of the following three criteria: a. Documentation of ECG changes indicative of acute MI (one or more of the following): • ST elevation > 1 mm in two or more contiguous leads • New left bundle branch • New q-wave in two of more contiguous leads b. New elevation in troponin greater than 3 times upper level of the reference range in the setting of suspected myocardial ischemia c. Physician diagnosis of myocardial infarction. Sepsis: Sepsis is the systemic response to infection. Report this variable if the patient has TWO OR MORE of the following five clinical signs and symptoms of Systemic Inflammatory Response Syndrome (SIRS): a. Temp >38 degrees C (100.4 degrees F) or < 36 degrees C (96.8 degrees F) b. HR >90 bpm c. RR >20 breaths/min or PaCO2 <32 mmHg(<4.3 kPa) d. WBC >12,000 cell/mm3, <4000 cells/mm3, or >10% immature (band) forms e. Anion gap acidosis: this is defined by either: • [Na + K] – [Cl + HCO3 (or serum CO2)]. If this number is greater than 16, then an anion gap acidosis is present. • Na – [Cl + HCO3 (or serum CO2)]. If this number is greater than 12, then an anion gap acidosis is present. AND one of the following: a. positive blood culture

	0706 Risk Adjusted Colon Surgery Outcome Measure
	b. clinical documentation of purulence or positive culture from any site thought to be causative In addition, a patient with a suspected post-operative clinical condition of infection, or bowel infarction, (which leads to the surgical procedure and meets the criteria for SIRS above), the findings at operation must confirm the diagnosis with one of more of the following: • Confirmed infarcted bowel requiring resection • Purulence in the operative site • Enteric contents in the operative site, or • Positive intra-operative cultures Severe Sepsis/Septic Shock: Sepsis is considered severe when it is associated with organ and/or circulatory dysfunction. Report this variable if the patient has sepsis AND documented organ and/or circulatory dysfunction. Examples of organ dysfunction include: oliguria, acute alteration in mental status, acute respiratory distress. Examples of circulatory dysfunction include: hypotension, requirement of inotropic or vasopressor agents. Severe Sepsis/Septic Shock is assigned when it appears to be related to Sepsis and not a Cardiogenic or Hypovolemic etiology. Deep Incisional SSI: Deep Incision SSI is an infection that occurs within 30 days after the operation and the infection appears to be related to the operation and infection involved deep soft tissues (for example, fascial and muscle layers) of the incision and at least one of the following: • Purulent drainage from the deep incision but not from the organ/space component of the surgical site. • A deep incision spontaneously dehisces or is deliberately opened by a surgeon when the patient has at least one of the following signs or symptoms: fever (> 38 C), localized pain, or tenderness, unless site is culture-negative. • An abscess or other evidence of infection involving the deep incision is found on direct examination, during reoperation, or by histopathologic or radiologic examination. • Diagnosis of a deep incision SSI by a surgeon or attending physician. Organ/Space SSI: is an infection that occurs within 30 days after the operation and the infection appears to be related to the operation and the infection involves any part of the anatomy (for example, organs or spaces), other than the incision, which was opened or manipulated during an operation and at least one of the following: • Purulent drainage from a drain that is placed through a stab wound into the organ/space. • Organisms isolated from an aseptically obtained culture of fluid or tissue in the organ/space. • An abscess or other evidence of infection involving the organ/space that is found on direct examination, during reoperation, or by histopathologic or radiologic examination. • Diagnosis of an organ/space SSI by a surgeon or attending physician. Wound Disruption: Separation of the layers of a surgical wound, which may be partial or complete, with disruption of the fascia. Unplanned Intubation for Respiratory/Cardiac Failure: Patient required placement of an endotracheal tube and mechanical or assisted ventilation because of the onset of respiratory or cardiac failure manifested by severe respiratory distress, hypoxia, hypercarbia, or respiratory acidosis. In patients who were intubated for their surgery, unplanned intubation occurs after they have been extubated after surgery. In patients who

	0706 Risk Adjusted Colon Surgery Outcome Measure
	were not intubated during surgery, intubation at any time after their surgery is considered unplanned. Pneumonia (without preoperative pneumonia): Enter "Yes" if the patient has pneumonia meeting the definition below. Patients with pneumonia must meet criteria from both Radiology and Signs/Symptoms/Laboratory sections listed as follows: Radiology: One definitive chest radiological exam (x-ray or CT)* with at least one of the following: • New or progressive and persistent infiltrate • Consolidation or opacity • Cavitation *Note: In patients with underlying pulmonary or cardiac disease (e.g. respiratory distress syndrome, bronchopulmonary dysplasia, pulmonary edema, or chronic obstructive pulmonary disease), two or more serial chest radiological exams (x-ray or CT) are required. (Serial radiological exams should be taken no less than 12 hours apart, but not more than 7 days apart. The occurrence should be assigned on the date the patient first met all of the criteria of the definition i.e, if the patient meets all PNA criteria on the day of the first xray, assign this date to the occurrence. Do not assign the date of the occurrence to when the second serial xray was performed). Signs/Symptoms/Laboratory: FOR ANY PATIENT, at least one of the following: • Fever (>380C or >100.40F) with no other recognized cause • Leukopenia (<4000 WBC/mm3) or leukocytosis(=12,000 WBC/mm3) • For adults = 70 years old, altered mental status with no other recognized cause And At least one of the following: • 5% Bronchoalveolar lavage (BAL) -obtained cells contain intracellular bacteria on direct microscopic exam (e.g., Gram stain) • Positive growth in blood culture not related to another source of infection • Positive growth in culture of pleural fluid • Positive quantitative culture from minimally contaminated lower respiratory tract (LRT) specimen (e.g. BAL or protected specimen brushing) OR At least two of the following: • New onset of purulent sputum, or change in character of sputum, or increased respiratory secretions, or increased suctioning requirements • New onset or worsening cough, or dyspnea, or tachypnea • Rales or rhonchi • Worsening gas exchange (e.g. O2 desaturations (e.g., PaO2/FiO2 = 240), increased oxygen requirements, or increased ventilator demand) Progressive Renal Insufficiency (without preoperative renal failure or dialysis): The reduced capacity of the kidney to perform its function as evidenced by a rise in creatinine of >2 mg/dl from preoperative value, but with no requirement for dialysis. Acute Renal Failure Requiring Dialysis (without preoperative renal failure or dialysis): In a patient who did not require dialysis preoperatively, worsening of renal dysfunction postoperatively requiring hemodialysis, peritoneal dialysis, hemofiltration, hemodiafiltration, or ultrafiltration.

	0706 Risk Adjusted Colon Surgery Outcome Measure
	Urinary Tract Infection: Postoperative symptomatic urinary tract infection must meet ONE of the following TWO criteria: Criterion One. One of the following five: a. fever (>38 degrees C), b. urgency, c. frequency, d. dysuria, e. suprapubic tenderness AND a urine culture of > 100,000 colonies/ml urine with no more than two species of organisms. OR Criterion Two. Two of the following five: a. fever (>38 degrees C), b. urgency, c. frequency, d. dysuria, e. suprapubic tenderness AND ANY ONE or MORE of the following seven: a. Dipstick test positive for leukocyte esterase and/or nitrate, b. Pyuria (>10 WBCs/mm3 or > 3 WBC/hpf of unspun urine), c. Organisms seen on Gram stain of unspun urine, d. Two urine cultures with repeated isolation of the same uropathogen with >100 colonies/ml urine in non-voided specimen, e. Urine culture with < 100,000 colonies/ml urine of single uropathogen in patient being treated with appropriate antimicrobial therapy, f. Physician's diagnosis, g. Physician institutes appropriate antimicrobial therapy.
Denominator Statement	Patients undergoing any ACS NSQIP listed (primary CPT) colon procedure. (44140, 44141, 44143, 44144, 44145, 44146, 44147, 44150, 44151, 44160, 44204, 44205, 44206, 44207, 44208, 44210)
Denominator Details	Cases are collected so as to match ACS NSQIP inclusion and exclusion criteria, thereby permitting valid application of ACS NSQIP model-based risk adjustment. See also exclusions below.
Exclusions	As noted above, cases are collected so as to match ACS NSQIP inclusion and exclusion criteria, thereby permitting valid application of ACS NSQIP model-based risk adjustment. Therefore, trauma and transplant surgeries are excluded as are surgeries not on the ACS NSQIP CPT list as eligible for selection (see details in next item). Patients who are ASA 6 (brain-death organ donor) are not eligible surgical cases. Of note, the measure excludes patients identified as having had prior surgical procedures within 30 days of a potential index procedure, since this measure is based on 30 day outcomes. A patient who is identified as having had a prior surgical procedure within 30 days of the index case being considered is excluded from accrual. A patient who has a second surgical procedure performed within 30 days after an index procedure has the second procedure recorded as a "Return to the operating room within 30 days" (one of the outcomes defined), but the second procedure cannot be accrued into the program as a new index procedure.

	0706 Risk Adjusted Colon Surgery Outcome Measure
Exclusion details	CPT Codes: Procedures not eligible for selection are excluded. (Measure only includes colon procedures, CPTs: 44140, 44141, 44143, 44144, 44145, 44146, 44147, 44150, 44151, 44160, 44204, 44205, 44206, 44207, 44208, 44210) MAJOR TRAUMA: A patient admitted to the hospital with acute trauma and multisystem injury who has surgery for the traumatic injury is excluded. TRANSPLANT: A patient who is admitted to the hospital for a transplant and has a transplant procedure and any additional surgical procedures during the transplant hospitalization will be excluded, though any operation performed after the patient has been discharged from the transplant stay is eligible for selection. Donor procedures on living donors are not excluded unless meeting other exclusion criteria. ASA CLASS 6: A patient classified as ASA Class 6 is not eligible for inclusion. As noted above, the measure excludes patients identified as having had prior surgical procedures within 30 days of a potential index procedure, since this measure is based on 30 day outcomes. A patient who is identified as having had a prior surgical procedure within 30 days of the index case being considered is excluded from accrual. A patient who has a second surgical procedure performed within 30 days after an index procedure has the second procedure recorded as a "Return to the operating room within 30 days" (one of the outcomes defined), but the second procedure cannot be accrued into the program as a new index procedure.
Risk Adjustment	Statistical risk model ACS NSQIP performs hospital-level profiling by reporting case-mix adjusted and risk-adjusted postoperative outcomes. The statistical modeling is performed in three steps, which include case-mix adjustment, variable selection, then risk adjustment, all of Provided in response box S.15a
Stratification	There is no stratification of this risk-adjusted measure.
Type Score	Ratio better quality = lower score
Algorithm	For data collected during the one year time interval at each hospital: (a) O = the number of observed adverse events at the hospital; (b) using parameters from the applicable model derived logistic equation, compute predicted event probabilities for each patient in the hospital's data set; (c) the sum of these predicted probabilities defines E; (d) compute the hospital's O/E ratio and applicable confidence intervals. See also the risk adjustment methodology section. No diagram provided
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	0713 Ventriculoperitoneal (VP) shunt malfunction rate in children
Steward	Boston Children's Hospital, Center for Patient Safety and Quality Research
Description	This measure is a 30-day malfunction rate for hospitals that perform cerebrospinal ventriculoperitoneal shunt operations in children between the ages of 0 and 18 years.
Type	Outcome
Data Source	Electronic Clinical Data Pediatric Health Information System (PHIS): PHIS is an administrative database that contains inpatient, emergency department and ambulatory surgery data from 42 not-for-profit, tertiary care pediatric hospitals in the United States. These hospitals are af Attachment ICD9_to_10_mapping_PHIS-VPShunt-635996755578611549.xlsx

	0713 Ventriculoperitoneal (VP) shunt malfunction rate in children
Level	Facility
Setting	Hospital/Acute Care Facility
Numerator Statement	The number of initial ventriculoperitoneal (VP) shunt placement procedures performed on children between the ages of 0 and 18 years of age that malfunction and result in shunt revision within 30 days of initial placement.
Numerator Details	Number of cases of initial VP shunt placement (ICD-10 procedure codes 0016072, 0016073, 00160J2, 00160J3 00160K2, 00160K3, 0016372, 0016373, 00163J2, 00163J3, 00163K2, 00163K3, 0016074, 00160J4, 00160K4, 0016374, 00163J4, 00163K4, 0W110J9, 0W110JB, 0016076, 00160J6, 00160K6, 0016376, 00163J6, 00163K6, 0W110JG, 0W110JJ, 0016077, 00160J7, 00160K7, 0016377, 00163J7, 00163K7 (either as a primary of secondary procedure)) among patients between the ages of 0 and 18 years at the time of placement resulting in a malfunction characterized by a shunt revision within 30 days of initial procedure.
Denominator Statement	The total number of initial cerebrospinal VP shunt procedures performed on children between the ages of 0 and 18 years.
Denominator Details	The total number of initial VP shunt placements (ICD-10 procedure codes 0016072, 0016073, 00160J2, 00160J3 00160K2, 00160K3, 0016372, 0016373, 00163J2, 00163J3, 00163K2, 00163K3, 0016074, 00160J4, 00160K4, 0016374, 00163J4, 00163K4, 0W110J9, 0W110JB, 0016076, 00160J6, 00160K6, 0016376, 00163J6, 00163K6, 0W110JG, 0W110JJ, 0016077, 00160J7, 00160K7, 0016377, 00163J7, 00163K7 (either as a primary of secondary procedure)) among patients between the ages of 0 and 18 years at the time of procedure. Patients also have no evidence of VP shunt placement or removal in the year prior to their initial procedure.
Exclusions	Patients with evidence of VP shunt placement or removal in the year prior to their index procedure are excluded.
Exclusion details	Patients with evidence of VP shunt placement (ICD-10 procedure codes 0016072, 0016073, 00160J2, 00160J3 00160K2, 00160K3, 0016372, 0016373, 00163J2, 00163J3, 00163K2, 00163K3, 0016074, 00160J4, 00160K4, 0016374, 00163J4, 00163K4, 0W110J9, 0W110JB, 0016077, 00160J7, 00160K7, 0016377, 00163J7, 00163K7 (either as a primary of secondary procedure)) or malfunction (identified by ICD-10 procedure codes(either as a primary of secondary procedure) 00W60JZ, 00W63JZ, 00W64JZ (Revision of Synthetic Substitute in Cerebral Ventricle: Open Approach, Percutaneous Approach, Percutaneous Endoscopic Approach), or the combination of codes 00P60JZ, 00P63JZ, 00P64JZ (Removal of Synthetic Substitute from Cerebral Ventricle: Open Approach, Percutaneous Approach, Percutaneous Endoscopic Approach) and one of the following: 0016072, 0016073, 00160J2, 00160J3 00160K2, 00160K3, 0016372, 0016373, 00163J2, 00163J3, 00163K2, 00163K3, 0016074, 00160J4, 00160K4, 0016374, 00163J4, 00163K4, 0W110J9, 0W110JB, 0016076, 00160J6, 00160K6, 0016376, 00163J6, 00163K6, 0W110JG, 0W110JJ, 0016077, 00160J7, 00160K7, 0016377, 00163J7, 00163K7, 0016078, 00160J8, 00160K8, 00163J8, 00163K8, during the same admission in the year prior to their initial procedure are excluded.
Risk Adjustment	Statistical risk model We used logistic regression models to determine the risk adjustment variables. The predicted value for each case is computed using a logistic regression model with covariates for with age at insertion (0-30 d, 31-365 d, and 1 y), congenital anomalies,
Stratification	No Stratification is done with the data.
Type Score	Rate/proportion better quality = lower score
Algorithm	The measure is a 30-day VP shunt malfunction rate defined as the proportion of shunt revisions within 30 days over the number of initial cerebrospinal VP shunt placement

	0713 Ventriculoperitoneal (VP) shunt malfunction rate in children
	procedures performed on children between the ages of 0 and 18 years. In order to stabilize the rates due to small number of events, the measure will be presented as a 3-year rolling rate. The benchmark for each year is the mean VP malfunction rate of all participating pediatric hospitals in the Pediatric Health Information System PHIS dataset.
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	1519 Statin Therapy at Discharge after Lower Extremity Bypass (LEB)
Steward	Society for Vascular Surgery
Description	Percentage of patients aged 18 years and older undergoing infrainguinal lower extremity bypass who are prescribed a statin medication at discharge. This measure is proposed for both hospitals and individual providers.
Type	Process
Data Source	Electronic Clinical Data : Registry The Society for Vascular Surgery Vascular Quality Initiative Registry The Vascular Study Group of New England Registry Attachment LEB-defs-v.01.09_v1.doc
Level	Facility, Clinician : Group/Practice, Clinician : Individual
Setting	Hospital/Acute Care Facility
Numerator Statement	Patients undergoing infrainguinal lower extremity bypass who are prescribed a statin medication at discharge.
Numerator Details	ANY registry that includes anatomic details or CPT procedure codes is required to identify patients for numerator inclusion. The Society for Vascular Surgery Vascular Quality Initiative (SVS VQI) and the Vascular Study Group of New England (VSGNE)are examples of registries which capture detailed anatomic information, but the measure is not limited to these registries. It could also be used by other registries that capture this same information. No other registries are required for computation. Infrainguinal lower extremity bypass is defined as a bypass beginning at or below the external iliac artery and extending into the ipsilateral leg. It includes procedures with CPT codes 35656, 35556, 35583, 35666, 35566, 35585, 35671, 35571, 35587. The numerator is calculated as the number of patients age 18 and over undergoing such a procedure who are prescribed a statin medication at the time of discharge, which is also captured in the above registries.
Denominator Statement	All patients aged 18 years and older undergoing lower extremity bypass as defined above who are discharged alive, excluding those patients who are intolerant to statins.
Denominator Details	ANY registry that includes anatomic details or CPT procedure codes is required to identify patients for denominator inclusion. The Society for Vascular Surgery Vascular Quality Initiative and the Vascular Study Group of New England are examples of registries that capture detailed anatomic information, but the measure is not limited to these registries. Infrainguinal lower extremity bypass is defined as a bypass beginning at or below the external iliac artery and extending into the ipsilateral leg. It includes procedures with CPT codes 35656, 35556, 35583, 35666, 35566, 35585, 35671, 35571, 35587. Only patients who are discharged alive are included in the denominator, and patients who are intolerant to statins are excluded, as described below.
Exclusions	Chart documentation that patient was not an eligible candidate for statin therapy due to known drug intolerance, or patient died before discharge.

	1519 Statin Therapy at Discharge after Lower Extremity Bypass (LEB)
Exclusion details	Chart documentation that patient was not an eligible candidate for statin therapy due to known drug intolerance, or patient died before discharge. These data are captured in the SVS VQI and VSGNE registries.
Risk Adjustment	No risk adjustment or risk stratification NA
Stratification	Not required
Type Score	Rate/proportion better quality = higher score
Algorithm	All patients age 18 and older undergoing infrainguinal LEB who were prescribed statin at discharge divided by (all patients over 18 undergoing infrainguinal LEB minus those intolerant to statins minus those who died before discharge).
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	1523 Rate of Open Repair of Abdominal Aortic Aneurysms (AAA) Where Patients Are Discharged Alive
Steward	Society for Vascular Surgery
Description	Percentage of asymptomatic patients undergoing open repair of abdominal aortic aneurysms (AAA)who are discharged alive. This measure is proposed for both hospitals and individual providers.
Type	Outcome
Data Source	Electronic Clinical Data : Registry Society for Vascular Surgery Vascular Quality Initiative Registry Vascular Study Group of New England Registry Attachment LEB-defs-v.01.09_v1-636009094258447860.doc
Level	Facility, Clinician : Group/Practice, Clinician : Individual
Setting	Hospital/Acute Care Facility
Numerator Statement	Patients discharged alive/home following open repair of asymptomatic AAAs in men with < 6 cm diameter and women with < 5.5 cm diameter AAAs.
Numerator Details	ANY registry that includes hospitalization details, AAA diameter and discharge status is required to identify patients for numerator inclusion. The Society for Vascular Surgery Vascular Quality Initiative (SVS VQI) and the Vascular Study Group of New England (VSGNE) are examples of registries that record such information, but the measure is not limited to these registries. Any registry that collects this data could report on this measure. Patients who died in hospital following elective open infrarenal AAA repair if their aneurysm was asymptomatic (< 6cm dia in men, <5.5 cm dia in women, judged by preoperative imaging (CT, MR or ultrasound)).
Denominator Statement	All elective open repairs of asymptomatic AAAs in men with < 6 cm dia and women with < 5.5 cm dia AAAs
Denominator Details	ANY registry that includes hospitalization details, AAA diameter and discharge status is required to identify patients for denominator inclusion. The Society for Vascular Surgery Vascular Quality Initiative (SVS VQI) and the Vascular Study Group of New England (VSGNE) are examples of registries that record such information, but the measure is not limited to these registries. Patients who underwent elective open AAA repair are included if their

	1523 Rate of Open Repair of Abdominal Aortic Aneurysms (AAA) Where Patients Are Discharged Alive
	aneurysm was asymptomatic (< 6cm dia in men, <5.5 cm dia in women, judged by preoperative imaging(CT, MR or ultrasound)).
Exclusions	= 6 cm minor diameter - men = 5.5 cm minor diameter - women Symptomatic AAAs that required urgent/emergent (non-elective) repair
Exclusion details	Patients undergoing non-elective open repair of symptomatic AAAs or those with AAAs larger than the diameters noted above.
Risk Adjustment	No risk adjustment or risk stratification See "Scientific Acceptablility" section for rationale
Stratification	Not required
Type Score	Rate/proportion better quality = lower score
Algorithm	Identify denominator, exclude non-elective repair of symptomatic or ruptured patients and men with AAA >6 cm, and women with AAA >5.5, find number of deaths Outcome = deaths/ # cases
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	1534 In-hospital mortality following elective EVAR of AAAs
Steward	Society for Vascular Surgery
Description	Percentage of patients undergoing elective endovascular repair of asymptomatic infrarenal abdominal aortic aneurysms (AAA) who die while in hospital. This measure is proposed for both hospitals and individual providers.
Type	Outcome
Data Source	Electronic Clinical Data : Registry Society for Vascular Surgery Vascular Quality Initiative Registry Vascular Study Group of New England Registry Attachment EVAR defs v.01.09.doc
Level	Facility, Clinician : Group/Practice, Clinician : Individual
Setting	Hospital/Acute Care Facility
Numerator Statement	Mortality following elective endovascular infrarenal AAA repair of asymptomatic AAAs in men with < 6 cm dia and women with < 5.5 cm dia AAAs
Numerator Details	ANY registry that includes hospitalization details, AAA diameter and discharge status is required to identify patients for numerator inclusion. The Society for Vascular Surgery Vascular Quality Initiative (SVS VQI) and the Vascular Study Group of New England (VSGNE) are examples of registries that record such information, but the measure is not limited to these registries. It could be reported by other registries that collect this same information. No other registry is needed for computation. Patients who died in hospital following elective endovascular infrarenal AAA repair if their aneurysm was asymptomatic (< 6cm dia in men, <5.5 cm dia in women, judged by preoperative imaging (CT, MR or ultrasound)).
Denominator Statement	All elective endovascular repairs of asymptomatic AAAs in men with < 6 cm dia and women with < 5.5 cm dia AAAs
Denominator Details	ANY registry that includes hospitalization details, AAA diameter and discharge status is required to identify patients for denominator inclusion. The Society for Vascular Surgery

	1534 In-hospital mortality following elective EVAR of AAAs
	Vascular Quality Initiative (SVS VQI) and the Vascular Study Group of New England (VSGNE) are examples of registries that record such information, but the measure is not limited to these registries. Patients who died in hospital following elective endovascular infrarenal AAA repair if their aneurysm was asymptomatic (< 6cm dia in men, <5.5 cm dia in women, judged by preoperative imaging (CT, MR or ultrasound)).
Exclusions	= 6 cm diameter - men = 5.5 cm diameter – women Symptomatic AAAs that required urgent/emergent (non-elective) repair
Exclusion details	Patients undergoing non-elective open repair of symptomatic AAAs or those with AAAs larger than the diameters noted above.
Risk Adjustment	No risk adjustment or risk stratification See "Scientific Acceptablility" section for rationale
Stratification	NA
Type Score	Rate/proportion better quality = lower score
Algorithm	Identify denominator, exclude non-elective repair of symptomatic or ruptured patients and men with AAA >6 cm, and women with AAA >5.5, find number of deaths Outcome = deaths/ # cases No diagram provided
Copyright / Disclaimer	N/A

	1540 Postoperative Stroke or Death in Asymptomatic Patients undergoing Carotid Endarterectomy
Steward	Society for Vascular Surgery
Description	Percentage of patients age 18 or older without carotid territory neurologic or retinal symptoms within the one year immediately preceding carotid endarterectomy (CEA) who experience stroke or death following surgery while in the hospital. This measure is proposed for both hospitals and individual surgeons.
Type	Outcome
Data Source	Electronic Clinical Data : Registry Society for Vascular Surgery Vascular Quality Initiative Registry Vascular Study Group of New England Registry Attachment CEA defs v.01.09.doc
Level	Facility, Clinician : Group/Practice, Clinician : Individual
Setting	Hospital/Acute Care Facility
Numerator Statement	Patients age 18 or older without preoperative carotid territory neurologic or retinal symptoms within the one year immediately preceding CEA who experience stroke or death during their hospitalization following carotid endarterectomy
Numerator Details	ANY registry that includes hospitalization details and symptom status within 120 days is required to identify patients for numerator inclusion. The Society for Vascular Surgery Vascular Quality Initiative (SVS VQI) and the Vascular Study Group of New England (VSGNE) are examples of registries that record such information, but the measure is not limited to these registries. If a registry collects this data then they could report this measure. Patients who were asymptomatic within one year of the CEA (CPT code 37215) who died or experienced postoperative in hospital stroke are included.
Denominator Statement	Asymptomatic patients (based on NASCET criteria) on the within one year of CEA
Denominator Details	ANY registry that includes hospitalization details and symptom status within 120 days is required to identify patients for denominator inclusion. The Society for Vascular Surgery Vascular Quality Initiative (SVS VQI) and the Vascular Study Group of New England (VSGNE) are examples of registries that record such information, but the measure is not limited to these registries. Patients who were asymptomatic within one year of the CAS (CPT code 37215)are included.
Exclusions	DENOMINATOR EXCLUSIONS: Symptomatic carotid stenosis: Ipsilateral carotid territory TIA or stroke less than 120 days prior to procedure: 9006F OR Other carotid stenosis: Ipsilateral TIA or stroke 120 days or greater prior to procedure or any prior contralateral carotid territory or vertebrobasilar TIA or stroke: 9007F
Exclusion details	DENOMINATOR EXCLUSIONS: Symptomatic carotid stenosis: Ipsilateral carotid territory TIA or stroke less than 120 days prior to procedure: 9006F OR Other carotid stenosis: Ipsilateral TIA or stroke 120 days or greater prior to procedure or any prior contralateral carotid territory or vertebrobasilar TIA or stroke: 9007F
Risk Adjustment	No risk adjustment or risk stratification See "Scientific Acceptablility" section for rationale
Stratification	Not required

	1540 Postoperative Stroke or Death in Asymptomatic Patients undergoing Carotid Endarterectomy
Type Score	Rate/proportion better quality = lower score
Algorithm	Asymptomatic patients undergoing CEA who experience inhospital stroke or death/all asymptomatic patients undergoing CEA. This measure is to be reported each time a CEA is performed during the reporting period. It is anticipated that clinicians who provide services of CEA, as described in the measure, based on the services provided and the measure-specific denominator coding will report this measure. This measure may be reported by clinicians who perform the quality actions described in the measure based on the services provided and the measure-specific denominator coding. No diagram provided
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	1543 Postoperative Stroke or Death in Asymptomatic Patients undergoing Carotid Artery Stenting (CAS)
Steward	Society for Vascular Surgery
Description	Percentage of patients 18 years of age or older without carotid territory neurologic or retinal symptoms within 120 days immediately proceeding carotid angioplasty and stent (CAS) placement who experience stroke or death during their hospitalization for this procedure. This measure is proposed for both hospitals and individual interventionalists.
Type	Outcome
Data Source	Electronic Clinical Data : Registry Society for Vascular Surgery Vascular Quality Initiative Registry Vascular Study Group of New England Registry Attachment CAS defs v.01.09.doc
Level	Facility, Clinician : Group/Practice, Clinician : Individual
Setting	Hospital/Acute Care Facility
Numerator Statement	Patients over age 18 without preoperative carotid territory neurologic or retinal symptoms within one year of their procedure who experience stroke or death during their hospitalization following elective carotid artery angioplasty and stent placement.
Numerator Details	ANY registry that includes hospitalization details and symptom status within 120 days is required to identify patients for numerator inclusion. The Society for Vascular Surgery Vascular Quality Initiative (SVS VQI) and the Vascular Study Group of New England (VSGNE) are examples of registries that record such information, but the measure is not limited to these registries. Other registries that collect this same information could report these measures. Patients who were asymptomatic within one year of the CAS (CPT code 37215) who died or had a stroke recorded in the registry during that admission.
Denominator Statement	Patients over age 18 without preoperative carotid territory neurologic or retinal symptoms within one year immediately preceding carotid artery stenting.
Denominator Details	ANY registry that includes hospitalization details and symptom status within one year is required to identify patients for numerator inclusion. The Society for Vascular Surgery Vascular Quality Initiative (SVS VQI) and the Vascular Study Group of New England (VSGNE) are examples of registries that record such information, but the measure is not limited to these registries. Patients who were asymptomatic within one year of the CAS (CPT code 37215) are included.

	1543 Postoperative Stroke or Death in Asymptomatic Patients undergoing Carotid Artery Stenting (CAS)
Exclusions	Per PQRS Specifications for 2016: DENOMINATOR EXCLUSIONS: Symptomatic carotid stenosis: Ipsilateral carotid territory TIA or stroke less than 120 days prior to procedure: 9006F OR Other carotid stenosis: Ipsilateral TIA or stroke 120 days or greater prior to procedure or any prior contralateral carotid territory or vertebrobasilar TIA or stroke: 9007F
Exclusion details	Patients with NASCET criteria neurologic symptoms (transient ischemic attack, amaurosis, or stroke) within the one year immediately proceeding CAS. DENOMINATOR EXCLUSIONS per PQRS 2016 specifications: Symptomatic carotid stenosis: Ipsilateral carotid territory TIA or stroke less than 120 days prior to procedure: 9006F OR Other carotid stenosis: Ipsilateral TIA or stroke 120 days or greater prior to procedure or any prior contralateral carotid territory or vertebrobasilar TIA or stroke: 9007F
Risk Adjustment	No risk adjustment or risk stratification See "Scientific Acceptablility" section for rationale
Stratification	Not required
Type Score	Rate/proportion better quality = lower score
Algorithm	Number of asymptomatic patients undergoing CAS who have in hospital stroke or death / Number of asymptomatic patients undergoing CAS INSTRUCTIONS: This measure is to be reported each time a CAS is performed during the reporting period. It is anticipated that clinicians who provide services of CAS, as described in the measure, based on the services provided and the measure-specific denominator coding will report this measure. This measure may be reported by clinicians who perform the quality actions described in the measure based on the services provided and the measure-specific denominator coding. No diagram provided
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	1550 Hospital-level risk-standardized complication rate (RSCR) following elective primary total hip arthroplasty (THA) and/or total knee arthroplasty (TKA)
Steward	Centers for Medicare & Medicaid Services
Description	The measure estimates a hospital-level risk-standardized complication rate (RSCR) associated with elective primary THA and TKA in Medicare Fee-For-Service beneficiaries who are 65 years and older. The outcome (complication) is defined as any one of the specified complications occurring from the date of index admission to 90 days post date of the index admission (the admission included in the measure cohort). The target population is patients 18 and over. CMS annually reports the measure for patients who are 65 years or older, are enrolled in fee-for-service (FFS) Medicare, and hospitalized in non-federal acute-care hospitals.

	1550 Hospital-level risk-standardized complication rate (RSCR) following elective primary total hip arthroplasty (THA) and/or total knee arthroplasty (TKA)
Type	Outcome
Data Source	Administrative claims, Other, Paper Medical Records Data sources: The currently publically reported measure is specified and has been tested using: 1. Medicare Part A inpatient and Part B outpatient claims: This data source contains claims data for FFS inpatient and outpatient services including: Medicar No data collection instrument provided Attachment NQF_1550_HipKnee_Complication_Data_Dictionary_v1.0.xlsx
Level	Facility
Setting	Hospital/Acute Care Facility
Numerator Statement	The outcome for this measure is any complication occurring during the index admission (not coded present on arrival) to 90 days post-date of the index admission. Complications are counted in the measure only if they occur during the index hospital admissi
Numerator Details	The composite complication is a dichotomous outcome (yes for any complication(s); no for no complications). Therefore, if a patient experiences one or more complications, the outcome variable will get coded as a "yes". Complications are counted in the measure only if they occur during the index hospital admission (and are not present on admission) or during a readmission. The complications captured in the numerator are identified during the index admission OR associated with a readmission up to 90 days post-date of index admission, depending on the complication. The follow-up period for complications from date of index admission is as follows: The follow-up period for AMI, pneumonia, and sepsis/septicemia/shock is seven days from the date of index admission because these conditions are more likely to be attributable to the procedure if they occur within the first week after the procedure. Additionally, analyses indicated a sharp decrease in the rate of these complications after seven days. Death, surgical site bleeding, and pulmonary embolism are followed for 30 days following admission because clinical experts agree these complications are still likely attributable to the hospital performing the procedure during this period and rates for these complications remained elevated until roughly 30 days post admission. The measure follow-up period is 90 days after admission for mechanical complications and periprosthetic joint infection/wound infection. Experts agree that mechanical complications and periprosthetic joint infection/wound infections due to the index THA/TKA occur up to 90 days following THA/TKA. The measure counts all complications occurring during the index admission regardless of when they occur. For example, if a patient experiences an AMI on day 10 of the index admission, the measure will count the AMI as a complication, although the specified follow-up period for AMI is seven days. Clinical experts agree with this approach, as such complications likely represent the quality of care provided during the index admission. As of 2014 reporting, the measure does not count complications in the complications outcome that are coded as POA during the index admission; this prevents identifying a condition as a complication of care if it was present on admission for the THA/TKA procedure. For full list of ICD-9 and ICD-10 codes defining complications, see the Data Dictionary attached in field S.2b., sheet “Complication Codes ICD9-ICD10”.
Denominator Statement	The target population for the publically reported measure includes admissions for Medicare FFS beneficiaries who are at least 65 years of age undergoing elective primary THA and/or TKA procedures.

	1550 Hospital-level risk-standardized complication rate (RSCR) following elective primary total hip arthroplasty (THA) and/or total knee arthroplasty (TKA)
	Additional details are provided in S.9 Denominator Detail
Denominator Details	To be included in the measure cohort used in public reporting, patients must meet the following additional inclusion criteria: 1. Enrolled in Medicare fee-for-service (FFS) Part A and Part B for the 12 months prior to the date of admission; and enrolled in Part A during the index admission; 2. Aged 65 or older 3. Having a qualifying elective primary THA/TKA procedure; elective primary THA/TKA procedures are defined as those procedures without any of the following: • Femur, hip, or pelvic fractures coded in the principal or secondary discharge diagnosis field of the index admission • Partial hip arthroplasty (PHA) procedures (with a concurrent THA/TKA); partial knee arthroplasty procedures are not distinguished by ICD9 codes and are currently captured by the THA/TKA measure • Revision procedures with a concurrent THA/TKA • Resurfacing procedures with a concurrent THA/TKA • Mechanical complication coded in the principal discharge • Malignant neoplasm of the pelvis, sacrum, coccyx, lower limbs, or bone/bone marrow or a disseminated malignant neoplasm coded in the principal discharge diagnosis field • Removal of implanted devises/prostheses • Transfer status from another acute care facility for the THA/TKA Patients are eligible for inclusion in the denominator if they had an elective primary THA and/or a TKA AND had continuous enrollment in Part A and Part B Medicare fee-for-service (FFS) 12 months prior to the date of index admission. This measure can also be used for an all-payer population aged 18 years and older. We have explicitly tested the measure in both patients aged 18+ years and those aged 65+ years (see Section 2b4.11 of the Testing Attachment for details, 2b4.11). International Classification of Diseases, 9th Revision, Clinical Modification (ICD-9-CM) codes used to define the cohort for each measure are: ICD-9-CM codes used to define a THA or TKA: 81.51 Total Hip Replacement 81.54 Total Knee Replacement ICD-10 Codes that define a THA or TKA: 0SR90J9 Replacement of Right Hip Joint with Synthetic Substitute, Cemented, Open Approach 0SR90JA Replacement of Right Hip Joint with Synthetic Substitute, Uncemented, Open Approach 0SR90JZ Replacement of Right Hip Joint with Synthetic Substitute, Open Approach 0SRB0J9 Replacement of Left Hip Joint with Synthetic Substitute, Cemented, Open Approach 0SRB0JA Replacement of Left Hip Joint with Synthetic Substitute, Uncemented, Open Approach 0SRB0JZReplacement of Left Hip Joint with Synthetic Substitute, Open Approach 0SRC07Z Replacement of Right Knee Joint with Autologous Tissue Substitute, Open Approach 0SRC0JZReplacement of Right Knee Joint with Synthetic Substitute, Open Approach

	1550 Hospital-level risk-standardized complication rate (RSCR) following elective primary total hip arthroplasty (THA) and/or total knee arthroplasty (TKA)
	0SRC0KZ Replacement of Right Knee Joint with Nonautologous Tissue Substitute, Open Approach 0SRD07Z Replacement of Left Knee Joint with Autologous Tissue Substitute, Open Approach 0SRD0JZ Replacement of Left Knee Joint with Synthetic Substitute, Open Approach 0SRD0KZReplacement of Left Knee Joint with Nonautologous Tissue Substitute, Open Approach 0SRT07Z Replacement of Right Knee Joint, Femoral Surface with Autologous Tissue Substitute, Open Approach 0SRT0JZ Replacement of Right Knee Joint, Femoral Surface with Synthetic Substitute, Open Approach 0SRT0KZ Replacement of Right Knee Joint, Femoral Surface with Nonautologous Tissue Substitute, Open Approach 0SRU07Z Replacement of Left Knee Joint, Femoral Surface with Autologous Tissue Substitute, Open Approach 0SRU0JZ Replacement of Left Knee Joint, Femoral Surface with Synthetic Substitute, Open Approach 0SRU0KZ Replacement of Left Knee Joint, Femoral Surface with Nonautologous Tissue Substitute, Open Approach 0SRV07Z Replacement of Right Knee Joint, Tibial Surface with Autologous Tissue Substitute, Open Approach 0SRV0JZ Replacement of Right Knee Joint, Tibial Surface with Synthetic Substitute, Open Approach 0SRV0KZ Replacement of Right Knee Joint, Tibial Surface with Nonautologous Tissue Substitute, Open Approach 0SRW07Z Replacement of Left Knee Joint, Tibial Surface with Autologous Tissue Substitute, Open Approach 0SRW0JZ Replacement of Left Knee Joint, Tibial Surface with Synthetic Substitute, Open Approach 0SRW0KZ Replacement of Left Knee Joint, Tibial Surface with Nonautologous Tissue Substitute, Open Approach An ICD-9 to ICD-10 crosswalk is attached in field S.2b. (Data Dictionary or Code Table). Elective primary THA/TKA procedures are defined as those procedures without any of the following: 1) Femur, hip, or pelvic fractures coded in principal or secondary discharge diagnosis fields of the index admission 2) Partial hip arthroplasty (PHA) procedures with a concurrent THA/TKA 3) Revision procedures with a concurrent THA/TKA 4) Resurfacing procedures with a concurrent THA/TKA 5) Mechanical complication coded in the principal discharge 6) Malignant neoplasm of the pelvis, sacrum, coccyx, lower limbs, or bone/bone marrow or a disseminated malignant neoplasm coded in the principal discharge diagnosis field 7) Removal of implanted devises/prostheses 8) Transfer status from another acute care facility for the THA/TKA For a full list of ICD-9 and ICD-10 codes defining the following see attached Data Dictionary, sheet “THA TKA Cohort Codes Part 2.”
Exclusions	This measure excludes index admissions for patients:

	1550 Hospital-level risk-standardized complication rate (RSCR) following elective primary total hip arthroplasty (THA) and/or total knee arthroplasty (TKA)
	1. Without at least 90 days post-discharge enrollment in FFS Medicare; 2. Who were discharged against medical advice (AMA); or, 3. Who had more than two THA/TKA procedure codes during the index hospitalization. After applying these exclusion criteria, we randomly select one index admission for patients with multiple index admissions in a calendar year. We therefore exclude the other eligible index admissions in that year.
Exclusion details	This measure excludes index admissions for patients: 1. Without at least 90 days post-discharge enrollment in FFS Medicare Rationale: The 90-day complication outcome cannot be assessed in this group since claims data are used to determine whether a complication of care occurred. 2. Who were discharged against medical advice (AMA); or, Rationale: Providers did not have the opportunity to deliver full care and prepare the patient for discharge. 3. Who had more than two THA/TKA procedure codes during the index hospitalization Rationale: Although clinically possible, it is highly unlikely that patients would receive more than two elective THA/TKA procedures in one hospitalization, which may reflect a coding error.
Risk Adjustment	Statistical risk model Our approach to risk adjustment is tailored to and appropriate for a publicly reported outcome measure, as articulated in the American Heart Association (AHA) Scientific Statement, "Standards for Statistical Models Used for Public Reporting of Health Outc Available in attached Excel or csv file at S.2b
Stratification	N/A
Type Score	Rate/proportion better quality = lower score
Algorithm	The measure estimates hospital-level RSCRs following elective primary THA/TKA using hierarchical logistic regression models. In brief, the approach simultaneously models data at the patient and hospital levels to account for variance in patient outcomes within and between hospitals (Normand and Shahian, 2007). At the patient level, it models the log-odds of a complication occurring within 90 days of the index admission using age, sex, selected clinical covariates, and a hospital-specific intercept. At the hospital level, it models the hospital-specific intercepts as arising from a normal distribution. The hospital intercept represents the underlying risk of a complication at the hospital, after accounting for patient risk. The hospital-specific intercepts are given a distribution to account for the clustering (non-independence) of patients within the same hospital. If there were no differences among hospitals, then after adjusting for patient risk, the hospital intercepts should be identical across all hospitals. The RSCR is calculated as the ratio of the number of "predicted" to the number of "expected" admissions with a complication at a given hospital, multiplied by the national observed complication rate. For each hospital, the numerator of the ratio is the number of complications within 90 days predicted on the basis of the hospital's performance with its observed case mix, and the denominator is the number of complications expected based on the nation's performance with that hospital's case mix. This approach is analogous to a ratio of "observed" to "expected" used in other types of statistical analyses. It conceptually allows for a comparison of a particular hospital's performance given its case mix to an average hospital's performance with the same case mix. Thus, a lower ratio indicates lower-than-expected complication rates or better quality, and a higher ratio indicates higher-than-expected complication rates or worse quality.

	1550 Hospital-level risk-standardized complication rate (RSCR) following elective primary total hip arthroplasty (THA) and/or total knee arthroplasty (TKA)
	The "predicted" number of admissions with a complication (the numerator) is calculated by using the coefficients estimated by regressing the risk factors and the hospital-specific intercept on the risk of having an admission with a complication. The estimated hospital-specific intercept is added to the sum of the estimated regression coefficients multiplied by the patient characteristics. The results are log transformed and summed over all patients attributed to a hospital to get a predicted value. The "expected" number of admissions with a complication (the denominator) is obtained in the same manner, but a common intercept using all hospitals in our sample is added in place of the hospital-specific effect. The results are log transformed and summed over all patients in the hospital to get an expected value. To assess hospital performance for each reporting period, we re-estimate the model coefficients using the years of data in that period. This calculation transforms the ratio of predicted over expected into a rate that is compared to the national observed complication rate. The hierarchical logistic regression models are described fully in the original methodology report (Grosso et al., 2012). References: Grosso L, Curtis J, Geary L, et al. Hospital-level Risk-Standardized Complication Rate Following Elective Primary Total Hip Arthroplasty (THA) And/Or Total Knee Arthroplasty (TKA) Measure Methodology Report. 2012. Normand S-LT, Shahian DM. 2007. Statistical and Clinical Aspects of Hospital Outcomes Profiling. Stat Sci 22(2): 206-226. Available in attached appendix at A.1
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	1551 Hospital-level 30-day risk-standardized readmission rate (RSRR) following elective primary total hip arthroplasty (THA) and/or total knee arthroplasty (TKA)
Steward	Centers for Medicare & Medicaid Services
Description	The measure estimates a hospital-level risk-standardized readmission rate (RSRR) following elective primary THA and/or TKA in Medicare Fee-For-Service beneficiaries who are 65 years and older. The outcome (readmission) is defined as unplanned readmission for any cause within 30 days of the discharge date for the index admission (the admission included in the measure cohort). A specified set of planned readmissions do not count in the readmission outcome. The target population is patients 18 and over. CMS annually reports the measure for patients who are 65 years or older, are enrolled in fee-for-service (FFS) Medicare, and hospitalized in non-federal acute-care hospitals.
Type	Outcome
Data Source	Administrative claims, Other Data sources: The currently publically reported measure is specified and has been testing using: 1. Medicare Part A inpatient and Part B outpatient claims: This data source contains claims data for FFS inpatient and outpatient services including: Medic No data collection instrument provided Attachment NQF_1551_HipKnee_Readmission_S2b_Data_Dictionary_v1.0.xlsx
Level	Facility
Setting	Hospital/Acute Care Facility
Numerator	The outcome for this measure is 30-day readmission. We define readmission as an inpatient admission for any cause, with the exception of certain planned readmissions, within 30 days from the date of discharge of the index hospitalization. If a patient has

	1551 Hospital-level 30-day risk-standardized readmission rate (RSRR) following elective primary total hip arthroplasty (THA) and/or total knee arthroplasty (TKA)
Statement	
Numerator Details	The measure counts readmissions to any acute care hospital for any cause within 30 days of the date of discharge of the index THA and/or TKA hospitalization, excluding planned readmissions as defined below. Planned Readmission Algorithm (Version 4.0) The Planned Readmission Algorithm is a set of criteria for classifying readmissions as planned among the general Medicare population using Medicare administrative claims data. The algorithm identifies admissions that are typically planned and may occur within 30 days of discharge from the hospital. The Planned Readmission Algorithm has three fundamental principles: 1. A few specific, limited types of care are always considered planned (transplant surgery, maintenance chemotherapy/immunotherapy, rehabilitation); 2. Otherwise, a planned readmission is defined as a non-acute readmission for a scheduled procedure; and 3. Admissions for acute illness or for complications of care are never planned. The algorithm was developed in 2011 as part of the Hospital-Wide Readmission measure. In 2013, CMS applied the algorithm to its other readmission measures. In applying the algorithm to condition- and procedure-specific measures, teams of clinical experts reviewed the algorithm in the context of each measure-specific patient cohort and, where clinically indicated, adapted the content of the algorithm to better reflect the likely clinical experience of each measure's patient cohort. For the THA/TKA readmission measure, CMS used the Planned Readmission Algorithm without making any changes. The Planned Readmission Algorithm and associated code tables are attached in data field S.2b (Data Dictionary or Code Table). For more details on the Planned Readmission Algorithm, please see the report titled "2016 Procedure-Specific Measures Updates and Specifications Report Hospital-Level 30-Day Risk-Standardized Readmission Measures, Version 5.0" posted in data field A.1 or at https://www.qualitynet.org/dcs/BlobServer?blobkey=id&blobnocache=true&blobwhere=1228890567754&blobheader=multipart%2Foctet-stream&blobheadername1=Content-Disposition&blobheadervalue1=attachment%3Bfilename%3DProcSpecific_Rdmsn_Rpt_2016.pdf&blobcol=urldata&blobtable=MungoBlobs.
Denominator Statement	The target population for the publicly reported measure includes admissions for Medicare FFS beneficiaries who are at least 65 years of age undergoing elective primary THA and/or TKA procedures. Additional details are provided in S.9 Denominator Details.
Denominator Details	To be included in the measure cohort used in public reporting, patients must meet the following additional inclusion criteria: 1. Enrolled in Medicare fee-for-service (FFS) Part A and Part B Medicare for the 12 months prior to the date of admission; and enrolled in Part A during the index admission; 2. Aged 65 or over; 3. Discharged alive from a non-federal acute care hospital; and, 4. Have a qualifying elective primary THA/TKA procedure; elective primary THA/TKA procedures defined as those procedures without any of the following: • Femur, hip, or pelvic fractures coded in principal or secondary discharge diagnosis fields of the index admission;

	1551 Hospital-level 30-day risk-standardized readmission rate (RSRR) following elective primary total hip arthroplasty (THA) and/or total knee arthroplasty (TKA)
	• Partial hip arthroplasty (PHA) procedures with a concurrent THA/TKA; • Revision procedures with a concurrent THA/TKA; • Resurfacing procedures with a concurrent THA/TKA; • Mechanical complication coded in the principal discharge diagnosis field; • Malignant neoplasm of the pelvis, sacrum, coccyx, lower limbs, or bone/bone marrow or a disseminated malignant neoplasm coded in the principal discharge diagnosis field; • Removal of implanted devices/prostheses; or • Transfer from another acute care facility for the THA/TKA This measure can also be used for an all-payer population aged 18 years and older. We have explicitly tested the measure in both patients aged 18 years and older and those aged 65 years or older (see Testing Attachment for details, 2b4.11). International Classification of Diseases, 9th Revision, Clinical Modification (ICD-9-CM) codes used to define the cohort for each measure are: ICD-9 codes used to define a THA or TKA: 81.51 Total Hip Arthroplasty 81.54 Total Knee Arthroplasty ICD-10 codes that define a THA or TKA: 0SR90J9 Replacement of Right Hip Joint with Synthetic Substitute, Cemented, Open Approach 0SR90JA Replacement of Right Hip Joint with Synthetic Substitute, Uncemented, Open Approach 0SR90JZ Replacement of Right Hip Joint with Synthetic Substitute, Open Approach 0SRB0J9 Replacement of Left Hip Joint with Synthetic Substitute, Cemented, Open Approach 0SRB0JA Replacement of Left Hip Joint with Synthetic Substitute, Uncemented, Open Approach 0SRB0JZ Replacement of Left Hip Joint with Synthetic Substitute, Open Approach 0SRC07Z Replacement of Right Knee Joint with Autologous Tissue Substitute, Open Approach 0SRC0JZ Replacement of Right Knee Joint with Synthetic Substitute, Open Approach 0SRC0KZ Replacement of Right Knee Joint with Nonautologous Tissue Substitute, Open Approach 0SRD07Z Replacement of Left Knee Joint with Autologous Tissue Substitute, Open Approach 0SRD0JZ Replacement of Left Knee Joint with Synthetic Substitute, Open Approach 0SRD0KZ Replacement of Left Knee Joint with Nonautologous Tissue Substitute, Open Approach 0SRT07Z Replacement of Right Knee Joint, Femoral Surface with Autologous Tissue Substitute, Open Approach 0SRT0JZ Replacement of Right Knee Joint, Femoral Surface with Synthetic Substitute, Open Approach 0SRT0KZ Replacement of Right Knee Joint, Femoral Surface with Nonautologous Tissue Substitute, Open Approach 0SRU07Z Replacement of Left Knee Joint, Femoral Surface with Autologous Tissue Substitute, Open Approach 0SRU0JZ Replacement of Left Knee Joint, Femoral Surface with Synthetic Substitute, Open Approach 0SRU0KZ Replacement of Left Knee Joint, Femoral Surface with Nonautologous Tissue Substitute, Open Approach 0SRV07Z Replacement of Right Knee Joint, Tibial Surface with Autologous Tissue Substitute, Open Approach 0SRV0JZ Replacement of Right Knee Joint, Tibial Surface with Synthetic Substitute, Open Approach

	1551 Hospital-level 30-day risk-standardized readmission rate (RSRR) following elective primary total hip arthroplasty (THA) and/or total knee arthroplasty (TKA)
	0SRV0KZ Replacement of Right Knee Joint, Tibial Surface with Nonautologous Tissue Substitute, Open Approach 0SRW07Z Replacement of Left Knee Joint, Tibial Surface with Autologous Tissue Substitute, Open Approach 0SRW0JZ Replacement of Left Knee Joint, Tibial Surface with Synthetic Substitute, Open Approach 0SRW0KZ Replacement of Left Knee Joint, Tibial Surface with Nonautologous Tissue Substitute, Open Approach An ICD-9 to ICD-10 crosswalk is attached in field S.2b. (Data Dictionary or Code Table). Elective primary THA/TKA procedures are defined as those procedures without any of the following (For a full list of ICD-9 and ICD-10 codes defining the following see attached Data Dictionary, sheet "THA TKA Cohort Codes Part 2"): 1) Femur, hip, or pelvic fractures coded in principal or secondary discharge diagnosis fields of the index admission; 2) Partial hip arthroplasty (PHA) procedures with a concurrent THA/TKA; 3) Revision procedures with a concurrent THA/TKA; 4) Resurfacing procedures with a concurrent THA/TKA; 5) Mechanical complication coded in the principal discharge diagnosis field; 6) Malignant neoplasm of the pelvis, sacrum, coccyx, lower limbs, or bone/bone marrow or a disseminated malignant neoplasm coded in the principal discharge diagnosis field; 7) Removal of implanted devises/prostheses; and 8) Transfer status from another acute care facility for the THA/TKA.
Exclusions	This measure excludes admissions for patients: 1) Without at least 30 days post-discharge enrollment in FFS Medicare; 2) Who were discharged against medical advice (AMA); 3) Admitted for the index procedure and subsequently transferred to another acute care facility; 4) Who had more than two THA/TKA procedure codes during the index hospitalization; or 5) Who had THA/TKA admissions within 30 days of a prior THA/TKA index admission.
Exclusion details	This measure excludes index admissions for patients: 1. Without at least 30 days of post-discharge enrollment in FFS Medicare as determined by examining the Medicare Enrollment Database (EDB). Rationale: The 30-day readmission outcome cannot be assessed in this group since claims data are used to determine whether a patient was readmitted. 2. Who were discharged against medical advice (AMA), which is identified by examining the discharge destination indicator in claims data. Rationale: Providers did not have the opportunity to deliver full care and prepare the patient for discharge. 3. Admitted for the index procedure and subsequently transferred to antoher acute care facility, which are defined as when a patient with an inpatient hospital admission (with at least one qualifying THA/TKA procedure) is discharged from an acute care hospital and admitted to another acute care hospital on the same or next day. Rationale: Patients admitted for the index procedure and subsequently transferred to another acute care facility are excluded, as determining which hospital the readmission outcome should be attributed to is difficult. 4. Who had more than two THA/TKA procedure codes during the index hospitalization, which is identified by examining procedure codes in the claims data.

	1551 Hospital-level 30-day risk-standardized readmission rate (RSRR) following elective primary total hip arthroplasty (THA) and/or total knee arthroplasty (TKA)
	Rationale: Although clinically possible, it is highly unlikely that patients would receive more than two elective THA/TKA procedures in one hospitalization, which may reflect a coding error. 5. Who had THA/TKA admissions within 30 days prior to THA/TKA index admission. Rationale: Additional THA/TKA admissions within 30 days are excluded as index admissions because they are part of the outcome. A single admission does not count as both an index admission and a readmission for another index admission.
Risk Adjustment	Statistical risk model Our approach to risk adjustment is tailored to and appropriate for a publicly reported outcome measure, as articulated in the American Heart Association (AHA) Scientific Statement, "Standards for Statistical Models Used for Public Reporting of Health Outc Available in attached Excel or csv file at S.2b
Stratification	N/A
Type Score	Rate/proportion better quality = lower score
Algorithm	The measure estimates hospital-level 30-day all-cause RSRRs following elective primary THA/TKA using hierarchical logistic regression models. In brief, the approach simultaneously models data at the patient and hospital levels to account for variance in patient outcomes within and between hospitals (Normand and Shahian, 2007). At the patient level, it models the log-odds of readmission within 30 days of discharge using age, sex, selected clinical covariates, and a hospital-specific intercept. At the hospital level, it models the hospital-specific intercepts as arising from a normal distribution. The hospital intercept represents the underlying risk of a readmission at the hospital, after accounting for patient risk. The hospital-specific intercepts are given a distribution to account for the clustering (non-independence) of patients within the same hospital. If there were no differences among hospitals after adjusting for patient risk, the hospital intercepts should be identical across all hospitals. The RSRR is calculated as the ratio of the number of "predicted" to the number of "expected" readmission at a given hospital, multiplied by the national observed readmission rate. For each hospital, the numerator of the ratio is the number of readmissions within 30 days predicted on the basis of the hospital's performance with its observed case mix, and the denominator is the number of readmissions expected based on the nation's performance with that hospital's case mix. This approach is analogous to a ratio of "observed" to "expected" used in other types of statistical analyses. It conceptually allows for a comparison of a particular hospital's performance given its case mix to an average hospital's performance with the same case mix. Thus, a lower ratio indicates lower-than-expected readmission rates or better quality, and a higher ratio indicates higher-than-expected readmission rates or worse quality. The "predicted" number of readmissions (the numerator) is calculated by using the coefficients estimated by regressing the risk factors and the hospital-specific intercept on the risk of readmission. The estimated hospital-specific intercept is added to the sum of the estimated regression coefficients multiplied by the patient characteristics. The results are transformed and summed over all patients attributed to a hospital to get a predicted value. The "expected" number of readmissions (the denominator) is obtained in the same manner, but a common intercept using all hospitals in our sample is added in place of the hospital-specific intercept. The results are transformed and summed over all patients in the hospital to get an expected value. To assess hospital performance for each reporting period, we re-estimate the model coefficients using the years of data in that period.

	1551 Hospital-level 30-day risk-standardized readmission rate (RSRR) following elective primary total hip arthroplasty (THA) and/or total knee arthroplasty (TKA)
	This calculation transforms the ratio of predicted over expected into a rate that is compared to the national observed readmission rate. The hierarchical logistic regression models are described fully in the original methodology report (Grosso et al., 2012). References: Grosso L, Curtis J, Geary L, et al. Hospital-level 30-Day All-Cause Risk-Standardized Readmission Rate Following Elective Primary Total Hip Arthroplasty (THA) And/Or Total Knee Arthroplasty (TKA) Measure Methodology Report. 2012. Normand S-LT, Shahian DM. 2007. Statistical and Clinical Aspects of Hospital Outcomes Profiling. Stat Sci 22(2): 206-226. Available in attached appendix at A.1
Copyright / Disclaimer	N/A

	2998 : Infection rate of bicondylar tibia plateau fractures
Steward	Orthopedic Trauma Association
Description	Percent of patients aged 18 years and older undergoing ORIF of a bicondylar tibial plateau fracture who develop a postoperative deep incisional wound infection based on CDC guidelines for deep infection associated with implants
Type	Outcome
Data Source	Other, Electronic Clinical Data : Registry An OTA certified QCDR will be used by OTA members to gather and record data elements and outcomes. The OTA will publish data elements and outcome measure on public web site so non-OTA members are able to keep their own database using this Performance Mea No data collection instrument provided
Level	Facility, Clinician : Group/Practice, Clinician : Individual
Setting	Hospital/Acute Care Facility
Numerator Statement	Number of patients aged 18 years and older undergoing ORIF of a bicondylar tibial plateu fracture who develop a postoperative deep incisional infection associated with an implant within 1 year of fracture fixation. We do not have adequate data to provid
Numerator Details	Deep incisional SSI Must meet the following criteria: Infection occurs within 1 year after the index operative procedure (where day 1 = the procedure date) AND involves deep soft tissues of the incision (e.g., fascial and muscle layers) AND patient has at least one of the following: a. purulent drainage from the deep incision. b. a deep incision that spontaneously dehisces, or is deliberately opened or aspirated by a surgeon, attending physician** or other designee and an organism is identified by a culture or non-culture based microbiologic testing method which is performed for purposes of clinical diagnosis or treatment (e.g., not Active January 2016 9-9 Procedure-associated Module SSI Surveillance Culture/Testing (ASC/AST) or culture or non-culture based microbiologic testing method is not performed AND

	2998 : Infection rate of bicondylar tibia plateau fractures
	patient has at least one of the following signs or symptoms: fever (>38°C); localized pain or tenderness. A culture or non-culture based test that has a negative finding does not meet this criterion. Through patient records, patients with closed bicondylar tibial plateau fractures will be identified. Patients for this study will be selected by narrowing down the pool of patients with those who have the complication of deep infection. Patient with infection will be identified by an operative report for irrigation and debridement of the operative wound and confirmed culture-positive intraoperative findings. Patients can be identified with either and ICD-10 code (S82.141, S82.142) or by CPT billing codes. (27536) and have an admission for a post op wound infection (CPT 10180)
Denominator Statement	All patients undergoing ORIF of a closed bicondylar tibial plateau fracture aged 18 years or older. Patients can be identified with either and ICD-10 code (S82.141, S82.142) or by CPT billing codes. (27536). Risk calculation can be added once adequate v
Denominator Details	Number of bicondylar tibial plateau procedures utilizing ICD-10 codes S82.141 (right tibia) and S82.142 (left tibia) and have a procedure for fixation of this injury with CPT code 27536 utilized
Exclusions	N/A
Exclusion details	N/A
Risk Adjustment	No risk adjustment or risk stratification N/A
Stratification	We are not able to perform risk stratification at this time. We will gather the data below as well as previously reported risk factors for infection in the orthopedic literature for this injury.Previously reported factors in relatively small case series
Type Score	Rate/proportion better quality = lower score
Algorithm	Please refer to numerator and denominator sections for detailed information. No diagram provided
Copyright / Disclaimer	N/A

	3016 PBM-01: Preoperative Anemia Screening
Steward	The Joint Commission
Description	This measure assesses the proportion of selected elective surgical patients age 18 and over with documentation of pre-operative anemia screening in the window between 45 and 14 days before the surgery start date
Type	Process
Data Source	Electronic Clinical Data, Electronic Clinical Data : Electronic Health Record, Electronic Clinical Data : Laboratory Hospitals report EHR data using Certified Electronic Health Record Technology (CEHRT), and by submitting Quality Reporting Document Architecture Category 1 (QRDA-1). No data collection instrument provided Attachment PreopAnemiaScreen_v4_3_Thu_May_26_11.06.21_CDT_2016.xls
Level	Facility
Setting	Hospital/Acute Care Facility

	3016 PBM-01: Preoperative Anemia Screening
Numerator Statement	Patients with preoperative anemia screening done in the window between 45 and 14 days prior to the surgery start date.
Numerator Details	Hemoglobin and hematocrit level drawn is represented as a code from the following value set and associated QDM datatype: * “Laboratory Test, Performed: Hemoglobin Blood Serum Plasma” using “Hemoglobin Blood Serum Plasma LOINC Value Set (2.16.840.1.113762.1.4.1104.4) Date of the elective surgical procedure is represented by a code from the following value set and associated QDM datatype: * “Procedure, Performed: Selected Elective Surgical Procedures” using “Selected Elective Surgical Procedures Grouping Value Set (2.16.840.1.113762.1.4.1029.19)”
Denominator Statement	Patients age 18 and older with a length of stay less than or equal to 120 days who undergo selected elective surgical procedures
Denominator Details	* "Encounter, Performed: Encounter Inpatient" using "Encounter Inpatient SNOMEDCT Value Set (2.16.840.1.113883.3.666.5.307)" Selected elective surgical procedures are represented by a code from the following value set and associated QDM datatype: * “Procedure, Performed: Selected Elective Surgical Procedures” using “Selected Elective Surgical Procedures Grouping Value Set (2.16.840.1.113762.1.4.1029.19)”
Exclusions	• Patients whose surgical procedure is performed to address a traumatic injury • * Patients with a solid organ transplant recorded <=48 hours prior to the encounter or during the encounter
Exclusion details	Traumatic injury is represented by a code from the following value set and associated QDM datatype: * Attribute: "Diagnosis: Traumatic Injury" using "Traumatic Injury Grouping Value Set (2.16.840.1.113762.1.4.1029.10)" Solid organ transplant is represented by a code from the following value set and associated QDM datatype: * “Procedure, Performed: Solid Organ Transplant” using “Solid Organ Transplant Grouping Value Set (2.16.840.1.113762.1.4.1029.11)”
Risk Adjustment	No risk adjustment or risk stratification n/a
Stratification	This measure is not stratified.
Type Score	Rate/proportion better quality = higher score
Algorithm	See attached HQMF file. Available at measure-specific web page URL identified in S.1
Copyright / Disclaimer	Measure specifications are in the Public Domain LOINC(R) is a registered trademark of the Regenstrief Institute. This material contains SNOMED Clinical Terms (R) (SNOMED CT(c)) copyright 2004-2014 International Health Terminology Standards Development Organization. All rights reserved. These performance measures are not clinical guidelines and do not establish a standard of medical care, and have not been tested for all potential applications. The measures and specifications are provided without warranty.

	3017 PBM-02: Preoperative Hemoglobin Level
Steward	The Joint Commission
Description	This measure is designed to allow transfusion/blood use review committees to identify patients undergoing elective surgery with suboptimal, uncorrected hemoglobin levels that may have led to perioperative transfusion. This measure assesses, via stratification, pre-operative hemoglobin levels of selected elective surgical patients age 18 and over who received a perioperative red blood cell transfusion.
Type	Process
Data Source	Electronic Clinical Data, Electronic Clinical Data : Electronic Health Record, Electronic Clinical Data : Laboratory Hospitals report EHR data using Certified Electronic Health Record Technology (CEHRT), and by submitting Quality Reporting Document Architecture Category 1 (QRDA-1). No data collection instrument provided Attachment PreopHemoglobinLevel_v4_3_Wed_Jun_08_15.16.14_CDT_2016.xls
Level	Facility
Setting	Hospital/Acute Care Facility
Numerator Statement	Patients whose hemoglobin level measured on the most recent pre-operative hemoglobin level was: 12.0 grams or above >=11.0 and <12.0 grams (mild anemia) >=8.0 and <11.0 grams (moderate anemia) Below 8.0 grams (severe anemia)
Numerator Details	Pre-operative hemoglobin level is represented as a code from the following value set and associated QDM datatype: "Laboratory Test, Performed: Hemoglobin blood serum plasma" using "Hemoglobin blood serum plasma Grouping Value Set (2.16.840.1.113762.1.4.1104.4)"
Denominator Statement	Selected elective surgical patients age 18 and over, who received a transfusion of whole blood or packed cells in the time window from anytime during the surgical procedure to 5 days after the surgical procedure or to discharge, whichever is sooner.
Denominator Details	Inpatient encounters are represented by the valueset and associated QDM datatype: "Encounter, Performed: Encounter Inpatient" using "Encounter Inpatient SNOMEDCT Value Set (2.16.840.1.113883.3.666.5.307)" Selected elective surgical procedures are represented by a code from the following value set and associated QDM datatype: "Procedure, Performed: Selected Elective Surgical Procedures" using "Selected Elective Surgical Procedures Grouping Value Set (2.16.840.1.113762.1.4.1029.19)" Transfusion of whole blood or packed cells is represented by a code from the following Value Set and associated QDM datatype: "Procedure, Performed: Blood Transfusion Administration" using "Blood Transfusion Administration SNOMEDCT Value Set (2.16.840.1.113762.1.4.1029.24)"
Exclusions	• Patients under age 18 • Patients whose surgical procedure is performed to address a traumatic injury • Patients who have a solid organ transplant • Patients who are pregnant during the hospitalization, including those who delivered and those who did not deliver during this hospitalization • Patients who undergo extra-corporeal membrane oxygenation procedures (ECMO) prior to the elective surgical procedure.

	3017 PBM-02: Preoperative Hemoglobin Level
	• Patients with sickle cell disease or hereditary hemoglobinopathy
Exclusion details	Traumatic injury is represented by a code from the following value set and associated QDM datatype: Attribute: "Diagnosis: Traumatic Injury" using "Traumatic Injury Grouping Value Set (2.16.840.1.113762.1.4.1029.10)" Solid organ transplant is represented by a code from the following value set and associated QDM datatype; "Procedure, Performed: Solid Organ Transplant" using "Solid Organ Transplant Grouping Value Set (2.16.840.1.113762.1.4.1029.11)" Pregnancy, delivered and not delivered, is represented by a code from the following value set and associated QDM datatype: “Procedure, Performed: Maternal and Fetal Procedures” using “Maternal and Fetal Procedures Grouping Value Set (2.16.840.1.113762.1.4.1029.51) Or Attribute: “Diagnosis: Pregnancy, Childbirth, and the Puerperium Grouping Value Set (2.16.840.1.113762.1.4.1029.50) ECMO is represented by a code from the following value set and associated QDM datatype: "Procedure, Performed: ECMO" using "ECMO Grouping Value Set (2.16.840.1.113762.1.4.1029.22)" Sickle cell disease and hereditary hemoglobinopathy is represented by a code from the following value set and associated QDM datatype: Attribute: "Diagnosis: Sickle Cell Disease and Related Blood Disorders" using "Sickle Cell Disease and Related Blood Disorders Grouping Value Set (2.16.840.1.113762.1.4.1029.35)"
Risk Adjustment	No risk adjustment or risk stratification n/a
Stratification	Stratification 1 = AND: Most Recent: "Occurrence A of Laboratory Test, Performed: Hemoglobin blood serum plasma" <= 45 day(s) starts before start of "Occurrence A of Procedure, Performed: Selected Elective Surgical Procedures" AND: "Occurrence A of Labo
Type Score	Count better quality = score within a defined interval
Algorithm	See attached HQMF file. Available at measure-specific web page URL identified in S.1
Copyright / Disclaimer	Ad.6. Copyright Statement This measure resides in the public domain and is not copyrighted LOINC(R) is a registered trademark of the Regenstrief Institute. This material contains SNOMED Clinical Terms (R) (SNOMED CT(c)) copyright 2004-2014 International Health Terminology Standards Development Organization. All rights reserved. These performance measures are not clinical guidelines and do not establish a standard of medical care, and have not been tested for all potential applications. The measures and specifications are provided without warranty

	3019 PBM-03: Preoperative Blood Type Testing and Antibody Screening
Steward	The Joint Commission
Description	This measure assesses the proportion of selected elective surgical patients age 18 and over who had timely preoperative assessment of blood type and crossmatch or type and screening.
Type	Process
Data Source	Electronic Clinical Data, Electronic Clinical Data : Electronic Health Record, Electronic Clinical Data : Laboratory Hospitals report EHR data using Certified Electronic Health Record Technology (CEHRT), and by submitting Quality Reporting Document Architecture Category 1 (QRDA-1). No data collection instrument provided Attachment PreoperativeBloodTypeTesting_v4_3_Wed_May_25_08.46.30_CDT_2016.xls
Level	Facility
Setting	Hospital/Acute Care Facility
Numerator Statement	Patients who had a type and crossmatch or type and screen completed within 45 days prior to the surgery start date and time.
Numerator Details	Patients who had a type and crossmatch or type and screen are represented by code in the following value set and associated QDM datatype: • Laboratory Test, Performed: Blood Group Antibody Screen" using "Blood Group Antibody Screen LOINC Value Set (2.16.840.1.113762.1.4.1029.30)" • "Laboratory Test, Performed: Major Crossmatch" using "Major Crossmatch LOINC Value Set (2.16.840.1.113762.1.4.1029.29)"
Denominator Statement	Selected elective surgical patients age 18 and over
Denominator Details	Selected elective surgical patients are represented by a code in the following value set and associated QDM datatype: "Procedure, Performed: Selected Elective Surgical Procedures PBM03" using "Selected Elective Surgical Procedures PBM03 Grouping Value Set (2.16.840.1.113762.1.4.1029.14)" Inpatients age 18 and over are represented by a code from the following Value Set and associated QDM Datatype: "Encounter, Performed: Encounter Inpatient" using "Encounter Inpatient SNOMEDCT Value Set (2.16.840.1.113883.3.666.5.307)"
Exclusions	• Patients under age 18 • Patients whose surgical procedure is performed to address a traumatic injury • Patients who have a solid organ transplant • Patients who refuse transfusion
Exclusion details	Traumatic injury is represented by a code in the following value set and associated QDM datatype: Attribute: "Diagnosis: Traumatic Injury" using "Traumatic Injury Grouping Value Set (2.16.840.1.113762.1.4.1029.10)" Solid organ transplant is represented by a code from the following value set and asscoiated QDM datatype: "Procedure, Performed: Solid Organ Transplant" using "Solid Organ Transplant Grouping Value Set (2.16.840.1.113762.1.4.1029.11)" Refusal of transfusion is represented by a code from the following values set and associated QDM datatype:

	3019 PBM-03: Preoperative Blood Type Testing and Antibody Screening
	"Procedure, Order not done: Patient Refusal" using "Patient Refusal SNOMEDCT Value Set (2.16.840.1.113883.3.117.1.7.1.93)"
Risk Adjustment	No risk adjustment or risk stratification n/a
Stratification	This measure is not stratified.
Type Score	Rate/proportion better quality = higher score
Algorithm	Se attached HQMF file. Available at measure-specific web page URL identified in S.1
Copyright / Disclaimer	Ad.6. Copyright Statement This measure resides in the public domain and is not copyrighted LOINC(R) is a registered trademark of the Regenstrief Institute. This material contains SNOMED Clinical Terms (R) (SNOMED CT(c)) copyright 2004-2014 International Health Terminology Standards Development Organization. All rights reserved. These performance measures are not clinical guidelines and do not establish a standard of medical care, and have not been tested for all potential applications. The measures and specifications are provided without warranty.

	3020 PBM-04: Initial Transfusion Threshold
Steward	The Joint Commission
Description	This measure assesses the proportion of various pre-transfusion hemoglobin levels in patients age 18 and over receiving the first unit of a whole blood or packed cell transfusion. Over time, in a patient blood management program, there should be a higher proportion of patients receiving blood at the lower hemoglobin threshold and a lower proportion receiving blood at the higher hemoglobin thresholds. It also identifies patients who receive transfusions that should be reviewed by hospital transfusion/blood usage committees so that appropriate educational programs can be developed as part of a patient blood management program.
Type	Process
Data Source	Electronic Clinical Data, Electronic Clinical Data : Electronic Health Record, Electronic Clinical Data : Laboratory Hospitals report EHR data using Certified Electronic Health Record Technology (CEHRT), and by submitting Quality Reporting Document Architecture Category 1 (QRDA-1). No data collection instrument provided Attachment InitialTransfusionThreshold_v4_3_Wed_Jun_08_10.20.18_CDT_2016.xls
Level	Facility
Setting	Hospital/Acute Care Facility
Numerator Statement	Patients whose hemoglobin level measured prior to the transfusion and closest to the transfusion was: • less than 7.0 grams • >=7.0 and <8.0 grams • >=8.0 and <9.0 grams • >=9.0 and <10.0 grams • 10.0 grams or greater

	3020 PBM-04: Initial Transfusion Threshold
Numerator Details	Hemoglobin level prior to and closest to the transfusion is represented by a code from the following Value Set and associated QDM datatype: • "Laboratory Test, Performed: Hemoglobin blood serum plasma" using "Hemoglobin blood serum plasma LOINC Value Set (2.16.840.1.113762.1.4.1104.4)
Denominator Statement	Patients age 18 and over receiving the first unit of a whole blood or packed cell transfusion
Denominator Details	Inpatient encounters are represented by a code from the following value set and associated QDM datatype: •"Encounter, Performed: Encounter Inpatient" using "Encounter Inpatient SNOMEDCT Value Set (2.16.840.1.113883.3.666.5.307)" Patients who receive the first unit of a packed cell or whole blood transfusion are represented by a code from the following Value Set and associated QDM datatype: "Procedure, Performed: Blood Transfusion Administration" using "Blood Transfusion SNOMEDCT Value Set (2.16.840.1.113762.1.4.1029.24)
Exclusions	• Patients who have a surgical procedure performed to address a traumatic injury • Patients who have a solid organ transplant • Patients undergoing extracorporeal membrane oxygenation (ECMO) treatment at the time of initial transfusion. • Patients whose first unit of whole blood or packed red blood cells was given while an Emergency Department patient. • Patients with sickle cell disease or hereditary hemoglobinopathy
Exclusion details	Patients who have a surgical procedure performed to address a traumatic injury are represented by a code from the following Value Set and associated QDM datatype: "Attribute: Diagnosis: Traumatic Injury" using "Traumatic Injury Grouping Value Set (2.16.840.1.113762.1.4.1029.10) Patients who have a solid organ transplant are represented by a code from the following Value Set and associated QDM datatype: "Procedure, Performed: Solid Organ Transplant" using "Solid Organ Transplant Grouping Value Set (2.16.840.1.113762.1.4.1029.11)" Patients who undergo ECMO at the time of initial transfusion are represented by a code from the following Value Set and associated QDM datatype: "Procedure, Performed: ECMO" using "ECMO Grouping Value Set (2.16.840.1.113762.1.4.1029.22) Patients whose first unit is given while an Emergency Department patient are implicity excluded as blood administered in an ED location is not captured in this measure. Patients with sickle cell disease or hereditary hemoglobinopathy are represented by a code from the following Value Set and associated QDM datatype: Attribute: "Diagnosis: Sickle Cell Disease and Related Blood Disorders" using "Sickle Cell Disease and Related Blood Disorders Grouping Value Set (2.16.840.1.113762.1.4.1029.35)"
Risk Adjustment	No risk adjustment or risk stratification n/a
Stratification	Stratification 1 = AND: Most Recent: "Occurrence A of Laboratory Test, Performed: Hemoglobin blood serum plasma" <= 45 day(s) starts before start of "Occurrence A of Procedure, Performed: Blood Transfusion Administration" AND: "Occurrence A of Laborator

	3020 PBM-04: Initial Transfusion Threshold
Type Score	Count better quality = score within a defined interval
Algorithm	See attached HQMF file. Available at measure-specific web page URL identified in S.1
Copyright / Disclaimer	This measure resides in the public domain and is not copyrighted LOINC(R) is a registered trademark of the Regenstrief Institute. This material contains SNOMED Clinical Terms (R) (SNOMED CT(c)) copyright 2004-2014 International Health Terminology Standards Development Organization. All rights reserved. These performance measures are not clinical guidelines and do not establish a standard of medical care, and have not been tested for all potential applications. The measures and specifications are provided without warranty.

	3021 PBM-05: Blood Usage, Selected Elective Surgical Patients
Steward	The Joint Commission
Description	This measure assesses the proportion of selected elective surgical patients age 18 and over who had a timely preoperative anemia screening and subsequent perioperative transfusion. Since preoperative anemia is a predictor of perioperative transfusion, this measure can identify records of patients needing further review for uncorrected preoperative anemia or other blood management measures, such as a restrictive transfusion strategy or cell salvage, that should have been taken to avoid transfusion.
Type	Process
Data Source	Electronic Clinical Data, Electronic Clinical Data : Electronic Health Record, Electronic Clinical Data : Laboratory Hospitals report EHR data using Certified Electronic Health Record Technology (CEHRT), and by submitting Quality Reporting Document Architecture Category 1 (QRDA-1). No data collection instrument provided Attachment BloodUsageinSESP_v4_3_Wed_May_25_08.49.06_CDT_2016.xls
Level	Facility
Setting	Hospital/Acute Care Facility
Numerator Statement	Patients who had a non-autologous whole blood or non-autologous packed red blood cell transfusion administered in the time window from anytime during the surgical procedure to 5 days after the surgical procedure or to discharge, whichever is sooner.
Numerator Details	Non-autologous whole blood or non-autologous packed red blood cell transfusion is represented by a code from the following value set and associated QDM datatype: "Procedure, Performed: Blood Transfusion Administration" using "Blood Transfusion Administration SNOMEDCT Value Set (2.16.840.1.113762.1.4.1029.24)"
Denominator Statement	Selected elective surgical patients age 18 and older who had a preoperative anemia screening in the time window between 45 and 14 days before surgery start date.
Denominator Details	Inpatients age 18 and over are represented by a code from the following Value Set and associated QDM Datatype: "Encounter, Performed: Encounter Inpatient" using "Encounter Inpatient SNOMEDCT Value Set (2.16.840.1.113883.3.666.5.307)" Selected elective surgical patients are represented by a code from the following Value Set and associated QDM datatype: "Procedure, Performed: Selected Elective Surgical Procedures" using "Selected Elective Surgical Procedures Grouping Value Set (2.16.840.1.113762.1.4.1029.19)"

	3021 PBM-05: Blood Usage, Selected Elective Surgical Patients
	Preoperative anemia screening is represented by a code from the following Value Set and associated QDM datatype: "Laboratory Test, Performed: Hemoglobin blood serum plasma" using "Hemoglobin blood serum plasma Grouping Value Set (2.16.840.1.113762.1.4.1104.4)"
Exclusions	• Patients under age 18 • Patients whose surgical procedure is performed to address a traumatic injury • Patients who have a solid organ transplant • Patients with sickle cell disease or hereditary hemoglobinopathy • Patients who refuse blood transfusion. • Patients who receive an autologous blood transfusion
Exclusion details	Traumatic injury is represented by a code from the following Value Set and associated QDM datatype: Attribute: "Diagnosis: Traumatic Injury" using "Traumatic Injury Grouping Value Set (2.16.840.1.113762.1.4.1029.10)" Solid organ transplant is represented by a code from the following Value Set and associated QDM datatype: "Procedure, Performed: Solid Organ Transplant" using "Solid Organ Transplant Grouping Value Set (2.16.840.1.113762.1.4.1029.11)" Sickle cell disease or hereditary hemoglobinopathy is represented by a code from the following Value Set and associated QDM datatype: Attribute: "Diagnosis: Sickle Cell Disease and Related Blood Disorders" using "Sickle Cell Disease and Related Blood Disorders Grouping Value Set (2.16.840.1.113762.1.4.1029.35)" Patients who refuse transfusion are represented by a code from the following Value Set and associated QDM datatype: Procedure, Order not done: Patient Refusal" using "Patient Refusal SNOMEDCT Value Set (2.16.840.1.113883.3.117.1.7.1.93)" Patients who receive autologous blood are represented by a code from the following Valu Set and associated QDM datatype: "Substance, Order: Autologous Blood Product" using "Autologous Blood Product SNOMEDCT Value Set (2.16.840.1.113762.1.4.1029.36)"
Risk Adjustment	No risk adjustment or risk stratification n/a
Stratification	This measure is not stratified.
Type Score	Rate/proportion better quality = lower score
Algorithm	See attached HQMF file. Available at measure-specific web page URL identified in S.1
Copyright / Disclaimer	This measure resides in the public domain and is not copyrighted LOINC(R) is a registered trademark of the Regenstrief Institute. This material contains SNOMED Clinical Terms (R) (SNOMED CT(c)) copyright 2004-2014 International Health Terminology Standards Development Organization. All rights reserved. These performance measures are not clinical guidelines and do not establish a standard of medical care, and have not been tested for all potential applications. The measures and specifications are provided without warranty.

	3024 Carotid Endarterectomy: Evaluation of Vital Status and NIH Stroke Scale at Follow Up
Steward	American College of Cardiology
Description	Proportion of patients with carotid endarterectomy procedures who had follow up performed for evaluation of vital status and neurological assessment with an NIH Stroke Scale (by an examiner who is certified by the American Stroke Association
Type	Process
Data Source	Electronic Clinical Data : Registry NCDR Care Registry Available in attached appendix at A.1 No data dictionary
Level	Facility, Population : National
Setting	Hospital/Acute Care Facility
Numerator Statement	Patient Status (alive or Deceased) at follow-up AND neurologic status with an assessment using the NIH Stroke Scale (by an examiner who is certified by the American Stroke Association)
Numerator Details	Field Name: Patient Follow-up Performed Seq No: 9000 Definition: Indicate whether patient follow-up was performed after the procedure. The recommended timeframe for follow-up is 30 days; the measure credits any follow up occurring between days 21-60, inclusive. 1=Yes Field Name: Follow-Up Date Seq No: 9002 Definition: Indicate the date of follow-up. The recommended timeframe for follow-up is 30 days;the measure credits any follow up occurring between days 21-60, inclusive. Field Name: Follow Up NIH Stroke Scale Administered Seq No: 9010 Definition: Indicate if the National Institutes of Health Stroke Scale (NIHSS) was administered during follow-up occurring between days 21-60, inclusive 1=Yes Follow-up NIH Stroke Scale Examiner Certified Seq No: 9014 Definition: Indicate the date the National Institutes of Health Stroke Scale (NIHSS) was administered during the follow-up period. Note - The recommended timeframe for follow-up is 30 days; the measure credits any follow up occurring between days 21-60, inclusive. 1=Yes Field Name: Follow-up NIH Stroke Scale Examiner Certified Seq No: 9014 Definition: Indicate if the examiner who performed follow up is certified to determine the NIH Stroke and is not the operator who performed the current procedure. Examiner certified= yes Supporting definitions: The Stroke Scale assessment should be conducted by someone other than the operator for the current procedure. Note - NIHSS examiners may become certified through the American Stroke Association. NIH Stroke Scale Certification is currently available online free of charge: http://learn.heart.org/ihtml/application/student /interface.heart2/nihss.html Field Name: Patient Status Seq No: 9100 Definition: Indicate if the patient is alive or deceased. Alive (1) or deceased (2)

	3024 Carotid Endarterectomy: Evaluation of Vital Status and NIH Stroke Scale at Follow Up
Denominator Statement	CARE Registry patients that underwent carotid endarterectomy
Denominator Details	Count of CARE Registry patients that had a carotid endarterectomy
Exclusions	Patients with a discharge status of deceased. Patients with was an acute, evolving stroke and dissection during the episode of care.
Exclusion details	Field Name: Discharge Status Seq No: 8010 Definition: Indicate whether the patient was alive or deceased at discharge from the hospitalization during which the procedure occurred. Alive=2 Field Name: Spontaneous Carotid Artery Dissection Seq No: 5060 Definition: Indicate if the patient has had a spontaneous carotid artery dissection prior to the current procedure. 1=Yes Field Name: Acute Evolving Stroke Seq No: 4340 Definition: Indicate if the patient has experienced an acute evolving stroke with ischemia which is ongoing and progressing at the time of the procedure. Acute evolving stroke includes all of the following: 1. Any sudden development of neurological deficits attributable to cerebral ischemia and/or infarction. 2. Onset of symptoms occurring within prior three days and ongoing at time of procedure. 3. The event is marked by progressively worsening symptoms. Note: Possible symptoms include, but are not limited to the following: numbness or weakness of the face or body; difficulty speaking or understanding; blurred or decreased vision; dizziness; or loss of balance and coordination. 1=Yes
Risk Adjustment	No risk adjustment or risk stratification No risk adjustment.
Stratification	The measure is not stratified.
Type Score	Count better quality = higher score
Algorithm	Not a risk model measure. No diagram provided
Copyright / Disclaimer	American College of Cardiology Foundation All Rights Reserved ACC realizes the various NCDR endorsed measures are not readily available on their own main webpage. However, ACCF plans to update their main webpage (acc.org) to include the macrospecifications of the NQF endorsed measures. ACC hopes to work collaboratively with NQF to create a consistent and standard format would be helpful for various end users. In the interim, the supplemental materials include the details needed to understand this model. In addition, interested parties are always able to contact comment@acc.org to reach individuals at the ACC Quality Measurement Team.

	3030 STS Individual Surgeon Composite Measure for Adult Cardiac Surgery
Steward	The Society of Thoracic Surgeons
Description	The STS Individual Surgeon Composite Measure for Adult Cardiac Surgery includes five major procedures (isolated CABG, isolated AVR, AVR+CABG, MVRR, MVRR+CABG) and comprises the following two domains: Domain 1 – Risk-Adjusted Operative Mortality Operative mortality is defined as death before hospital discharge or within 30 days of the operation. Domain 2 – Risk-Adjusted Major Morbidity Major morbidity is defined as the occurrence of any one or more of the following major complications: 1. Prolonged ventilation, 2. Deep sternal wound infection, 3. Permanent stroke, 4. Renal failure, and 5. Reoperations for bleeding, coronary graft occlusion, prosthetic or native valve dysfunction, and other cardiac reasons, but not for other non-cardiac reasons. All measures are based on audited clinical data collected in the STS Adult Cardiac Surgery Database. Individual surgeons with at least 100 eligible cases during the 3-year measurement window will receive a score for each domain and an overall composite score. In addition to calculating composite score point estimates with credible intervals, surgeons will be assigned rating categories designated by the following: 1 star – lower-than-expected performance 2 stars – as-expected performance 3 stars – higher-than-expected performance
Type	Composite
Data Source	Electronic Clinical Data : Registry STS Adult Cardiac Surgery Database – Version 2.73; STS Adult Cardiac Surgery Database Version 2.81 went live on July 1, 2014, but there were not sufficient data available in version 2.81 to develop this composite measure. Available at measure-specific web page URL identified in S.1 No data dictionary
Level	Clinician : Individual
Setting	Hospital/Acute Care Facility
Numerator Statement	Due to the complex methodology used to construct the composite measure, it is impractical to separately discuss the numerator and denominator. The following discussion describes in detail this multiprocedural, multidimensional composite measure. The STS Individual Surgeon Composite Measure for Adult Cardiac Surgery includes five major procedures, i.e., isolated coronary artery bypass grafting (CABG), isolated aortic valve replacement (AVR), AVR+CABG, isolated mitral valve repair or replacement (MVRR), and MVRR+CABG, and comprises the following two domains: Domain 1 – Risk-Adjusted Operative Mortality Operative mortality is defined as death before hospital discharge or within 30 days of the operation. Domain 2 – Risk-Adjusted Major Morbidity Major morbidity is defined as the occurrence of any one or more of the following major complications: 1. Prolonged ventilation 2. Deep sternal wound infection

	3030 STS Individual Surgeon Composite Measure for Adult Cardiac Surgery
	3. Permanent stroke 4. Renal failure and 5. Reoperations for bleeding, coronary graft occlusion, prosthetic or native valve dysfunction, and other cardiac reasons, but not for other non-cardiac reasons Individual surgeons with at least 100 eligible cases during the 3-year measurement window will receive a score for each domain and an overall composite score. In addition to calculating composite score point estimates with credible intervals, surgeons will be assigned rating categories designated by the following: 1 star – lower-than-expected performance 2 stars – as-expected performance 3 stars – higher-than-expected performance Patient Population: The analysis population consists of patients aged 18 years or older who undergo isolated CABG, isolated AVR, AVR+CABG, isolated MVRR, and MVRR+CABG. Time Window: 3 years By including composite performance scores for a portfolio of five procedures that account for nearly 80% of a typical STS Adult Cardiac Surgery Database participant surgeon's clinical activity, this metric provides a more balanced and comprehensive perspective than focusing on just one procedure or one end point. Recognizing that surgeons' practices vary, each surgeon's composite performance is implicitly "weighted" by the proportion of each type of procedure he or she performs. For instance, the results of surgeons who primarily perform mitral procedures are affected most by their mitral surgery results. This approach is especially relevant for surgeons with highly specialized practices who may do relatively few isolated CABG procedures and whose performance would thus be difficult to assess using a CABG measure only. Finally, performance on each of these procedures is estimated using risk models specific to those procedures, in most cases the exact or slightly modified versions of previously published models (references provided below). Final Composite Score: The overall composite score was calculated as a weighted sum of (1 minus risk-adjusted mortality rate) and (1 minus risk-adjusted major morbidity rate). Mortality and morbidity rates were weighted inversely by their respective standard deviations across surgeons. This procedure is equivalent to first rescaling mortality and morbidity rates by their respective standard deviations across surgeons and then assigning equal weighting to the rescaled mortality rate and rescaled morbidity rate. Standard deviations derived from the data were used to define the final composite measure as 0.81 x (1 minus risk-standardized mortality rate) + 0.19 x (1 minus risk-standardized complication rate). Details regarding the current STS adult cardiac surgery risk models can be found in the following manuscripts: • Shahian DM, O'Brien SM, Filardo G, Ferraris VA, et al. The Society of Thoracic Surgeons 2008 cardiac surgery risk models: part 1--coronary artery bypass grafting surgery. Ann Thorac Surg. 2009 Jul;88(1 Suppl):S2-22. • O'Brien SM, Shahian DM, Filardo G, et al. The Society of Thoracic Surgeons 2008 cardiac surgery risk models: part 2—isolated valve surgery. Ann Thorac Surg 2009;88(1 Suppl):S23–42. • Shahian DM, O'Brien SM, Filardo G, Ferraris VA, et al. The Society of Thoracic Surgeons 2008 cardiac surgery risk models: part 3--valve plus coronary artery bypass grafting surgery. Ann Thorac Surg 2009 Jul;88(1 Suppl):S43-62. Additional details regarding the Individual Surgeon Composite Measure for Adult Cardiac Surgery are provided in the attached manuscript:

	3030 STS Individual Surgeon Composite Measure for Adult Cardiac Surgery
	Shahian DM, He X, Jacobs JP, Kurlansky PA, Badhwar V, Cleveland JC Jr, Fazzalari FL, Filardo G, Normand SL, Furnary AP, Magee MJ, Rankin JS, Welke KF, Han J, O'Brien SM. The Society of Thoracic Surgeons Composite Measure of Individual Surgeon Performance for Adult Cardiac Surgery: A Report of The Society of Thoracic Surgeons Quality Measurement Task Force. Ann Thorac Surg. 2015;100:1315-25.
Numerator Details	See response in S.4. Numerator Statement
Denominator Statement	See response in S.4. Numerator Statement Patient Population: The analysis population consists of patients aged 18 years or older who undergo isolated CABG, isolated AVR, AVR+CABG, isolated MVRR, and MVRR+CABG.
Denominator Details	See response in S.7. Denominator Statement
Exclusions	Measure exclusions: Individual surgeons who do not meet the minimum case requirement (i.e., at least 100 eligible cases during the 3-year measurement window) will not receive a score for each domain and an overall composite score.
Exclusion details	See response in S.10. Denominator Exclusions
Risk Adjustment	Statistical risk model See Appendix Provided in response box S.15a
Stratification	N/A
Type Score	Rate/proportion better quality = higher score
Algorithm	Please see discussion under section S.4 and attached manuscripts. No diagram provided
Copyright / Disclaimer	N/A

	3031 STS Mitral Valve Repair/Replacement (MVRR) Composite Score
Steward	The Society of Thoracic Surgeons
Description	The STS Mitral Valve Repair/Replacement (MVRR) Composite Score measures 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: Domain 1 – Absence of Operative Mortality Proportion of patients (risk-adjusted) who do not experience operative mortality. Operative mortality is defined as death before hospital discharge or within 30 days of the operation. Domain 2 – Absence of Major Morbidity Proportion of patients (risk-adjusted) who do not experience any major morbidity. Major morbidity is defined as the occurrence of any one or more of the following major complications: 1. Prolonged ventilation, 2. Deep sternal wound infection, 3. Permanent stroke, 4. Renal failure, and

	3031 STS Mitral Valve Repair/Replacement (MVRR) Composite Score
	5. Reoperations for bleeding, prosthetic or native valve dysfunction, and other cardiac reasons, but not for other non-cardiac reasons. Outcome data are collected on all patients and from all participants. For optimal measure reliability, participants meeting a volume threshold of at least 36 cases over 3 years (i.e., approximately one mitral case per month) receive a score for each of the two domains, plus an overall composite score. The overall composite score is created by "rolling up" the domain scores into a single number. In addition to receiving a numeric score, participants are assigned to rating categories designated by the following: 1 star – lower-than-expected performance 2 stars – as-expected performance 3 stars – higher-than-expected performance
Type	Composite
Data Source	Electronic Clinical Data : Registry STS Adult Cardiac Surgery Database – Version 2.73; STS Adult Cardiac Surgery Database Version 2.81 went live on July 1, 2014. Available at measure-specific web page URL identified in S.1 No data dictionary
Level	Facility, Clinician : Group/Practice
Setting	Hospital/Acute Care Facility
Numerator Statement	Due to the complex methodology used to construct the composite measure, it is impractical to separately discuss the numerator and denominator. The following discussion describes how each domain score is calculated and how these are combined into an overall composite score. The STS Mitral Valve Repair/Replacement (MVRR) Composite Score comprises two domains consisting of six measures: Domain 1 – Absence of Operative Mortality Proportion of patients (risk-adjusted) who do not experience operative mortality. Operative mortality is defined as death before hospital discharge or within 30 days of the operation. Domain 2 – Absence of Major Morbidity Proportion of patients (risk-adjusted) who do not experience any major morbidity. Major morbidity is defined as the occurrence of any one or more of the following major complications: 1. Prolonged ventilation 2. Deep sternal wound infection 3. Permanent stroke 4. Renal failure and 5. Reoperations for bleeding, prosthetic or native valve dysfunction, and other cardiac reasons, but not for other non-cardiac reasons. Participants receive a score for each of the two domains, plus an overall composite score. The overall composite score was created by "rolling up" the domain scores into a single number. In addition to receiving a numeric score, participants are assigned to rating categories designated by the following: 1 star – lower-than-expected performance 2 stars – as-expected performance 3 stars – higher-than-expected performance

	3031 STS Mitral Valve Repair/Replacement (MVRR) Composite Score
	Patient Population: The analysis population consists of patients aged 18 years or older who undergo isolated MVRR with or without concomitant tricuspid valve repair (TVr), surgical ablation for atrial fibrillation (AF), or repair of atrial septal defect (ASD). Time Window: 3 years Data Completeness Requirement: Participants are excluded from the analysis if they have fewer than 36 isolated MVRR procedures in the patient population. Estimation of Composite Scores and Star Ratings: The statistical methodology used to estimate the STS MVRR composite score and star rating for each participant site was similar to that used for the STS isolated CABG, isolated AVR, and AVR+CABG measures. As with previous composite scores, we first translated risk-standardized event rates into risk-standardized absence of event rates so that a higher score indicated better performance. We then rescaled the morbidity and mortality domains by dividing by their respective standard deviations and then added the two domains together.
Numerator Details	See response in S.4. Numerator Statement
Denominator Statement	See response in S.4. Numerator Statement for complete description of measure specifications. Patient Population: The analysis population consists of patients aged 18 years or older who undergo isolated MVRR with or without concomitant tricuspid valve repair (TVr), surgical ablation for atrial fibrillation (AF), or repair of atrial septal defect (ASD).
Denominator Details	See response in S.7. Denominator Statement
Exclusions	Data Completeness Requirement: Participants are excluded from the analysis if they have fewer than 36 isolated MVRR procedures in the patient population.
Exclusion details	See response in S.10. Denominator Exclusions
Risk Adjustment	Statistical risk model See Appendix Provided in response box S.15a
Stratification	N/A
Type Score	Rate/proportion better quality = higher score
Algorithm	Please see discussion under section S.4 and attached manuscripts. No diagram provided
Copyright / Disclaimer	N/A

	3032 STS Mitral Valve Repair/Replacement (MVRR) + Coronary Artery Bypass Graft (CABG) Composite Score
Steward	The Society of Thoracic Surgeons
Description	The STS Mitral Valve Repair/Replacement (MVRR) + Coronary Artery Bypass Graft (CABG) Composite Score measures surgical performance for MVRR + CABG with or without concomitant Atrial Septal Defect (ASD) and Patient Foramen Ovale (PFO) closures, tricuspid valve repair (TVr), or surgical ablation for atrial fibrillation (AF). To assess overall quality, the STS MVRR +CABG Composite Score comprises two domains consisting of six measures: Domain 1 – Absence of Operative Mortality

	3032 STS Mitral Valve Repair/Replacement (MVRR) + Coronary Artery Bypass Graft (CABG) Composite Score
	Proportion of patients (risk-adjusted) who do not experience operative mortality. Operative mortality is defined as death before hospital discharge or within 30 days of the operation. Domain 2 – Absence of Major Morbidity Proportion of patients (risk-adjusted) who do not experience any major morbidity. Major morbidity is defined as the occurrence of any one or more of the following major complications: 1. Prolonged ventilation, 2. Deep sternal wound infection, 3. Permanent stroke, 4. Renal failure, and 5. Reoperations for bleeding, coronary graft occlusion, prosthetic or native valve dysfunction, and other cardiac reasons, but not for other non-cardiac reasons. Outcome data are collected on all patients and from all participants. For optimal measure reliability, participants meeting a volume threshold of at least 25 cases over 3 years receive a score for each of the two domains, plus an overall composite score. The overall composite score is created by "rolling up" the domain scores into a single number. In addition to receiving a numeric score, participants are assigned to rating categories designated by the following: 1 star – lower-than-expected performance 2 stars – as-expected performance 3 stars – higher-than-expected performance
Type	Composite
Data Source	Electronic Clinical Data : Registry STS Adult Cardiac Surgery Database – Version 2.73; STS Adult Cardiac Surgery Database Version 2.81 went live on July 1, 2014. Available at measure-specific web page URL identified in S.1 No data dictionary
Level	Facility, Clinician : Group/Practice
Setting	Hospital/Acute Care Facility
Numerator Statement	Due to the complex methodology used to construct the composite measure, it is impractical to separately discuss the numerator and denominator. The following discussion describes how each domain score is calculated and how these are combined into an overall composite score. The STS Mitral Valve Repair/Replacement (MVRR) Composite Score comprises two domains consisting of six measures: Domain 1 – Absence of Operative Mortality Proportion of patients (risk-adjusted) who do not experience operative mortality. Operative mortality is defined as death before hospital discharge or within 30 days of the operation. Domain 2 – Absence of Major Morbidity Proportion of patients (risk-adjusted) who do not experience any major morbidity. Major morbidity is defined as the occurrence of any one or more of the following major complications: 1. Prolonged ventilation, 2. Deep sternal wound infection, 3. Permanent stroke, 4. Renal failure, and

	3032 STS Mitral Valve Repair/Replacement (MVRR) + Coronary Artery Bypass Graft (CABG) Composite Score
	5. Reoperations for bleeding, coronary graft occlusion, prosthetic or native valve dysfunction, and other cardiac reasons, but not for other non-cardiac reasons. Participants receive a score for each of the two domains, plus an overall composite score. The overall composite score was created by "rolling up" the domain scores into a single number. In addition to receiving a numeric score, participants are assigned to rating categories designated by the following: 1 star – lower-than-expected performance 2 stars – as-expected performance 3 stars – higher-than-expected performance Patient Population: The analysis population consists of patients aged 18 years or older who MVRR + CABG with or without concomitant Atrial Septal Defect (ASD) and Patient Foramen Ovale (PFO) closures, tricuspid valve repair (TVr), or surgical ablation for atrial fibrillation (AF). Time Window: 3 years Data Completeness Requirement: Participants are excluded from the analysis if they have fewer than 25 MVRR + CABG procedures in the patient population. Estimation of Composite Scores and Star Ratings: To be consistent with the conventions of previous composite measures, risk-adjusted event rates were first converted into risk-adjusted absence-of-event rates. To calculate the composite, participant-specific absence of mortality rates and absence of morbidity rates were weighted inversely by their respective standard deviations across participants. This procedure was equivalent to first rescaling the absence of mortality rates and absence of morbidity rates by their respective standard deviations across participants, and then assigning equal weighting to the rescaled rates. Finally, in order to draw statistical inferences about participant performance, a Bayesian credible interval surrounding each participant's composite score was calculated. Unlike frequentist confidence intervals, Bayesian credible intervals have an intuitively direct interpretation as an interval containing the true value of the composite score with a specified probability (e.g., 95%). To determine star ratings for each participant, the credible interval of its composite score was compared with the STS average. Participants whose intervals were entirely above the STS average were classified as 3-star (higher than expected performance), and participants whose intervals were entirely below the STS average were classified as1-star (lower than expected performance). Credible intervals based on different probability levels (90%, 95%, 98%) were explored, and the resulting percentages of 1, 2, and 3-star programs were calculated.
Numerator Details	See response in S.4. Numerator Statement
Denominator Statement	See response in S.4. Numerator Statement for complete description of measure specifications. Patient Population: The analysis population consists of patients aged 18 years or older who MVRR + CABG with or without concomitant Atrial Septal Defect (ASD) and Patient Foramen Ovale (PFO) closures, tricuspid valve repair (TVr), or surgical ablation for atrial fibrillation (AF).
Denominator Details	See response in S.7. Denominator Statement
Exclusions	Data Completeness Requirement: Participants are excluded from the analysis if they have fewer than 25 MVRR + CABG procedures in the patient population.

	3032 STS Mitral Valve Repair/Replacement (MVRR) + Coronary Artery Bypass Graft (CABG) Composite Score
Exclusion details	See response in S.10. Denominator Exclusions
Risk Adjustment	Statistical risk model See Appendix Provided in response box S.15a
Stratification	N/A
Type Score	Rate/proportion better quality = higher score
Algorithm	Please see discussion under section S.4 and attached manuscripts. No diagram provided
Copyright / Disclaimer	N/A

Appendix F: Related and Competing Measures

Comparison of NQF #0117 and #0127

	0117 Beta Blockade at Discharge	0127 Preoperative Beta Blockade
Steward	The Society of Thoracic Surgeons	The Society of Thoracic Surgeons
Description	Percent of patients aged 18 years and older undergoing isolated CABG who were discharged on beta blockers	Percent of patients aged 18 years and older undergoing isolated CABG who received beta blockers within 24 hours preceding surgery.
Type	Process	Process
Data Source	Electronic Clinical Data : Registry STS Adult Cardiac Surgery Database – Version 2.73 URL URL	Electronic Clinical Data : Registry STS Adult Cardiac Surgery Database – Version 2.73 URL URL
Level	Population : County or City, Facility, Clinician : Group/Practice, Clinician : Individual, Population : National, Population : Regional, Population : State	Population : County or City, Facility, Clinician : Group/Practice, Clinician : Individual, Population : National, Population : Regional, Population : State, Clinician : Team
Setting	Hospital/Acute Care Facility	Hospital/Acute Care Facility
Numerator Statement	Number of patients undergoing isolated CABG who were discharged on beta blockers	Number of patients undergoing isolated CABG who received beta blockers within 24 hours preceding surgery
Numerator Details	Number of isolated CABG procedures in which discharge beta blockers [DCBeta (STS Adult Cardiac Surgery Database Version 2.73)] is marked "yes"	Number of isolated CABG procedures in which preoperative beta blockers [MedBeta (STS Adult Cardiac Surgery Database Version 2.73, Sequence number 1710)] is marked "yes"
Denominator Statement	All patients undergoing isolated CABG	All patients undergoing isolated CABG
Denominator Details	Number of isolated CABG procedures excluding cases with in-hospital mortality or cases for which discharge beta blocker use was contraindicated. Isolated CABG is determined as a procedure for which all of the following apply (note: full terms for STS field names are provided in brackets []): - OpCAB [Coronary Artery Bypass] is marked “Yes” - (VADProc [VAD Implanted or Removed] is marked “No” or “Missing”) or (VADProc is marked “Yes, Implanted” and UnplVAD [Unplanned VAD Insertion] is marked “yes”)	Number of isolated CABG procedures Isolated CABG is determined as a procedure for which all of the following apply (note: full terms for STS field names are provided in brackets []): - OpCAB [Coronary Artery Bypass] is marked “Yes” - (VADProc [VAD Implanted or Removed] is marked “No” or “Missing”) or (VADProc is marked “Yes, Implanted” and UnplVAD [Unplanned VAD Insertion] is marked “yes”) - OCarASDTy [Atrial Septal Defect Repair] is marked “PFO” or “missing”

	0117 Beta Blockade at Discharge	0127 Preoperative Beta Blockade
	- OCarASDTy [Atrial Septal Defect Repair Type] is marked "PFO" or "missing" - OCarAFibAProc [Atrial Fibrillation Ablation Procedure] is marked "primarily epicardial" or "missing" and - OpValve [Valve Surgery], VSAV [Aortic Valve Procedure], VSAVPr [Aortic Valve Procedure Performed], ResectSubA [Resection of sub-aortic stenosis], VSMV [Mitral Valve Procedure], VSMVPr [Mitral Valve Procedure Performed], OpTricus [Tricuspid Valve Procedure Performed], OpPulm [Pulmonic Valve Procedure Performed], OpONCard [Other Non-Cardiac Procedure], OCarLVA [Left Ventricular Aneurysm Repair], OCarVSD [Ventricular Septal Defect Repair], OCarSVR [Surgical Ventricular Restoration], OCarCong [Congenital Defect Repair], OCarTrma [surgical procedure for an injury due to Cardiac Trauma], OCarCrTx [Cardiac Transplant], OCAoProcType [Aortic Procedure Type], EndoProc [Endovascular Procedure (TEVAR)], OCTumor [resection of an intracardiac tumor], OCPulThromDis [Pulmonary Thromboembolectomy], OCarOthr [other cardiac procedure] are all marked "no" or "missing"	- OCarAFibAProc [Atrial Fibrillation Ablation Procedure] is marked "primarily epicardial" or "missing" and - OpValve [Valve Surgery], VSAV [Aortic Valve Procedure], VSAVPr [Aortic Valve Procedure Performed], ResectSubA [Resection of sub-aortic stenosis], VSMV [Mitral Valve Procedure], VSMVPr [Mitral Valve Procedure Performed], OpTricus [Tricuspid Valve Procedure Performed], OpPulm [Pulmonic Valve Procedure Performed], OpONCard [Other Non-Cardiac Procedure], OCarLVA [Left Ventricular Aneurysm Repair], OCarVSD [Ventricular Septal Defect Repair], OCarSVR [Surgical Ventricular Restoration], OCarCong [Congenital Defect Repair], OCarTrma [surgical procedure for an injury due to Cardiac Trauma], OCarCrTx [Cardiac Transplant], OCAoProcType [Aortic Procedure Type], EndoProc [Endovascular Procedure (TEVAR)], OCTumor [resection of an intracardiac tumor], OCPulThromDis [Pulmonary Thromboembolectomy], OCarOthr [other cardiac procedure] are all marked "no" or "missing"
Exclusions	Cases are removed from the denominator if there was an in-hospital mortality or if discharge beta blocker was contraindicated.	Cases are removed from the denominator if preoperative beta blocker was contraindicated or if the clinical status of the patient was emergent or emergent salvage prior to entering the operating room.
Exclusion Details	Mortality Discharge Status (MtDCStat), Mortality Date (MtDate), and Discharge Date (DischDt) indicate an in-hospital mortality; discharge beta blocker (DCBeta) marked as "Contraindicated"	Procedures with preoperative beta blockers [MedBeta (STS Adult Cardiac Surgery Database Version 2.73, Sequence number 1710)] marked as "Contraindicated"; or procedures with Status [Status(STS Adult Cardiac Surgery Database Version 2.73, Sequence number 2390)] marked "Emergent" or "Emergent Salvage"
Risk Adjustment	No risk adjustment or risk stratification	No risk adjustment or risk stratification
Stratification	n/a	n/a
Type Score	Rate/proportion better quality = higher score	Rate/proportion better quality = higher score

	0117 Beta Blockade at Discharge	0127 Preoperative Beta Blockade
Algorithm	n/a	n/a
Submission items	5.1 Identified measures: 0134 : Use of Internal Mammary Artery (IMA) in Coronary Artery Bypass Graft (CABG) 0119 : Risk-Adjusted Operative Mortality for CABG 0118 : Anti-Lipid Treatment Discharge 0116 : Anti-Platelet Medication at Discharge 0115 : Risk-Adjusted Surgical Re-exploration 0114 : Risk-Adjusted Postoperative Renal Failure 0131 : Risk-Adjusted Stroke/Cerebrovascular Accident 0130 : Risk-Adjusted Deep Sternal Wound Infection 0129 : Risk-Adjusted Postoperative Prolonged Intubation (Ventilation) 0127 : Preoperative Beta Blockade 2514 : Risk-Adjusted Coronary Artery Bypass Graft (CABG) Readmission Rate 5a.1 Are specs completely harmonized? Yes 5a.2 If not completely harmonized, identify difference, rationale, impact: 5b.1 If competing, why superior or rationale for additive value: N/A	5.1 Identified measures: 0114 : Risk-Adjusted Postoperative Renal Failure 0115 : Risk-Adjusted Surgical Re-exploration 0116 : Anti-Platelet Medication at Discharge 0117: Beta Blockade at Dischrage 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 0131 : Risk-Adjusted Stroke/Cerebrovascular Accident 0134 : Use of Internal Mammary Artery (IMA) in Coronary Artery Bypass Graft (CABG) 2514: Risk-Adjusted Coronary Artery Bypass Graft (CABG) Readmission Rate 5a.1 Are specs completely harmonized? Yes 5a.2 If not completely harmonized, identify difference, rationale, impact: 5b.1 If competing, why superior or rationale for additive value: N/A

Comparison of NQF #1523, #1534, #0357, and #0359

	1523: In-hospital mortality following elective open repair of AAAs	1534: In-hospital mortality following elective EVAR of AAAs	0357: Abdominal Aortic Aneurysm (AAA) Repair Volume (IQI 4)	0359: Abdominal Aortic Aneurysm (AAA) Repair Mortality Rate (IQI 11)
Steward	Society for Vascular Surgery	Society for Vascular Surgery	Agency for Healthcare Research and Quality	Agency for Healthcare Research and Quality
Description	Percentage of aymptomatic patients undergoing open repair of abdominal aortic aneurysms (AAA)who die while in hospital. This measure is proposed for both hospitals and individual providers.	Percentage of patients undergoing elective endovascular repair of asymptomatic infrarenal abdominal aortic aneurysms (AAA) who die while in hospital. This measure is proposed for both hospitals and individual providers.	The number of hospital discharges with a procedure for abdominal aortic aneurysm (AAA) repair for patients 18 years and older or obstetric patients. Includes optional metrics for the number of discharges grouped by rupture status and procedure type.	In-hospital deaths per 1,000 discharges with abdominal aortic aneurysm (AAA) repair, ages 18 years and older. Includes metrics for discharges grouped by type of diagnosis and procedure. Excludes obstetric discharges and transfers to another hospital. [NOTE: The software provides the rate per hospital discharge. However, common practice reports the measure as per 1,000 discharges. The user must multiply the rate obtained from the software by 1,000 to report in-hospital deaths per 1,000 hospital discharges.]
Type	Outcome	Outcome	Outcome	Outcome
Data Source	Electronic Clinical Data : Registry Society for Vascular Surgery Vascular Quality Initiative Registry Vascular Study Group of New England Registry Attachment OPEN AAA defs v.01.09.doc	Electronic Clinical Data : Registry Society for Vascular Surgery Vascular Quality Initiative Registry Vascular Study Group of New England Registry Attachment EVAR defs v.01.09.doc	Administrative claims The data source is hospital discharge data such as the HCUP State Inpatient Databases (SID) or equivalent using UB-04 coding standards. The data collection instrument is public-use AHRQ QI software available in SAS or Windows versions. URL Attachment IQI_Regression_Coefficients-_Code_Tables_and_Value_Sets .xlsx	Administrative claims The data source is hospital discharge data such as the HCUP State Inpatient Databases (SID) or equivalent using UB-04 coding standards. The data collection instrument is public-use AHRQ QI software available in SAS or Windows versions URL Attachment IQI_Regression_Coefficients-_Code_Tables_and_Value_Sets-635560593513890264.xlsx

	1523: In-hospital mortality following elective open repair of AAAs	1534: In-hospital mortality following elective EVAR of AAAs	0357: Abdominal Aortic Aneurysm (AAA) Repair Volume (IQI 4)	0359: Abdominal Aortic Aneurysm (AAA) Repair Mortality Rate (IQI 11)
Level	Facility, Clinician : Group/Practice, Clinician : Individual	Facility, Clinician : Group/Practice, Clinician : Individual	Facility	Facility
Setting	Hospital/Acute Care Facility	Hospital/Acute Care Facility	Hospital/Acute Care Facility	Hospital/Acute Care Facility
Numerator Statement	Mortality following elective open repair of asymptomatic AAAs in men with < 6 cm dia and women with < 5.5 cm dia AAAs	Since hospitals have sufficient annual volume to generate accurate reporting levels, these are proposed for reporting every 12 months for hospital. Since surgeons have lower individual volume, we recommend annual reporting of the last 50 consecutive procedures, which may span more than one year, with suppression if < 10 procedures (ie, reported as too low volume to report).	Time window can be determined by user, but is generally a calendar year. Note the volume-outcome estimates are based on one year of data.	Overall: Number of deaths (DISP=20) among cases meeting the inclusion and exclusion rules for the denominator. Stratum A (Open repair of ruptured AAA): Number of deaths (DISP=20) among cases meeting the inclusion and exclusion rules for the denominator. Stratum B (Open repair of unruptured AAA): Number of deaths (DISP=20) among cases meeting the inclusion and exclusion rules for the denominator. Stratum C (Endovascular repair of ruptured AAA): Number of deaths (DISP=20) among cases meeting the inclusion and exclusion rules for the denominator. Stratum D (Endovascular repair of unruptured AAA): Number of deaths (DISP=20) among cases meeting the inclusion and exclusion rules for the denominator.
Numerator Details	ANY registry that includes hospitalization details, AAA diameter and discharge	Mortality following elective endovascular infrarenal AAA repair of asymptomatic AAAs	Overall: Discharges, for patients ages 18 years and older or MDC 14	Overall:

	1523: In-hospital mortality following elective open repair of AAAs	1534: In-hospital mortality following elective EVAR of AAAs	0357: Abdominal Aortic Aneurysm (AAA) Repair Volume (IQI 4)	0359: Abdominal Aortic Aneurysm (AAA) Repair Mortality Rate (IQI 11)
	status is required to identify patients for numerator inclusion. The Society for Vascular Surgery Vascular Quality Initiative (SVS VQI) and the Vascular Study Group of New England (VSGNE) are examples of registries that record such information, but the measure is not limited to these registries. Patients who died in hospital following elective open infrarenal AAA repair if their aneurysm was asymptomatic (< 6cm dia in men, <5.5 cm dia in women, judged by preoperative imaging (CT, MR or ultrasound)).	in men with < 6 cm dia and women with < 5.5 cm dia AAAs	(pregnancy, childbirth, and puerperium), with either • any-listed ICD-9-CM diagnosis codes for ruptured AAA and any-listed ICD-9-CM procedure code for open AAA repair; or • any-listed ICD-9-CM diagnosis codes for un-ruptured AAA and any-listed ICD-9-CM procedure codes for open AAA repair; or • any-listed ICD-9-CM diagnosis codes for ruptured AAA and any-listed ICD-9-CM procedure codes for endovascular AAA repair; or • any-listed ICD-9-CM diagnosis codes for un-ruptured AAA and any-listed ICD-9-CM procedure codes for endovascular AAA repair	Number of deaths (DISP=20) among cases meeting the inclusion and exclusion rules for the denominator. Stratum A (Open repair of ruptured AAA): Number of deaths (DISP=20) among cases meeting the inclusion and exclusion rules for the denominator. Stratum B (Open repair of unruptured AAA): Number of deaths (DISP=20) among cases meeting the inclusion and exclusion rules for the denominator. Stratum C (Endovascular repair of ruptured AAA): Number of deaths (DISP=20) among cases meeting the inclusion and exclusion rules for the denominator. Stratum D (Endovascular repair of unruptured AAA): Number of deaths (DISP=20) among cases meeting the inclusion and exclusion rules for the denominator.
Denominator Statement	All elective open repairs of asymptomatic AAAs in men with < 6 cm dia and women with < 5.5 cm dia AAAs	ANY registry that includes hospitalization details, AAA diameter and discharge status is required to identify patients for numerator inclusion. The Society for Vascular Surgery Vascular Quality Initiative (SVS VQI) and the Vascular Study Group of New England (VSGNE)	ICD-9-CM Un-ruptured AAA diagnosis code: 4414 ABDOM AORTIC ANEURYSM ICD-9-CM Ruptured AAA diagnosis code: 4413 RUPT ABD AORTIC ANEURYSM	Overall: Discharges, for patients ages 18 years and older, with the following • any-listed ICD-9-CM diagnosis codes for ruptured AAA and any-listed ICD-9-CM procedure code for open AAA repair; or • any-listed ICD-9-CM diagnosis codes for unruptured AAA and any-listed ICD-

	1523: In-hospital mortality following elective open repair of AAAs	1534: In-hospital mortality following elective EVAR of AAAs	0357: Abdominal Aortic Aneurysm (AAA) Repair Volume (IQI 4)	0359: Abdominal Aortic Aneurysm (AAA) Repair Mortality Rate (IQI 11)
		are examples of registries that record such information, but the measure is not limited to these registries. It could be reported by other registries that collect this same information. No other registry is needed for computation. Patients who died in hospital following elective endovascular infrarenal AAA repair if their aneurysm was asymptomatic (< 6cm dia in men, <5.5 cm dia in women, judged by preoperative imaging (CT, MR or ultrasound)).	ICD-9-CM Open AAA repair procedure codes: 3834 AORTA RESECTION & ANAST 3844 RESECT ABDM AORTA W REPL 3864 EXCISION OF AORTA ICD-9-CM Endovascular AAA repair procedure codes: 3971 ENDO IMPL GRFT ABD AORTA 3977 TEMP ENDOVSC OCCLS VESSEL 3978 ENDOVAS IMPLN GRFT AORTA Exclude cases: • with missing gender (SEX=missing), age (AGE=missing), quarter (DQTR=missing), year (YEAR=missing) or principal diagnosis (DX1=missing) Stratum A (Open repair of ruptured AAA): Discharges, for patients ages 18 years and older or MDC 14 (pregnancy, childbirth, and puerperium), with any-listed ICD-9-CM diagnosis codes for ruptured AAA (see above) and any- listed ICD-9-CM procedure code for open AAA repair (see above).	9-CM procedure codes for open AAA repair; or • any-listed ICD-9-CM diagnosis codes for ruptured AAA and any-listed ICD-9-CM procedure codes for endovascular AAA repair; or • any-listed ICD-9-CM diagnosis codes for unruptured AAA and any-listed ICD-9-CM procedure codes for endovascular AAA repair Stratum A (Open repair of ruptured AAA): Discharges, for patients ages 18 years and older, with any-listed ICD-9-CM diagnosis code for ruptured AAA (see above) and any-listed ICD-9-CM procedure code for open AAA repair (see above). Stratum B (Open repair of unruptured AAA): Discharges, for patients ages 18 years and older, with any-listed ICD-9-CM diagnosis code for un-ruptured AAA (see above) and any-listed ICD-9-CM procedure code for open AAA repair (see above). Stratum C (Endovascular repair of ruptured AAA): Discharges, for patients ages 18 years and older, with any-listed ICD-9-CM diagnosis code for ruptured AAA (see above) and any-listed ICD-9-CM procedure code for endovascular AAA repair (see above).

	1523: In-hospital mortality following elective open repair of AAAs	1534: In-hospital mortality following elective EVAR of AAAs	0357: Abdominal Aortic Aneurysm (AAA) Repair Volume (IQI 4)	0359: Abdominal Aortic Aneurysm (AAA) Repair Mortality Rate (IQI 11)
			Exclude cases: • with missing gender (SEX=missing), age (AGE=missing), quarter (DQTR=missing), year (YEAR=missing) or principal diagnosis (DX1=missing) Stratum B (Open repair of unruptured AAA): Discharges, for patients ages 18 years and older or MDC 14 (pregnancy, childbirth, and puerperium), with any-listed ICD-9-CM diagnosis codes for un-ruptured AAA (see above) and any-listed ICD-9-CM procedure codes for open AAA repair (see above). Exclude cases: • with missing gender (SEX=missing), age (AGE=missing), quarter (DQTR=missing), year (YEAR=missing) or principal diagnosis (DX1=missing) Stratum C (Endovascular repair of ruptured AAA): Discharges, for patients ages 18 years and older or MDC 14 (pregnancy, childbirth, and puerperium), with any-listed ICD-9-CM diagnosis codes for ruptured AAA (see above) and any- listed ICD-9-CM procedure	Stratum D (Endovascular repair of unruptured AAA): Discharges, for patients ages 18 years and older, with any-listed ICD-9-CM diagnosis code for un-ruptured AAA (see above) and any-listed ICD-9-CM procedure code for endovascular AAA repair (see above).

	1523: In-hospital mortality following elective open repair of AAAs	1534: In-hospital mortality following elective EVAR of AAAs	0357: Abdominal Aortic Aneurysm (AAA) Repair Volume (IQI 4)	0359: Abdominal Aortic Aneurysm (AAA) Repair Mortality Rate (IQI 11)
			codes for endovascular AAA repair (see above). Exclude cases: • with missing gender (SEX=missing), age (AGE=missing), quarter (DQTR=missing), year (YEAR=missing) or principal diagnosis (DX1=missing) Stratum D (Endovascular repair of unruptured AAA): Discharges, for patients ages 18 years and older or MDC 14 (pregnancy, childbirth, and puerperium), with any-listed ICD-9-CM diagnosis codes for un-ruptured AAA (see above) and any-listed ICD-9-CM procedure codes for endovascular AAA repair (see above). Exclude cases: • with missing gender (SEX=missing), age (AGE=missing), quarter (DQTR=missing), year (YEAR=missing) or principal diagnosis (DX1=missing)	
Denominator Details	ANY registry that includes hospitalization details, AAA diameter and discharge status is required to identify patients for denominator inclusion. The Society for	All elective endovascular repairs of asymptomatic AAAs in men with < 6 cm dia and women with < 5.5 cm dia AAAs	Overall: Not applicable.	Overall: ICD-9-CM Un-ruptured AAA diagnosis codes: 4414 ABDOM AORTIC ANEURYSM

	1523: In-hospital mortality following elective open repair of AAAs	1534: In-hospital mortality following elective EVAR of AAAs	0357: Abdominal Aortic Aneurysm (AAA) Repair Volume (IQI 4)	0359: Abdominal Aortic Aneurysm (AAA) Repair Mortality Rate (IQI 11)
	Vascular Surgery Vascular Quality Initiative (SVS VQI) and the Vascular Study Group of New England (VSGNE) are examples of registries that record such information, but the measure is not limited to these registries. Patients who underwent elective open AAA repair are included if their aneurysm was asymptomatic (< 6cm dia in men, <5.5 cm dia in women, judged by preoperative imaging(CT, MR or ultrasound)).			ICD-9-CM Ruptured AAA diagnosis codes: 4413 RUPT ABD AORTIC ANEURYSM ICD-9-CM Open AAA repair procedure codes: 3834 AORTA RESECTION & ANAST 3844 RESECT ABDM AORTA W REPL 3864 EXCISION OF AORTA ICD-9-CM Endovascular AAA repair procedure codes: 3971 ENDO IMPL GRFT ABD AORTA 3977 TEMP ENDOVSC OCCLS VESSEL 3978 ENDOVAS IMPLN GRFT AORTA
Exclusions	= 6 cm minor diameter - men = 5.5 cm minor diameter - women Symptomatic AAAs that required urgent/emergent (non-elective) repair	ANY registry that includes hospitalization details, AAA diameter and discharge status is required to identify patients for denominator inclusion. The Society for Vascular Surgery Vascular Quality Initiative (SVS VQI) and the Vascular Study Group of New England (VSGNE) are examples of registries that record such information, but the measure is not limited to these registries. Patients who died in hospital following elective endovascular infrarenal AAA repair if their aneurysm was asymptomatic (< 6cm dia in men, <5.5 cm dia	Stratum A: Not applicable. Stratum B: Not applicable. Stratum C: Not applicable. Stratum D: Not applicable.	Overall: Exclude cases: •transferring to another short-term hospital (DISP=2) •MDC 14 (pregnancy, childbirth, and puerperium) •with missing discharge disposition (DISP=missing), gender (SEX=missing), age (AGE=missing), quarter (DQTR=missing), year (YEAR=missing) or principal diagnosis (DX1=missing)

	1523: In-hospital mortality following elective open repair of AAAs	1534: In-hospital mortality following elective EVAR of AAAs	0357: Abdominal Aortic Aneurysm (AAA) Repair Volume (IQI 4)	0359: Abdominal Aortic Aneurysm (AAA) Repair Mortality Rate (IQI 11)
		in women, judged by preoperative imaging (CT, MR or ultrasound)).		
Exclusion Details	Patients undergoing non-elective open repair of symptomatic AAAs or those with AAAs larger than the diameters noted above.	= 6 cm diameter - men = 5.5 cm diameter – women Symptomatic AAAs that required urgent/emergent (non-elective) repair Patients undergoing non-elective open repair of symptomatic AAAs or those with AAAs larger than the diameters noted above.	Not applicable	Exclude cases: • transferring to another short-term hospital (DISP=2) • MDC 14 (pregnancy, childbirth, and puerperium) • with missing discharge disposition (DISP=missing), gender (SEX=missing), age (AGE=missing), quarter (DQTR=missing), year (YEAR=missing) or principal diagnosis (DX1=missing)
Risk Adjustment	No risk adjustment or risk stratification See "Scientific Acceptablility" section for rationale	No risk adjustment or risk stratification See "Scientific Acceptability" section for rationale	Other Stratification, no risk adjustment For additional information on the method, please access the Empirical Methods document: http://www.qualityindicators.ahrq.gov/Downloads/Resources/Publications/2011/QI_Empirical_Methods_03-31-14.pdf The Empirical Methods are also attached as "supplemental materials". Available in attached Excel or csv file at S.2b	Statistical risk model The predicted value for each case is computed using a hierarchical model (logistic regression with hospital random effect) and covariates for gender, age in years (in 5-year age groups), All Patient Refined-Diagnosis Related Group (APR-DRG) and APR-DRG risk-of-mortality subclass. The reference population used in the model is the universe of discharges for states that participate in the HCUP State Inpatient Databases (SID) for the year 2008 (updated annually), a database consisting of 43 states and approximately 30 million adult discharges and 4,000 hospitals. The expected rate is computed as the sum of the predicted value for each case divided by the number of cases for the unit of analysis of interest (i.e.,

	1523: In-hospital mortality following elective open repair of AAAs	1534: In-hospital mortality following elective EVAR of AAAs	0357: Abdominal Aortic Aneurysm (AAA) Repair Volume (IQI 4)	0359: Abdominal Aortic Aneurysm (AAA) Repair Mortality Rate (IQI 11)
				hospital). The risk adjusted rate is computed using indirect standardization as the observed rate divided by the expected rate, multiplied by the reference population rate. Risk adjustment factors: sex age 18-24; age 25-29; age 30-34; age 35-39; age 40-44; age 45-49; age 50-54; age 55-59; age 60-64; age 65-69; age 70-74; age 75-79; age 80-84; age 85+ ADRG 1731 (other vascular procedures-minor) ADRG 1732 (other vascular procedures-moderate) ADRG 1733 (other vascular procedures-major) ADRG 1734 (other vascular procedures-extreme) ADRG 1691 (major thoracic and abdominal vascular procedures-minor) ADRG 1692 (major thoracic and abdominal vascular procedures-moderate) ADRG 1693 (major thoracic and abdominal vascular procedures-major) ADRG 1694 (major thoracic and abdominal vascular procedures-extreme MDC 5 (Cardiovascular) Transfer-in status

	1523: In-hospital mortality following elective open repair of AAAs	1534: In-hospital mortality following elective EVAR of AAAs	0357: Abdominal Aortic Aneurysm (AAA) Repair Volume (IQI 4)	0359: Abdominal Aortic Aneurysm (AAA) Repair Mortality Rate (IQI 11)
				For additional information on the method, please access the Empirical Methods document: http://www.qualityindicators.ahrq.gov/Downloads/Resources/Publications/2011/QI_Empirical_Methods_03-31-14.pdf The Empirical Methods are also attached as "supplemental materials". Available in attached Excel or csv file at S.2b
Stratification	Not required	NA	The indicator is stratified into four groups by 1) type of AAA repair (open vs. endovascular) and 2) AAA rupture status. Cases are assigned to strata according to a hierarchy based on mortality, with cases being assigned to the stratum with the highest mortality rate for which the case qualifies. In the case of AAA Repair Volume the current hierarchy is as follows: Strata hierarchy (listed from highest mortality to lowest mortality): 1. Stratum A (Open repair of ruptured AAA) 2. Stratum C (Endovascular repair of ruptured AAA) 3. Stratum B (Open repair of unruptured AAA)	The indicator is stratified into four groups by 1) type of AAA repair (open vs. endovascular) and 2) AAA rupture status Cases are assigned to strata according to a hierarchy based on mortality, with cases being assigned to the stratum with the highest mortality for which the case qualifies. In the case of AAA Repair Mortality the current hierarchy is as follows: Strata hierarchy (listed from highest mortality to lowest mortality): 1. Stratum A (Open repair of ruptured AAA) 2. Stratum C (Endovascular repair of ruptured AAA) 3. Stratum B (Open repair of unruptured AAA) 4. Stratum D (Endovascular repair of unruptured AAA)

	1523: In-hospital mortality following elective open repair of AAAs	1534: In-hospital mortality following elective EVAR of AAAs	0357: Abdominal Aortic Aneurysm (AAA) Repair Volume (IQI 4)	0359: Abdominal Aortic Aneurysm (AAA) Repair Mortality Rate (IQI 11)
			4. Stratum D (Endovascular repair of unruptured AAA) The stratification of the denominator for open vs. endovascular and ruptured vs. unruptured involve the following codes in the denominator specification: /* AAA Repair */ /* ICD-9-CM Procedure Codes: */ /* OPEN */; ´3834´ = ´1´ /* AORTA RESECTION & ANAST */ ´3844´ = ´1´ /* RESECT ABDM AORTA W REPL */ ´3864´ = ´1´ /* EXCISION OF AORTA */ /* ENDOVASCULAR */; ´3971´ = ´1´ /* ENDO IMPL GRFT ABD AORTA */ ´3977´ = ´1´ /* TEMP ENDOVSC OCCLS VESSEL */ ´3978´ = ´1´ /* ENDOVAS IMPLN GRFT AORTA */ /* Include Only: AAA */ /* ICD-9-CM Diagnosis Codes: */ /* RUPTURED */; ´4413 ´ = ´1´ /* RUPT ABD AORTIC ANEURYSM */ /* UNRUPTURED */;	The stratification of the denominator for open vs. endovascular and ruptured vs. unruptured involves the following codes in the denominator specification: AAA Repair ICD-9-CM Procedure Codes: OPEN ´3834´ = ´1´ /* AORTA RESECTION & ANAST */ ´3844´ = ´1´ /* RESECT ABDM AORTA W REPL */ ´3864´ = ´1´ /* EXCISION OF AORTA */ ENDOVASCULAR ´3971´ = ´1´ /* ENDO IMPL GRFT ABD AORTA */ ´3977´ = ´1´ /* TEMP ENDOVSC OCCLS VESSEL */ ´3978´ = ´1´ /* ENDOVAS IMPLN GRFT AORTA */ AAA ICD-9-CM Diagnosis Codes: RUPTURED ´4413 ´ = ´1´ /* RUPT ABD AORTIC ANEURYSM */ UNRUPTURED ´4414 ´ = ´1´ /* ABDOM AORTIC ANEURYSM */

	1523: In-hospital mortality following elective open repair of AAAs	1534: In-hospital mortality following elective EVAR of AAAs	0357: Abdominal Aortic Aneurysm (AAA) Repair Volume (IQI 4)	0359: Abdominal Aortic Aneurysm (AAA) Repair Mortality Rate (IQI 11)
			´4414 ´ = ´1´ /* ABDOM AORTIC ANEURYSM */	
Type Score	Rate/proportion better quality = lower score	Rate/proportion better quality = lower score	Count better quality = higher score	Rate/proportion better quality = lower score
Algorithm	Identify denominator, exclude non-elective repair of symptomatic or ruptured patients and men with AAA >6 cm, and women with AAA >5.5, find number of deaths Outcome = deaths/ # cases	Identify denominator, exclude non-elective repair of symptomatic or ruptured patients and men with AAA >6 cm, and women with AAA >5.5, find number of deaths Outcome = deaths/ # cases No diagram provided	The volume is the number of discharges with a diagnosis of, and a procedure for AAA. There are four volume strata: open vs. endovascular, and ruptured vs. un-ruptured.	«calculation_algorithm»
Submission items	5.1 Identified measures: 5a.1 Are specs completely harmonized? 5a.2 If not completely harmonized, identify difference, rationale, impact: 5b.1 If competing, why superior or rationale for additive value:	5.1 Identified measures: 5a.1 Are specs completely harmonized? 5a.2 If not completely harmonized, identify difference, rationale, impact: 5b.1 If competing, why superior or rationale for additive value:	5.1 Identified measures: 5a.1 Are specs completely harmonized? 5a.2 If not completely harmonized, identify difference, rationale, impact: 5b.1 If competing, why superior or rationale for additive value: The AHRQ QI measure is paired with a risk-adjusted mortality measure Related Measures: Leapfrog survival predicator	5.1 Identified measures: 5a.1 Are specs completely harmonized? 5a.2 If not completely harmonized, identify difference, rationale, impact: 5b.1 If competing, why superior or rationale for additive value: The AHRQ indicator is paired with a volume indicator, is included in a composite, and is risk-adjusted Related Measures: Leapfrog survival predicator

Comparison of NQF #1550, #0534, #0564, and #2052

	1550 Hospital-level risk-standardized complication rate (RSCR) following elective primary total hip arthroplasty (THA) and/or total knee arthroplasty (TKA)	0534 Hospital specific risk-adjusted measure of mortality or one or more major complications within 30 days of a lower extremity bypass (LEB).	0564 Cataracts: Complications within 30 Days Following Cataract Surgery Requiring Additional Surgical Procedures	2052 Reduction of Complications through the use of Cystoscopy during Surgery for Stress Urinary Incontinence
Steward	Centers for Medicare & Medicaid Services	American College of Surgeons	AMA-convened Physician Consortium for Performance Improvement	American Urological Association
Description	The measure estimates a hospital-level risk-standardized complication rate (RSCR) associated with elective primary THA and TKA in Medicare Fee-For-Service beneficiaries who are 65 years and older. The outcome (complication) is defined as any one of the specified complications occurring from the date of index admission to 90 days post date of the index admission (the admission included in the measure cohort). The target population is patients 18 and over. CMS annually reports the measure for patients who are 65 years or older, are enrolled in fee-for-service (FFS) Medicare, and hospitalized in non-federal acute-care hospitals.	Hospital specific risk-adjusted measure of mortality or one or more of the following major complications (cardiac arrest, myocardial infarction, CVA/stroke, on ventilator >48 hours, acute renal failure (requiring dialysis), bleeding/transfusions, graft/prosthesis/flap failure, septic shock, sepsis, and organ space surgical site infection), within 30 days of a lower extremity bypass (LEB) in patients age 16 and older.	Percentage of patients aged 18 years and older with a diagnosis of uncomplicated cataract who had cataract surgery and had any of a specified list of surgical procedures in the 30 days following cataract surgery which would indicate the occurrence of any of the following major complications: retained nuclear fragments, endophthalmitis, dislocated or wrong power IOL, retinal detachment, or wound dehiscence	Percentage of SUI surgeries for which cystoscopy was used during the surgical procedure to reduce complications
Type	Outcome	Outcome	Outcome	Process
Data Source	Administrative claims, Other, Paper Medical Records Data sources:	Registry data	Electronic Clinical Data, Electronic Clinical Data : Electronic Health Record,	Administrative claims, Paper Medical Records

	The currently publically reported measure is specified and has been tested using: 1. Medicare Part A inpatient and Part B outpatient claims: This data source contains claims data for FFS inpatient and outpatient services including: Medicare inpatient hospital care, outpatient hospital services, as well as inpatient and outpatient physician claims for the 12 months prior to an index admission. 2. Medicare Enrollment Database (EDB): This database contains Medicare beneficiary demographic, benefit/coverage, and vital status information. This data source was used to obtain information on several inclusion/exclusion indicators such as Medicare status on admission as well as vital status at discharge. These data have previously been shown to accurately reflect patient vital status (Fleming et al., 1992). During original measure development we validated the administrative claims-based definition of THA/TKA complication (original model specification) against a medical record data. 3. Data abstracted from medical records from eight participating hospitals (approximately 96		Electronic Clinical Data : Registry Not applicable No data collection instrument provided Attachment EP_CMS132_NQF0564_ValueSets_20140530.xlsx	No data collection instrument provided No data dictionary

	records per hospital; 644 total records) for Medicare beneficiaries over the age of 65 years who had a qualifying THA/TKA procedure between January 1 2007 and December 31, 2008. The measure was also specified and testing using an all-payer claims dataset although it is only publically reported using the data sources listed above 4. California Patient Discharge Data are a large, linked database of patient hospital admissions in the state of California. Using all-payer data from California, we performed analyses to determine whether the THA/TKA complication measure can be applied to all adult patients, including not only FFS Medicare patients aged 65 years or over, but also non-FFS Medicare patients aged 18-64 years at the time of admission. Additional Data source used for analysis of the impact of SES variables on the measure's risk model. Note, the variables derived from these data are not included in the measure as specified 5. The American Community Survey (2009-2013): The American Community Survey data are collected annually and an aggregated 5-years data			

	were used to calculate the AHRQ socioeconomic status (SES) composite index score. Reference: Fleming C., Fisher ES, Chang CH, Bubolz D, Malenda J. Studying outcomes and hospital utilization in the elderly: The advantages of a merged data base for Medicare and Veterans Affairs Hospitals. Medical Care. 1992; 30(5): 377-91. Suter LG, Parzynski CS, Grady JN, et al. 2014 Procedure Specific Complication Measure Updates and Specifications Report: Elective Primary Total Hip Arthroplasty (THA) and/or Total Knee Arthroplasty (TKA) Risk-Standardized Complication Measure (Version 3.0). 2014 No data collection instrument provided Attachment NQF_1550_HipKnee_Complication_Data_Dictionary_v1.0.xlsx			
Level	Facility	Facility/Agency	Clinician : Group/Practice, Clinician : Individual	Clinician : Individual
Setting	Hospital/Acute Care Facility	Hospital, Long Term Acute Care Hospital	Ambulatory Care : Ambulatory Surgery Center (ASC), Ambulatory Care : Clinician Office/Clinic, Hospital/Acute Care Facility	Ambulatory Care : Clinician Office/Clinic
Numerator Statement	The outcome for this measure is any complication occurring during the index admission (not coded present on arrival) to 90 days post-date of the index	Outcome: Death or one or more of the following major complications (cardiac arrest, myocardial infarction, CVA/stroke, on ventilator >48	See details in multiple formats	Female patients who had SUI surgery for which cystoscopy was used during the surgical procedure to reduce complications

	admission. Complications are counted in the measure only if they occur during the index hospital admission or during a readmission. The complication outcome is a dichotomous (yes/no) outcome. If a patient experiences one or more of these complications in the applicable time period, the complication outcome for that patient is counted in the measure as a “yes”.	hours, acute renal failure (requiring dialysis), bleeding/transfusions, graft/prosthesis/flap failure, septic shock, sepsis, and organ space surgical site infection) in patients undergoing lower extremity bypass surgery. Time Window: within 30 days of LEB procedure		
Numerator Details	The composite complication is a dichotomous outcome (yes for any complication(s); no for no complications). Therefore, if a patient experiences one or more complications, the outcome variable will get coded as a "yes". Complications are counted in the measure only if they occur during the index hospital admission (and are not present on admission) or during a readmission. The complications captured in the numerator are identified during the index admission OR associated with a readmission up to 90 days post-date of index admission, depending on the complication. The follow-up period for complications from date of index admission is as follows: The follow-up period for AMI, pneumonia, and		For Registry: Numerator Instructions: Codes for major complications (eg, retained nuclear fragments, endophthalmitis, dislocated or wrong power IOL, retinal detachment, or wound dehiscence): 65235, 65860, 65880, 65900, 65920, 65930, 66030, 66250, 66820, 66825, 66830, 66852, 66986, 67005, 67010, 67015, 67025, 67028, 67030, 67031, 67036, 67039, 67041, 67042, 67043, 67101, 67105, 67107, 67108, 67110, 67112, 67141, 67145, 67250, 67255 Report HCPCS Code: G8627: Surgical procedure performed within 30 days following cataract surgery for major complications (eg,	The numerator will be calculated using CPT codes: 52000

	sepsis/septicemia/shock is seven days from the date of index admission because these conditions are more likely to be attributable to the procedure if they occur within the first week after the procedure. Additionally, analyses indicated a sharp decrease in the rate of these complications after seven days. Death, surgical site bleeding, and pulmonary embolism are followed for 30 days following admission because clinical experts agree these complications are still likely attributable to the hospital performing the procedure during this period and rates for these complications remained elevated until roughly 30 days post admission. The measure follow-up period is 90 days after admission for mechanical complications and periprosthetic joint infection/wound infection. Experts agree that mechanical complications and periprosthetic joint infection/wound infections due to the index THA/TKA occur up to 90 days following THA/TKA. The measure counts all complications occurring during the index admission regardless of when they occur. For		retained nuclear fragments, endophthalmitis, dislocated or wrong power IOL, retinal detachment or wound dehiscence)	

	example, if a patient experiences an AMI on day 10 of the index admission, the measure will count the AMI as a complication, although the specified follow-up period for AMI is seven days. Clinical experts agree with this approach, as such complications likely represent the quality of care provided during the index admission. As of 2014 reporting, the measure does not count complications in the complications outcome that are coded as POA during the index admission; this prevents identifying a condition as a complication of care if it was present on admission for the THA/TKA procedure. For full list of ICD-9 and ICD-10 codes defining complications, see the Data Dictionary attached in field S.2b., sheet "Complication Codes ICD9-ICD10".			
Denominator Statement	The target population for the publically reported measure includes admissions for Medicare FFS beneficiaries who are at least 65 years of age undergoing elective primary THA and/or TKA procedures. Additional details are provided in S.9 Denominator Details.	Adult patients age 16 and older undergoing lower extremity bypass surgery Time Window: For development, 3 years of data (July 2004- June 2007). For public reporting, the timeframe has not been determined.	See details in multiple formats	Female patients who had SUI surgeries (without concomitant surgery for prolapse

Denominator Details	To be included in the measure cohort used in public reporting, patients must meet the following additional inclusion criteria: 1. Enrolled in Medicare fee-for-service (FFS) Part A and Part B for the 12 months prior to the date of admission; and enrolled in Part A during the index admission; 2. Aged 65 or older 3. Having a qualifying elective primary THA/TKA procedure; elective primary THA/TKA procedures are defined as those procedures without any of the following: • Femur, hip, or pelvic fractures coded in the principal or secondary discharge diagnosis field of the index admission • Partial hip arthroplasty (PHA) procedures (with a concurrent THA/TKA); partial knee arthroplasty procedures are not distinguished by ICD9 codes and are currently captured by the THA/TKA measure • Revision procedures with a concurrent THA/TKA • Resurfacing procedures with a concurrent THA/TKA • Mechanical complication coded in the principal discharge • Malignant neoplasm of the pelvis, sacrum, coccyx, lower	We are using this field to specifiy the codes that define the LEB patient cohort. 35537 - Bypass graft, with vein; aortoiliac 35538 - Bypass graft, with vein; aortobi-iliac 35539 - Bypass graft, with vein; aortofemoral 35540 - Bypass graft, with vein; aortobifemoral 35541 - Bypass graft with vein, aortoiliac or bi-iliac 35546 - Bypass graft with vein, aortofemoral or bifemoral 35548 - Bypass graft, with vein; aortoiliofemoral, unilateral 35549 - Bypass graft, with vein; aortoiliofemoral, bilateral 35551 - Bypass graft, with vein; aortofemoral-popliteal 35556 - Bypass graft, with vein; femoral-popliteal 35558 - Bypass graft, with vein; femoral-femoral, 35563 - Bypass graft, with vein; ilioiliac, 35565 - Bypass graft, with vein; iliofemoral, 35566 - Bypass graft, with vein; femoral-anterior tibial, posterior tibial, peroneal artery or other distal vessels 35571 - Bypass graft, with vein; popliteal-tibial, -peroneal artery or other distal vessels	Denominator Note: This is an episode-based measure, meaning there may be more than one reportable event for a given patient during the measurement period. The level of analysis for this measure is each cataract surgery during the measurement period. Every cataract surgery during the measurement period should be counted as a measurable denominator event for the measure calculation. For Registry: Denominator Instructions: Clinicians who indicate modifier 55, postoperative management only OR modifier 56, preoperative management only, will not qualify for this measure. Patients aged > or = 18 years on date of encounter AND Patient encounter during the reporting period (CPT): 66840, 66850, 66852, 66920, 66930, 66940, 66982, 66983, 66984	The denominator will be calculated using CPT codes and patient characteristics, such as gender and age (adult patients): 51840 51841 51845 51990 51992 57287 57288 57289

	limbs, or bone/bone marrow or a disseminated malignant neoplasm coded in the principal discharge diagnosis field • Removal of implanted devises/prostheses • Transfer status from another acute care facility for the THA/TKA Patients are eligible for inclusion in the denominator if they had an elective primary THA and/or a TKA AND had continuous enrollment in Part A and Part B Medicare fee-for-service (FFS) 12 months prior to the date of index admission. This measure can also be used for an all-payer population aged 18 years and older. We have explicitly tested the measure in both patients aged 18+ years and those aged 65+ years (see Section 2b4.11 of the Testing Attachment for details, 2b4.11). International Classification of Diseases, 9th Revision, Clinical Modification (ICD-9-CM) codes used to define the cohort for each measure are: ICD-9-CM codes used to define a THA or TKA: 81.51 Total Hip Replacement 81.54 Total Knee Replacement ICD-10 Codes that define a THA or TKA:	35583 - In-situ vein bypass; femoral-popliteal 35585 - In-situ vein bypass; femoral-anterior tibial, posterior tibial, or peroneal artery 35587 - Bypass graft, with vein; femoral-femoral 35623 - Bypass graft, with other than vein; axillary-popliteal or -tibial 35637 - Bypass graft, with other than vein; aortoiliac 35638 - Bypass graft, with other than vein; aortobi-iliac 35646 - Bypass graft, with other than vein; aortobifemoral 35647 - Bypass graft, with other than vein; aortofemoral 35651 - Bypass graft, with other than vein; aortofemoral-popliteal 35654 - Bypass graft, with other than vein; axillary-femoral-femoral 35656 - Bypass graft, with other than vein; femoral-popliteal 35661 - Bypass graft, with other than vein; femoral-femoral 35663 - Bypass graft, with other than vein; ilioiliac 35665 - Bypass graft, with other than vein; iliofemoral 35666 - Bypass graft, with other than vein; femoral-anterior tibial, posterior tibial, or peroneal artery		

	0SR90J9 Replacement of Right Hip Joint with Synthetic Substitute, Cemented, Open Approach 0SR90JA Replacement of Right Hip Joint with Synthetic Substitute, Uncemented, Open Approach 0SR90JZ Replacement of Right Hip Joint with Synthetic Substitute, Open Approach 0SRB0J9 Replacement of Left Hip Joint with Synthetic Substitute, Cemented, Open Approach 0SRB0JA Replacement of Left Hip Joint with Synthetic Substitute, Uncemented, Open Approach 0SRB0JZReplacement of Left Hip Joint with Synthetic Substitute, Open Approach 0SRC07Z Replacement of Right Knee Joint with Autologous Tissue Substitute, Open Approach 0SRC0JZReplacement of Right Knee Joint with Synthetic Substitute, Open Approach 0SRC0KZ Replacement of Right Knee Joint with Nonautologous Tissue Substitute, Open Approach 0SRD07Z Replacement of Left Knee Joint with Autologous Tissue Substitute, Open Approach	35671 - Bypass graft, with other than vein; popliteal-tibial or -peroneal artery 35700 - Reoperation, femoral-popliteal or femoral (popliteal)-anterior tibial, posterior tibial, peroneal artery, or other distal vessels, more than one month after original operation (List separately in addition to code for primary procedure) 35721 - Exploration (not followed by surgical repair), with or without lysis of artery; femoral artery 35741 - Exploration (not followed by surgical repair), with or without lysis of artery; popliteal artery 35879 - Revision, lower extremity arterial bypass, without thrombectomy, open; with vein patch angioplasty 35881 - Revision, lower extremity arterial bypass, without thrombectomy, open; with segmental vein interposition 35883 - Revision, femoral anastomosis of synthetic arterial bypass graft in groin, open; with nonautogenous patch graft (eg, Dacron, ePTFE, bovine pericardium) 35884 - Revision, femoral anastomosis of synthetic arterial bypass graft in groin, open; with autogenous vein patch graftI		

	0SRD0JZ Replacement of Left Knee Joint with Synthetic Substitute, Open Approach 0SRD0KZReplacement of Left Knee Joint with Nonautologous Tissue Substitute, Open Approach 0SRT07Z Replacement of Right Knee Joint, Femoral Surface with Autologous Tissue Substitute, Open Approach 0SRT0JZ Replacement of Right Knee Joint, Femoral Surface with Synthetic Substitute, Open Approach 0SRT0KZ Replacement of Right Knee Joint, Femoral Surface with Nonautologous Tissue Substitute, Open Approach 0SRU07Z Replacement of Left Knee Joint, Femoral Surface with Autologous Tissue Substitute, Open Approach 0SRU0JZ Replacement of Left Knee Joint, Femoral Surface with Synthetic Substitute, Open Approach 0SRU0KZ Replacement of Left Knee Joint, Femoral Surface with Nonautologous Tissue Substitute, Open Approach 0SRV07Z Replacement of Right Knee Joint, Tibial Surface with Autologous Tissue Substitute, Open Approach 0SRV0JZ Replacement of Right Knee Joint, Tibial Surface with			

	Synthetic Substitute, Open Approach 0SRV0KZ Replacement of Right Knee Joint, Tibial Surface with Nonautologous Tissue Substitute, Open Approach 0SRW07Z Replacement of Left Knee Joint, Tibial Surface with Autologous Tissue Substitute, Open Approach 0SRW0JZ Replacement of Left Knee Joint, Tibial Surface with Synthetic Substitute, Open Approach 0SRW0KZ Replacement of Left Knee Joint, Tibial Surface with Nonautologous Tissue Substitute, Open Approach An ICD-9 to ICD-10 crosswalk is attached in field S.2b. (Data Dictionary or Code Table). Elective primary THA/TKA procedures are defined as those procedures without any of the following: 1) Femur, hip, or pelvic fractures coded in principal or secondary discharge diagnosis fields of the index admission 2) Partial hip arthroplasty (PHA) procedures with a concurrent THA/TKA 3) Revision procedures with a concurrent THA/TKA 4) Resurfacing procedures with a concurrent THA/TKA			

	5) Mechanical complication coded in the principal discharge 6) Malignant neoplasm of the pelvis, sacrum, coccyx, lower limbs, or bone/bone marrow or a disseminated malignant neoplasm coded in the principal discharge diagnosis field 7) Removal of implanted devises/prostheses 8) Transfer status from another acute care facility for the THA/TKA For a full list of ICD-9 and ICD-10 codes defining the following see attached Data Dictionary, sheet "THA TKA Cohort Codes Part 2."			
Exclusions	This measure excludes index admissions for patients: 1. Without at least 90 days post-discharge enrollment in FFS Medicare; 2. Who were discharged against medical advice (AMA); or, 3. Who had more than two THA/TKA procedure codes during the index hospitalization. After applying these exclusion criteria, we randomly select one index admission for patients with multiple index admissions in a calendar year. We therefore exclude the other eligible index admissions in that year.	Trauma patients Any case that activates a trauma resuscitation or work-up	See details in multiple formats	Documentation of medical reason(s) for not using cystoscopy during SUI surgery (patients for whom the use of a cystoscope may not be appropriate, such as the presence of a new cystostomy repair). The panel noted that endoscopy after a new repair should be cautiously used. Concomitant prolapse surgery is an exclusion.

Exclusion Details	This measure excludes index admissions for patients: 1. Without at least 90 days post-discharge enrollment in FFS Medicare Rationale: The 90-day complication outcome cannot be assessed in this group since claims data are used to determine whether a complication of care occurred. 2. Who were discharged against medical advice (AMA); or, Rationale: Providers did not have the opportunity to deliver full care and prepare the patient for discharge. 3. Who had more than two THA/TKA procedure codes during the index hospitalization Rationale: Although clinically possible, it is highly unlikely that patients would receive more than two elective THA/TKA procedures in one hospitalization, which may reflect a coding error.	Applies the standard NSQIP approach for excluding trauma patients	According to the PCPI methodology, exclusions arise when the intervention required by the numerator is not appropriate for a group of patients who are otherwise included in the initial patient or eligible population of a measure (ie, the denominator). Exclusions are absolute and are to be removed from the denominator of a measure and therefore clinical judgment does not enter the decision. For measure Cataracts: Complications within 30 Days Following Cataract Surgery Requiring Additional Surgical Procedures, exclusions include patients with any one of a specified list of significant ocular conditions that impact the surgical complication rate. Exclusions, including applicable value sets, are included in the measure specifications. Additional details by data source are as follows: For Registry: Please see the attached value set spreadsheet for relevant coding for a specified list of significant ocular conditions that	Exclusions will be calculated using CPT codes and patient characteristics, such as gender and age. Concomitant prolapse surgery includes repair of cystocele, enterocele, rectocele or vaginal vault prolapse or hysterectomy performed due to uterine prolapse. Exclusions: 57240 57250 57260 57265 57267 57280 57282 57283 57425

			impact the surgical complication rate	
Risk Adjustment	Statistical risk model Our approach to risk adjustment is tailored to and appropriate for a publicly reported outcome measure, as articulated in the American Heart Association (AHA) Scientific Statement, "Standards for Statistical Models Used for Public Reporting of Health Outcomes" (Krumholz et al., 2006). The measure employs a hierarchical logistic regression model to create a hospital-level RSCR. In brief, the approach simultaneously models data at the patient and hospital levels to account for the variance in patient outcomes within and between hospitals (Normand & Shahian, 2007). At the patient level, the model adjusts the log-odds of complications occurring within 90 days of the index admission using age, sex, selected clinical covariates, and a hospital-specific intercept. At the hospital level, the approach models the hospital-specific intercepts as arising from a normal distribution. The hospital intercept represents the underlying risk of complication at the hospital, after accounting for patient risk. If there were no differences	Statistical risk model Hierarchical logistic regression modeling was used to calculate a hospital-specific lower extremity bypass standardized outcome ratio (LEBSOR). This is calculated as the ratio of "predicted" number of outcomes to the "expected" number of outcomes. For each hospital, the "numerator" of the ratio component of the LEBSOR is the predicted number of deaths or major complications within 30 days of LEB surgery given the hospital's performance with its observed case mix. The "denominator" is the expected number of death and major complications given the average of all hospital's case mix effects. By convention, the term "predicted" describes the numerator result, which is calculated using the hospital-specific intercept term. The "expected" is used for the denominator, which is calculated using the average hospital intercept term. Operationally, the expected number of death and major complications for each hospital is obtained by regressing the risk factors (see #16) on the complications using all hospitals in our sample, applying the	No risk adjustment or risk stratification Not applicable. No risk adjustment or risk stratification. This measure does not include a risk adjustment because the measure includes an exclusion for patients with any one of a specified list of significant ocular conditions that impact the likelihood of developing a complication. Excluding these patients captures care for the large majority of patients undergoing cataract surgery.	

	among hospitals, then after adjusting for patient risk, the hospital intercepts should be identical across all hospitals. Candidate and Final Risk-adjustment Variables: Candidate variables were patient-level risk-adjustors that were expected to be predictive of complication, based on empirical analysis, prior literature, and clinical judgment, including age and indicators of comorbidity and disease severity. For each patient, covariates are obtained from claims records extending 12 months prior to and including the index admission. For the measure currently implemented by CMS, these risk adjusters are identified using both inpatient and outpatient Medicare FFS claims data. However, in the all-payer hospital discharge database measure, the risk-adjustment variables can be obtained only from inpatient claims in the prior 12 months and the index admission. The model adjusts for case-mix differences based on the clinical status of patients at the time of admission. We use condition categories (CCs), which are clinically meaningful groupings of more than 15,000 ICD-9-CM diagnosis codes (Pope et al., 2000). A file that contains a list	subsequent estimated regression coefficients to the patient characteristics observed in the hospital, adding the average of the hospital-specific intercepts, transforming, and then summing over all patients in the hospital to get a value. This is a form of indirect standardization. The predicted hospital outcome is the number of deaths and major complications estimated in the "specific" hospital given its performance and case mix. Operationally, this is accomplished by estimating a hospital-specific intercept that herein represents baseline complications risk within the hospital, applying the estimated regression coefficients to the patient characteristics in the hospital, transforming, and then summing over all patients in the hospital to get a value. 1. FUNCTIONAL STATUS: This variable focuses on the patient's abilities to perform activities of daily living (ADLs) in the 30 days prior to surgery. Activities of daily living are defined as 'the activities usually performed in the course of a normal day in a person's life'. ADLs include: bathing, feeding, dressing, toileting, and mobility. Report the corresponding level of self-		

	of the ICD-9-CM codes and their groupings into CCs is attached in data field S.2b (Data Dictionary or Code Table). In addition, only comorbidities that convey information about the patient at admission or in the 12 months prior, and not complications that arise during the course of the index hospitalization, are included in the risk adjustment. Hence, we do not risk adjust for CCs that may represent adverse events of care when they are only recorded in the index admission. The final set of risk-adjustment variables is: Demographics Age-65 (years, continuous) for patients aged 65 or over cohorts; or Age (years, continuous) for patients aged 18 and over cohorts Male (%) THA/TKA Procedure Index admissions with an elective THA procedure Number of procedures (two vs. one) Clinical Risk Factors Other congenital deformity of hip (joint) (ICD-9 code 755.63) Post traumatic osteoarthritis (ICD-9 codes 716.15, 716.16) Morbid obesity (ICD-9 code 278.01)	care for activities of daily living demonstrated by this patient for the following two time points: (a) prior to the current illness, and (b) at the time the patient is being considered as a candidate for surgery (which should be no longer than 30 days prior to surgery). If the patient's status changes prior to surgery, that change should be reflected in your assessment of (b). For each of these time points, report the level of functional health status as defined by the following criteria. 1) Independent: The patient does not require assistance from another person for any activities of daily living. This includes a person who is able to function independently with prosthetics, equipment, or devices; 2) Partially dependent: The patient requires some assistance from another person for activities of daily living. This includes a person who utilizes prosthetics, equipment, or devices but still requires some assistance from another person for ADLs; 3) Totally dependent: The patient requires total assistance for all activities of daily living. 2. EMERGENCY SURGERY: An emergency case is usually performed as soon as possible		

	Metastatic cancer or acute leukemia (CC 7) Cancer (CC 8-12) Respiratory/heart/digestive/urinary/other neoplasms (CC 11-13) Diabetes mellitus (DM) or DM complications (CC 15-20, 119, 120) Protein-calorie malnutrition (CC 21) Bone/joint/muscle infections/necrosis (CC 37) Rheumatoid arthritis and inflammatory connective tissue disease (CC 38) Osteoarthritis of hip or knee (CC 40) Osteoporosis and other bone/cartilage disorders (CC 41) Dementia or other specific brain disorders (CC 49-50) Major psychiatric disorders (CC 54-56) Hemiplegia, paraplegia, paralysis, function disability (CC 67-69, 100-102, 177-178) Cardio-respiratory failure and shock (CC 79) Coronary atherosclerosis or angina (CC 83-84) Stroke (CC 95-96) Vascular or circulatory disease (CC 104-106) Chronic obstructive pulmonary disease (COPD) (CC 108)	and no later than 12 hours after the patient has been admitted to the hospital or after the onset of related preoperative symptomatology. Answer 'yes' if the surgeon and anesthesiologist report the case as emergent. 3. WORK RVU: Relative Value Unit: a factor tied to CPT codes developed and maintained by CMS, which is used in pricing of medical services 4. SGOT > 40: Pre-operative Lab Value 5. SERUM ALBUMIN: Pre-operative Lab Value 6. ASA CLASS: American Society of Anesthesiology class: Class I. Normal healthy patient; Class II. Patient with mild systemic disease Class III. Patient with severe systemic disease; Class IV. Patient with severe systemic disease that is a constant threat to life; Class V. a moribund patient who is not expected to survive without the operation 7. REST PAIN/GANGRENE: Rest pain is a more severe form of ischemic pain due to occlusive disease, which occurs at rest and		

	Pneumonia (CC 111-113) Pleural effusion/pneumothorax (CC 114) Dialysis status (CC 130) Renal failure (CC 131) Decubitus ulcer or chronic skin ulcer (CC 148-149) Trauma (CC 154-156, 158-161) Vertebral fractures (CC 157) Other injuries (CC 162) Major complications of medical care and trauma (CC 164) References: Krumholz HM, Brindis RG, Brush JE, et al. 2006. Standards for Statistical Models Used for Public Reporting of Health Outcomes: An American Heart Association Scientific Statement From the Quality of Care and Outcomes Research Interdisciplinary Writing Group: Cosponsored by the Council on Epidemiology and Prevention and the Stroke Council Endorsed by the American College of Cardiology Foundation. Circulation 113: 456-462. Normand S-LT, Shahian DM. 2007. Statistical and Clinical Aspects of Hospital Outcomes Profiling. Stat Sci 22 (2): 206-226. Pope G,Ellis R,Ash A, et al. Principal Inpatient Diagnostic Cost Group Models for	is manifested as a severe, unrelenting pain aggravated by elevation and often preventing sleep. Gangrene is a marked skin discoloration and disruption indicative of death and decay of tissues in the extremities due to severe and prolonged ischemia. Include patients with ischemic ulceration and/or tissue loss related to peripheral vascular disease. Do not include Fournier's gangrene. 8. TRANSFUSION >4 units within 72 hours of surgery: Preoperative loss of blood necessitating a minimum of 5 units of whole blood/packed red cells transfused during the 72 hours prior to surgery including any blood transfused in the emergency room. 9. MALE: Gender 10. CREATININE > 1.2 mg/dl: Pre-operative Lab Value		

	Medicare Risk Adjustment. Health Care Financing Review. 2000;21(3):26. Available in attached Excel or csv file at S.2b			
Stratification	N/A		Consistent with CMS' Measures Management System Blueprint and recent national recommendations put forth by the IOM and NQF to standardize the collection of race and ethnicity data, we encourage the results of this measure to be stratified by race, ethnicity, administrative sex, and payer and have included these variables as recommended data elements to be collected.	
Type Score	Rate/proportion better quality = lower score		Rate/proportion better quality = lower score	Rate/proportion better quality = higher score
Algorithm	The measure estimates hospital-level RSCRs following elective primary THA/TKA using hierarchical logistic regression models. In brief, the approach simultaneously models data at the patient and hospital levels to account for variance in patient outcomes within and between hospitals (Normand and Shahian, 2007). At the patient level, it models the log-odds of a complication occurring within 90 days of the index		To calculate performance rates: 1. Find the patients who meet the initial population (ie, the general group of patients that a set of performance measures is designed to address). 2. From the patients within the initial population criteria, find the patients who qualify for the denominator. (ie, the specific group of patients	See algorithm in 2a2.2

	admission using age, sex, selected clinical covariates, and a hospital-specific intercept. At the hospital level, it models the hospital-specific intercepts as arising from a normal distribution. The hospital intercept represents the underlying risk of a complication at the hospital, after accounting for patient risk. The hospital-specific intercepts are given a distribution to account for the clustering (non-independence) of patients within the same hospital. If there were no differences among hospitals, then after adjusting for patient risk, the hospital intercepts should be identical across all hospitals. The RSCR is calculated as the ratio of the number of "predicted" to the number of "expected" admissions with a complication at a given hospital, multiplied by the national observed complication rate. For each hospital, the numerator of the ratio is the number of complications within 90 days predicted on the basis of the hospital's performance with its observed case mix, and the denominator is the number of complications expected based on the nation's performance with that hospital's case mix.		for inclusion in a specific performance measure based on defined criteria). Note: in some cases the initial population and denominator are identical. 3. Find the patients who qualify for denominator exclusions and subtract from the denominator. 4. From the patients within the denominator, find the patients who meet the numerator criteria (ie, the group of patients in the denominator for whom a process or outcome of care occurs). Validate that the number of patients in the numerator is less than or equal to the number of patients in the denominator If the patient does not meet the numerator, this case represents a quality failure. This measure does not include a risk adjustment because the measure includes an exclusion for patients with any one of a specified list of significant ocular conditions that impact the likelihood of developing a complication. Excluding these patients captures care for the large majority of patients	

	This approach is analogous to a ratio of "observed" to "expected" used in other types of statistical analyses. It conceptually allows for a comparison of a particular hospital's performance given its case mix to an average hospital's performance with the same case mix. Thus, a lower ratio indicates lower-than-expected complication rates or better quality, and a higher ratio indicates higher-than-expected complication rates or worse quality. The "predicted" number of admissions with a complication (the numerator) is calculated by using the coefficients estimated by regressing the risk factors and the hospital-specific intercept on the risk of having an admission with a complication. The estimated hospital-specific intercept is added to the sum of the estimated regression coefficients multiplied by the patient characteristics. The results are log transformed and summed over all patients attributed to a hospital to get a predicted value. The "expected" number of admissions with a complication (the denominator) is obtained in the same manner, but a common intercept using		undergoing cataract surgery. No diagram provided	

	all hospitals in our sample is added in place of the hospital-specific effect. The results are log transformed and summed over all patients in the hospital to get an expected value. To assess hospital performance for each reporting period, we re-estimate the model coefficients using the years of data in that period. This calculation transforms the ratio of predicted over expected into a rate that is compared to the national observed complication rate. The hierarchical logistic regression models are described fully in the original methodology report (Grosso et al., 2012). References: Grosso L, Curtis J, Geary L, et al. Hospital-level Risk-Standardized Complication Rate Following Elective Primary Total Hip Arthroplasty (THA) And/Or Total Knee Arthroplasty (TKA) Measure Methodology Report. 2012. Normand S-LT, Shahian DM. 2007. Statistical and Clinical Aspects of Hospital Outcomes Profiling. Stat Sci 22(2): 206-226. Available in attached appendix at A.1			
Submission items	5.1 Identified measures: 0534 : Hospital specific risk-adjusted		5.1 Identified measures:	5.1 Identified measures: 0098 : Urinary

	measure of mortality or one or more major complications within 30 days of a lower extremity bypass (LEB). 0564 : Cataracts: Complications within 30 Days Following Cataract Surgery Requiring Additional Surgical Procedures 1551 : Hospital-level 30-day risk-standardized readmission rate (RSRR) following elective primary total hip arthroplasty (THA) and/or total knee arthroplasty (TKA) 2052 : Reduction of Complications through the use of Cystoscopy during Surgery for Stress Urinary Incontinence 5a.1 Are specs completely harmonized? Yes 5a.2 If not completely harmonized, identify difference, rationale, impact: We did not include in our list of related measures any non-outcome measures (for example, process measures) with the same target population as our measure. Because this is an outcome measure, clinical coherence of the cohort takes precedence over alignment with related non-outcome measures. Furthermore, non-outcome measures are limited due to		5a.1 Are specs completely harmonized? 5a.2 If not completely harmonized, identify difference, rationale, impact: Not applicable. 5b.1 If competing, why superior or rationale for additive value: Not applicable	Incontinence: Assessment, Characterization, and Plan of Care for Urinary Incontinence in Women Aged 65 Years and Older 0099 : Urinary Incontinence: Characterization of Urinary Incontinence in Women Aged 65 Years and Older 0100 : Urinary Incontinence: Plan of Care for Urinary Incontinence in Women Aged 65 Years and Older 0030 : Management of Urinary Incontinence in Older Adults (MUI) 5a.1 Are specs completely harmonized? 5a.2 If not completely harmonized, identify difference, rationale, impact: As a rule, AUA/ACOG seek to harmonize proposed measures with those currently in use for the same topics. For example, the first of the proposed measures “Complete Workup for Assessment of Stress Urinary Incontinence” describes procedures consistent with

	broader patient exclusions. This is because they typically only include a specific subset of patients who are eligible for that measure (for example, patients who receive a specific medication or undergo a specific procedure). 5b.1 If competing, why superior or rationale for additive value: N/A			common standard practices. In developing the proposed set of measures, extant performance measures were considered and kept in mind but were of limited usefulness because they were designed to apply to urinary incontinence in general and to women over 65 years of age. In contrast, we required measures that focused on the surgical intervention for SUI in particular and included women under 65 year of age who constitute the majority of those affected by SUI.As a rule, AUA/ACOG seek to harmonize proposed measures with those currently in use for the same topics. For example, the first of the proposed measures "Complete Workup for Assessment of Stress Urinary Incontinence" describes procedures consistent with common standard practices. In developing the proposed set of measures, extant performance measures were considered and kept in mind but were of limited usefulness because they

				were designed to apply to urinary incontinence in general and to women over 65 years of age. In contrast, we required measures that focused on the surgical intervention for SUI in particular and included women under 65 year of age who constitute the majority of those affected by SUI. 5b.1 If competing, why superior or rationale for additive value:

Comparison of NQF #1551, #0505, #0506, #0330, #1789, and #1891

	1551 Hospital-level 30-day risk-standardized readmission rate (RSRR) following elective primary total hip arthroplasty (THA) and/or total knee arthroplasty (TKA)	0505 Hospital 30-day all-cause risk-standardized readmission rate (RSRR) following acute myocardial infarction (AMI) hospitalization.	0506 Hospital 30-day, all-cause, risk-standardized readmission rate (RSRR) following pneumonia hospitalization	0330 Hospital 30-day, all-cause, risk-standardized readmission rate (RSRR) following heart failure (HF) hospitalization	1789 Hospital-Wide All-Cause Unplanned Readmission Measure (HWR)	1891 Hospital 30-day, all-cause, risk-standardized readmission rate (RSRR) following chronic obstructive pulmonary disease (COPD) hospitalization
Steward	Centers for Medicare & Medicaid Services	Centers for Medicare & Medicaid Services	Centers for Medicare & Medicaid Services	Centers for Medicare & Medicaid Services	Centers for Medicare & Medicaid Services	Centers for Medicare & Medicaid Services
Description	The measure estimates a hospital-level risk-standardized readmission rate	The measure estimates a hospital-level 30-day risk-standardized	The measure estimates a hospital-level 30-day, all-cause, risk-standardized	The measure estimates a hospital-level risk-standardized readmission rate	The measure estimates a hospital-level risk-standardized readmission rate	The measure estimates a hospital-level 30-day, all-cause, risk-standardized

	(RSRR) following elective primary THA and/or TKA in Medicare Fee-For-Service beneficiaries who are 65 years and older. The outcome (readmission) is defined as unplanned readmission for any cause within 30 days of the discharge date for the index admission (the admission included in the measure cohort). A specified set of planned readmissions do not count in the readmission outcome. The target population is patients 18 and over. CMS annually reports the measure for patients who are 65 years or older, are enrolled in fee-for-service (FFS) Medicare, and hospitalized in non-federal acute-care hospitals.	readmission rate (RSRR) for patients discharged from the hospital with a principal diagnosis of acute myocardial infarction (AMI). The outcome is defined as unplanned readmission for any cause within 30 days of the discharge date for the index admission. A specified set of planned readmissions do not count as readmissions. The target population is patients aged 18 years and older. CMS annually reports the measure for individuals who are 65 years and older and are either Medicare fee-for-service (FFS) beneficiaries hospitalized in non-federal hospitals or patients hospitalized in Department of	readmission rate (RSRR) for patients discharged from the hospital with either a principal discharge diagnosis of pneumonia, including aspiration pneumonia or a principal discharge diagnosis of sepsis (not severe sepsis) with a secondary diagnosis of pneumonia (including aspiration pneumonia) coded as present on admission (POA). Readmission is defined as unplanned readmission for any cause within 30 days of the discharge date for the index admission. A specified set of planned readmissions do not count as readmissions. CMS annually reports the measure for patients who are 65 years or older and	(RSRR) for patients discharged from the hospital with a principal diagnosis of heart failure (HF). The outcome (readmission) is defined as unplanned readmission for any cause within 30 days of the discharge date for the index admission (the admission included in the measure cohort). A specified set of planned readmissions do not count in the readmission outcome. The target population is patients 18 and over. CMS annually reports the measure for patients who are 65 years or older, are enrolled in fee-for-service (FFS) Medicare, and hospitalized in non-federal hospitals or Veterans Health Administration (VA) hospitals.	(RSRR) of unplanned, all-cause readmission after admission for any eligible condition within 30 days of hospital discharge. The measure reports a single summary RSRR, derived from the volume-weighted results of five different models, one for each of the following specialty cohorts based on groups of discharge condition categories or procedure categories: surgery/gynecology; general medicine; cardiorespiratory; cardiovascular; and neurology, each of which will be described in greater detail below. The measure also indicates the hospital-level standardized risk ratios (SRR) for each of these five specialty cohorts.	readmission rate (RSRR) for patients discharged from the hospital with either a principal discharge diagnosis of COPD or a principal discharge diagnosis of respiratory failure with a secondary diagnosis of acute exacerbation of COPD. The outcome (readmission) is defined as unplanned readmission for any cause within 30 days of the discharge date for the index admission (the admission included in the measure cohort). A specified set of planned readmissions do not count in the readmission outcome. CMS annually reports the measure for patients who are 65 years or older, are enrolled in fee-for-service (FFS) Medicare, and

		Veterans Affairs (VA) facilities.	are enrolled in fee-for-service (FFS) Medicare hospitalized in non-federal hospitals. Please note this measure has been substantially updated since the last submission; as described in S.3., the cohort has been expanded. Throughout this application we refer to this measure as version 8.2.		The outcome is defined as unplanned readmission for any cause within 30 days of the discharge date for the index admission (the admission included in the measure cohort). A specified set of planned readmissions do not count in the readmission outcome. CMS annually reports the measure for patients who are 65 years or older, are enrolled in fee-for-service (FFS) Medicare, and hospitalized in non-federal hospitals.	hospitalized in non-federal hospitals.
Type	Outcome	Outcome	Outcome	Outcome	Outcome	Outcome
Data Source	Administrative claims, Other Data sources: The currently publically reported measure is specified and has been testing using: 1. Medicare Part A inpatient and Part B	Claims	Administrative claims Data sources for the Medicare FFS measure: 1. Medicare Part A inpatient and Part B outpatient claims: This data source contains claims data for FFS inpatient	Administrative claims Data sources for the Medicare FFS measure: 1. Medicare Part A inpatient and Part B outpatient claims: This data source contains claims data for FFS inpatient	Administrative claims Data sources for the Medicare FFS measure: 1. Medicare Part A claims data for calendar years 2007 and 2008 were combined and then randomly split into	Administrative claims Data sources for the Medicare FFS measure: 1. Medicare Part A inpatient and Part B outpatient claims: This data source contains claims data for FFS inpatient

	outpatient claims: This data source contains claims data for FFS inpatient and outpatient services including: Medicare inpatient hospital care, outpatient hospital services, as well as inpatient and outpatient physician claims for the 12 months prior to an index admission. 2. Medicare Enrollment Database (EDB): This database contains Medicare beneficiary demographic, benefit/coverage, and vital status information. This data source was used to obtain information on several inclusion/exclusion indicators such as Medicare status on admission as well as vital status at discharge. These data have previously been		and outpatient services including: Medicare inpatient hospital care, outpatient hospital services, as well as inpatient and outpatient physician claims for the 12 months prior to an index admission. 2. Medicare Enrollment Database (EDB): This database contains Medicare beneficiary demographic, benefit/coverage, and vital status information. This data source was used to obtain information on several inclusion/exclusion indicators such as Medicare status on admission as well as vital status. These data have previously been shown to accurately reflect patient vital status (Fleming et al., 1992).	and outpatient services including: Medicare inpatient hospital care, outpatient hospital services, as well as inpatient and outpatient physician claims for the 12 months prior to an index admission. 2. Medicare Enrollment Database (EDB): This database contains Medicare beneficiary demographic, benefit/coverage, and vital status information. This data source was used to obtain information on several inclusion/exclusion indicators such as Medicare status on admission as well as vital status. These data have previously been shown to accurately reflect patient vital status (Fleming et al., 1992).	two equal subsets (development sample and validation sample). Risk variable selection was done using the development sample, the risk models for each of the five specialty cohorts in the measure were applied to the validation sample and the models' performance was compared. In addition we re-tested the models in Medicare Part A claims data from calendar year 2009 to look for temporal stability in the models' performance. The number of measured entities and index admissions are listed below by specialty cohort. 2. Medicare Enrollment Database (EDB): This database contains Medicare	and outpatient services including: Medicare inpatient hospital care, outpatient hospital services, as well as inpatient and outpatient physician claims for the 12 months prior to an index admission. 2. Medicare Enrollment Database (EDB): This database contains Medicare beneficiary demographic, benefit/coverage, and vital status information. This data source was used to obtain information on several inclusion/exclusion indicators such as Medicare status on admission as well as vital status. These data have previously been shown to accurately reflect patient vital status (Fleming et al., 1992).

	shown to accurately reflect patient vital status (Fleming et al., 1992). The measure was also specified and testing using an all-payer claims dataset although it is only publically reported using the data sources listed above: 3. California Patient Discharge Data in addition to CMS Medicare FFS data for patients in California hospitals. Using all-payer data from California, we performed analyses to determine whether the THA/TKA readmission measure can be applied to all adult patients, including not only FFS Medicare patients aged 65 years or over, but also non-FFS Medicare patients aged 18-64 years at the time of admission.		3. The American Community Survey (2008-2012): The American Community Survey data are collected annually and an aggregated 5-years of data were used to calculate the AHRQ SES composite index score. 4. Data sources for the all-payer update: For our analyses to examine use in all-payer data, we used all-payer data from California in addition to CMS data for Medicare FFS 65+ patients in California hospitals. California is a diverse state, and, with more than 37 million residents, California represents 12% of the US population. We used the California Patient Discharge Data, a large, linked database of patient hospital admissions.	3. The American Community Survey (2008-2012): The American Community Survey data are collected annually and an aggregated 5-years data were used to calculate the AHRQ socioeconomic status (SES) composite index score. 4. Data sources for the all-payer testing: For our analyses to examine use in all-payer data, we used all-payer data from California. California is a diverse state, and, with more than 37 million residents, California represents 12% of the US population. We used the California Patient Discharge Data, a large, linked database of patient hospital admissions. In 2006, there were approximately 3 million adult discharges from	beneficiary demographic, benefit/coverage, and vital status information. This data source was used to obtain information on several inclusion/exclusion indicators such as Medicare status on admission and following discharge from index admission Reference: Fleming C., Fisher ES, Chang CH, Bubolz D, Malenda J. Studying outcomes and hospital utilization in the elderly: The advantages of a merged data base for Medicare and Veterans Affairs Hospitals. Medical Care. 1992; 30(5): 377-91. No data collection instrument provided Attachment NQF_1789_HWR_N	3. The American Community Survey (2008-2012): The American Community Survey data are collected annually and an aggregated 5-years of data were used to calculate the AHRQ SES composite index score. 4. Data sources for the all-payer testing: For our analyses to examine use in all-payer data, we used all-payer data from California. California is a diverse state, and, with more than 37 million residents, California represents 12% of the US population. We used the California Patient Discharge Data, a large, linked database of patient hospital admissions. In 2006, there were approximately 3 million adult discharges from more than 450 non-

	Additional data source used for the analysis of the impact of SES variables on the measure's risk model. Note that the variables derived from these data are not included in the measure as specified 4. The American Community Survey (2009-2013): The American Community Survey data are collected annually and an aggregated 5-years data were used to calculate the AHRQ socioeconomic status (SES) composite index score. Reference: Fleming C., Fisher ES, Chang CH, Bubolz D, Malenda J. Studying outcomes and hospital utilization in the elderly: The advantages of a merged data base		In 2009, there were 3,193,904 adult discharges from 446 non-Federal acute care hospitals. Records are linked by a unique patient identification number, allowing us to determine patient history from previous hospitalizations and to evaluate rates of both readmission and mortality (via linking with California vital statistics records). Using all-payer data from California as well as CMS Medicare FFS data for California hospitals, we performed analyses to determine whether the pneumonia mortality measure can be applied to all adult patients, including not only FFS Medicare patients aged 65+ but also non-FFS Medicare patients aged 18-64 years at	more than 450 non-Federal acute care hospitals. Records are linked by a unique patient identification number, allowing us to determine patient history from previous hospitalizations and to evaluate rates of both readmission and mortality (via linking with California vital statistics records). Using all-payer data from California, we performed analyses to determine whether the HF readmission measure can be applied to all adult patients, including not only FFS Medicare patients aged 65 years or over, but also non-FFS Medicare patients aged 18-64 years at the time of admission. Reference: Fleming C., Fisher ES, Chang CH,	QF_Data_Dictionary_01-29-16_v1.0.xlsx	Federal acute care hospitals. Records are linked by a unique patient identification number, allowing us to determine patient history from previous hospitalizations and to evaluate rates of both readmission and mortality (via linking with California vital statistics records). Using all-payer data from California, we performed analyses to determine whether the COPD readmission measure can be applied to all adult patients, including not only FFS Medicare patients aged 65 years or over, but also non-FFS Medicare patients aged 18-64 years at the time of admission. Reference: Fleming C., Fisher ES, Chang CH, Bubolz D, Malenda

	for Medicare and Veterans Affairs Hospitals. Medical Care. 1992; 30(5): 377-91. Dorsey K, Grady J, Desai N, et al. 2016 Procedure-Specific Measures Updates and Specifications Report Hospital-Level 30-Day Risk-Standardized Readmission Measures: Elective Primary Total Hip Arthroplasty (THA) and/or Total Knee Arthroplasty (TKA) & Elective Primary Total Hip Arthroplasty (THA) and/or Total Knee Arthroplasty (TKA) (Version 5.0). 2016 No data collection instrument provided Attachment NQF_1551_HipKnee_Readmission_S2b_Data_Dictionary_v1.0.xlsx		the time of admission. Reference: Fleming C., Fisher ES, Chang CH, Bubolz D, Malenda J. Studying outcomes and hospital utilization in the elderly: The advantages of a merged data base for Medicare and Veterans Affairs Hospitals. Medical Care. 1992; 30(5): 377-91. No data collection instrument provided Attachment NQF_0506_PN_Readmission_S2b_Readmission_Data_Dictionary_v1.0.xlsx	Bubolz D, Malenda J. Studying outcomes and hospital utilization in the elderly: The advantages of a merged data base for Medicare and Veterans Affairs Hospitals. Medical Care. 1992; 30(5): 377-91. No data collection instrument provided Attachment NQF_0330_HF_Readmission_S2b_Data_Dictionary_v1.0.xlsx		J. Studying outcomes and hospital utilization in the elderly: The advantages of a merged data base for Medicare and Veterans Affairs Hospitals. Medical Care. 1992; 30(5): 377-91. No data collection instrument provided Attachment NQF_1891_COPD_Readmission_S2b_Readmission_Data_Dictionary_v1.0.xlsx
Level	Facility	Facility	Facility	Facility	Facility	Facility
Setting	Hospital/Acute Care Facility	Hospital	Hospital/Acute Care Facility	Hospital/Acute Care Facility	Hospital/Acute Care Facility	Hospital/Acute Care Facility

Numerator Statement	The outcome for this measure is 30-day readmission. We define readmission as an inpatient admission for any cause, with the exception of certain planned readmissions, within 30 days from the date of discharge of the index hospitalization. If a patient has more than one unplanned admissions (for any reason) within 30 days after discharge from the index admission, only one is counted as a readmission. The measure looks for a dichotomous yes or no outcome of whether each admitted patient has an unplanned readmission within 30 days. However, if the first readmission after discharge is considered planned, any subsequent	The outcome for this measure is 30-day readmission. We define readmission as an inpatient admission for any cause, with the exception of certain planned readmissions, within 30 days from the date of discharge from the index AMI admission. If a patient has more than one unplanned admission within 30 days of discharge from the index admission, only the first one is counted as a readmission. The measure looks for a dichotomous yes or no outcome of whether each admitted patient has an unplanned readmission within 30 days. However, if the first readmission after discharge is considered planned, then no readmission is counted, regardless	The outcome for this measure is 30-day readmission. We define readmission as an inpatient admission for any cause, with the exception of certain planned readmissions, within 30 days from the date of discharge from the index admission for patients 18 and older discharged from the hospital with a principal discharge diagnosis of pneumonia, including aspiration pneumonia or a principal discharge diagnosis of sepsis (not severe sepsis) with a secondary discharge diagnosis of pneumonia (including aspiration pneumonia) coded as POA and no secondary discharge diagnosis of severe sepsis. If a patient has more than one unplanned admission (for any	The outcome for this measure is 30-day readmission. We define readmission as an inpatient admission for any cause, with the exception of certain planned readmissions, within 30 days from the date of discharge from the index HF admission. If a patient has more than one unplanned admissions (for any reason) within 30 days after discharge from the index admission, only one is counted as a readmission. The measure looks for a dichotomous yes or no outcome of whether each admitted patient has an unplanned readmission within 30 days. However, if the first readmission after discharge is considered planned, any subsequent	The outcome for this measure is 30-day readmission. We define readmission as an inpatient admission for any cause, with the exception of certain planned readmissions, within 30 days from the date of discharge from an eligible index admission. If a patient has more than one unplanned admission (for any reason) within 30 days after discharge from the index admission, only one is counted as a readmission. The measure looks for a dichotomous yes or no outcome of whether each admitted patient has an unplanned readmission within 30 days. However, if the first readmission after discharge is considered planned, any subsequent	The outcome for this measure is 30-day readmission. We define readmission as an inpatient admission for any cause, with the exception of certain planned readmissions, within 30 days from the date of discharge from the index admission for patients discharged from the hospital with a principal discharge diagnosis of COPD or principal discharge diagnosis of respiratory failure with a secondary discharge diagnosis of acute exacerbation of COPD. If a patient has more than one unplanned admission (for any reason) within 30 days after discharge from the index admission, only the first one is counted as a readmission. The measure looks for a dichotomous

	unplanned readmission is not counted as an outcome for that index admission, because the unplanned readmission could be related to care provided during the intervening planned readmission rather than during the index admission.	of whether a subsequent unplanned readmission takes place. This is because it is not clear whether such readmissions are appropriately attributed to the original index admission or the intervening planned readmission.	reason) within 30 days after discharge from the index admission, only the first one is counted as a readmission. The measure looks for a dichotomous yes or no outcome of whether each admitted patient has an unplanned readmission within 30 days. However, if the first readmission after discharge is considered planned, any subsequent unplanned readmission is not counted as an outcome for that index admission because the unplanned readmission could be related to care provided during the intervening planned readmission rather than during the index admission.	unplanned readmission is not counted as an outcome for that index admission, because the unplanned readmission could be related to care provided during the intervening planned readmission rather than during the index admission.	unplanned readmission is not counted as an outcome for that index admission because the unplanned readmission could be related to care provided during the intervening planned readmission rather than during the index admission.	yes or no outcome of whether each admitted patient has an unplanned readmission within 30 days. However, if the first readmission after discharge is considered planned, any subsequent unplanned readmission is not counted as an outcome for that index admission because the unplanned readmission could be related to care provided during the intervening planned readmission rather than during the index admission.
Numerator Details	The measure counts readmissions to any acute care hospital	The measure counts readmissions to any acute care hospital	The measure counts readmissions to any acute care hospital	The measure counts readmissions to any acute care hospital	The measure counts readmissions to any acute care hospital	The measure counts readmissions to any acute care hospital

	for any cause within 30 days of the date of discharge of the index THA and/or TKA hospitalization, excluding planned readmissions as defined below. Planned Readmission Algorithm (Version 4.0) The Planned Readmission Algorithm is a set of criteria for classifying readmissions as planned among the general Medicare population using Medicare administrative claims data. The algorithm identifies admissions that are typically planned and may occur within 30 days of discharge from the hospital. The Planned Readmission Algorithm has three fundamental principles:	for any cause within 30 days of the date of discharge of the index AMI admission, excluding planned readmissions as defined below. Planned Readmission Algorithm The Planned Readmission Algorithm is a set of criteria for classifying readmissions as planned among the general Medicare population using Medicare administrative claims data. The algorithm identifies admissions that are typically planned and may occur within 30 days of discharge from the hospital. The Planned Readmission Algorithm has three fundamental principles:	for any cause within 30 days of the date of discharge of the index pneumonia admission, excluding planned readmissions as defined below. Planned Readmission Algorithm (Version 4.0) The planned readmission algorithm is a set of criteria for classifying readmissions as planned among the general Medicare population using Medicare administrative claims data. The algorithm identifies admissions that are typically planned and may occur within 30 days of discharge from the hospital. The planned readmission algorithm has three fundamental principles:	for any cause within 30 days of the date of discharge of the index HF admission, excluding planned readmissions as defined below. Planned Readmission Algorithm (Version 4.0) The Planned Readmission Algorithm is a set of criteria for classifying readmissions as planned among the general Medicare population using Medicare administrative claims data. The algorithm identifies admissions that are typically planned and may occur within 30 days of discharge from the hospital. The Planned Readmission Algorithm has three fundamental principles: 1. A few specific, limited types of	for any cause within 30 days of the date of discharge of the index admission, excluding planned readmissions as defined below. Planned Readmission Algorithm (Version 4.0) The Planned Readmission Algorithm is a set of criteria for classifying readmissions as planned among the general Medicare population using Medicare administrative claims data. The algorithm identifies admissions that are typically planned and may occur within 30 days of discharge from the hospital. The Planned Readmission Algorithm has three fundamental principles: 1. A few specific, limited types of	for any cause within 30 days of the date of discharge of the index COPD admission, excluding planned readmissions as defined below. Planned Readmission Algorithm (Version 3.0) The Planned Readmission Algorithm is a set of criteria for classifying readmissions as planned among the general Medicare population using Medicare administrative claims data. The algorithm identifies admissions that are typically planned and may occur within 30 days of discharge from the hospital. The Planned Readmission Algorithm has three fundamental principles:

	1. A few specific, limited types of care are always considered planned (transplant surgery, maintenance chemotherapy/immunotherapy, rehabilitation); 2. Otherwise, a planned readmission is defined as a non-acute readmission for a scheduled procedure; and 3. Admissions for acute illness or for complications of care are never planned. The algorithm was developed in 2011 as part of the Hospital-Wide Readmission measure. In 2013, CMS applied the algorithm to its other readmission measures. In applying the algorithm to condition- and procedure-specific measures, teams of clinical experts	1. A few specific, limited types of care are always considered planned (obstetric delivery, transplant surgery, maintenance chemotherapy/radiotherapy/immunotherapy, rehabilitation); 2. Otherwise, a planned readmission is defined as a non-acute readmission for a scheduled procedure; and 3. Admissions for acute illness or for complications of care are never planned. The algorithm was developed in 2011 as part of the Hospital-Wide Readmission measure. In 2013, CMS applied the algorithm to its other readmission measures. The Planned Readmission Algorithm replaced	1. A few specific, limited types of care are always considered planned (transplant surgery, maintenance chemotherapy/immunotherapy, rehabilitation); 2. Otherwise, a planned readmission is defined as a non-acute readmission for a scheduled procedure; and 3. Admissions for acute illness or for complications of care are never planned. The algorithm was developed in 2011 as part of the Hospital-Wide Readmission measure. In 2013, CMS applied the algorithm to its other readmission measures. In applying the algorithm to condition- and procedure-specific measures, teams of clinical experts	care are always considered planned (transplant surgery, maintenance chemotherapy/immunotherapy, rehabilitation); 2. Otherwise, a planned readmission is defined as a non-acute readmission for a scheduled procedure; and 3. Admissions for acute illness or for complications of care are never planned. The algorithm was developed in 2011 as part of the Hospital-Wide Readmission measure. In 2013, CMS applied the algorithm to its other readmission measures. In applying the algorithm to condition- and procedure-specific measures, teams of clinical experts reviewed the algorithm in the	care are always considered planned (obstetric delivery, transplant surgery, maintenance chemotherapy/immunotherapy, rehabilitation); 2. Otherwise, a planned readmission is defined as a non-acute readmission for a scheduled procedure; and 3. Admissions for acute illness or for complications of care are never planned. The algorithm was developed in 2011 as part of the Hospital-Wide Readmission measure. In 2013, CMS applied the algorithm to its other readmission measures. The Planned Readmission Algorithm and associated code tables are attached in data field S.2b	1. A few specific, limited types of care are always considered planned (obstetric delivery, transplant surgery, maintenance chemotherapy/immunotherapy, rehabilitation); 2. Otherwise, a planned readmission is defined as a non-acute readmission for a scheduled procedure; and 3. Admissions for acute illness or for complications of care are never planned. The algorithm was developed in 2011 as part of the Hospital-Wide Readmission measure. In 2013, CMS applied the algorithm to its other readmission measures. In applying the algorithm to condition- and procedure-specific measures, teams of

	reviewed the algorithm in the context of each measure-specific patient cohort and, where clinically indicated, adapted the content of the algorithm to better reflect the likely clinical experience of each measure's patient cohort. For the THA/TKA readmission measure, CMS used the Planned Readmission Algorithm without making any changes. The Planned Readmission Algorithm and associated code tables are attached in data field S.2b (Data Dictionary or Code Table). For more details on the Planned Readmission Algorithm, please see the report titled "2016 Procedure-Specific Measures Updates and	the definition of planned readmissions in the original AMI measure because the algorithm uses a more comprehensive definition. In applying the algorithm to condition- and procedure-specific measures, teams of clinical experts reviewed the algorithm in the context of each measure-specific patient cohort and, where clinically indicated, adapted the content of the algorithm to better reflect the likely clinical experience of each measure's patient cohort. For the AMI readmission measure, CMS used the Planned Readmission Algorithm without making any changes. Analyzing Medicare FFS data from July	reviewed the algorithm in the context of each measure-specific patient cohort and, where clinically indicated, adapted the content of the algorithm to better reflect the likely clinical experience of each measure's patient cohort. The planned readmission algorithm is applied to the pneumonia measure without modifications. The planned readmission algorithm and associated code tables are attached in data field S.2b (Data Dictionary or Code Table).	context of each measure-specific patient cohort and, where clinically indicated, adapted the content of the algorithm to better reflect the likely clinical experience of each measure's patient cohort. For the heart failure readmission measure, CMS used the Planned Readmission Algorithm without making any changes. The Planned Readmission Algorithm and associated code tables are attached in data field S.2b (Data Dictionary or Code Table). For more details on the Planned Readmission Algorithm, please see the report titled "2015 Condition-Specific Measures Updates and Specifications Report Hospital-	(Data Dictionary or Code Table).	clinical experts reviewed the algorithm in the context of each measure-specific patient cohort and, where clinically indicated, adapted the content of the algorithm to better reflect the likely clinical experience of each measure's patient cohort. For the COPD readmission measure, CMS used the Planned Readmission Algorithm without making any changes. The Planned Readmission Algorithm and associated code tables are attached in data field S.2b (Data Dictionary or Code Table).

	Specifications Report Hospital-Level 30-Day Risk-Standardized Readmission Measures, Version 5.0" posted in data field A.1 or at https://www.qualitynet.org/dcs/BlobServer?blobkey=id&blobnocache=true&blobwhere=1228890567754&blobheader=multipart%2Foctet-stream&blobheadername1=Content-Disposition&blobheadervalue1=attachment%3Bfilename%3DProcSpecific_Rdmsn_Rpt_2016.pdf&blobcol=urldata&blobtable=MungoBlobs.	2009-June 2012, 2.4% of index hospitalizations after AMI were followed by a planned readmission within 30 days of discharge. The Planned Readmission Algorithm and associated code tables are attached in data field S.2b (Data Dictionary or Code Table). For more details on the Planned Readmission Algorithm, please see the report titled "2013 Measures Updates and Specifications Report: Hospital-Level 30-Day Risk-Standardized Readmission Measures for Acute Myocardial Infarction, Heart Failure, and Pneumonia (Version 6.0)" posted on the web page provided in data field S.1.		Level 30-Day Risk-Standardized Readmission Measures for HF, version 4.0" posted in data field A.1 or at https://www.qualitynet.org/dcs/BlobServer?blobkey=id&blobnocache=true&blobwhere=1228890435217&blobheader=multipart%2Foctet-stream&blobheadername1=Content-Disposition&blobheadervalue1=attachment%3Bfilename%3DRdmn_AMIHFPNCOPDSTK_Msr_UpdtRpt.pdf&blobcol=urldata&blobtable=MungoBlobs.		

Denominator Statement	The target population for the publicly reported measure includes admissions for Medicare FFS beneficiaries who are at least 65 years of age undergoing elective primary THA and/or TKA procedures. Additional details are provided in S.9 Denominator Details.	The target population for this measure is patients aged 18 years and older hospitalized for AMI. The measure is currently publicly reported by CMS for those 65 years and older who are either Medicare FFS beneficiaries admitted to non-federal hospitals or patients admitted to VA hospitals. The measure includes admissions for patients discharged from the hospital with a principal diagnosis of AMI and with a complete claims history for the 12 months prior to admission. As noted above, this measure can also be used for an all-payer population aged 18 years and older. We have explicitly tested the measure in both patients aged 18+	This claims-based measure can be used in either of two patient cohorts: (1) patients aged 65 years or over or (2) patients aged 18 years or older. We have specifically tested the measure in both age groups. The cohort includes admissions for patients aged 18 years and older discharged from the hospital with principal discharge diagnosis of pneumonia, including aspiration pneumonia or a principal discharge diagnosis of sepsis (not severe sepsis) with a secondary discharge diagnosis of pneumonia (including aspiration pneumonia) coded as POA and no secondary discharge diagnosis of severe sepsis; and with a	This claims-based measure can be used in either of two patient cohorts: (1) patients aged 65 years or older or (2) patients aged 18 years or older. We have explicitly tested the measure in both age groups. The cohort includes admissions for patients aged 18 years and older discharged from the hospital with either a principal discharge diagnosis of HF (see codes below) and with a complete claims history for the 12 months prior to admission. The measure is currently publicly reported by CMS for those patients 65 years and older who are Medicare FFS beneficiaries admitted to non-federal hospitals or Veterans Health	The measure includes admissions for Medicare beneficiaries who are 65 years and older and are discharged from all non-federal, acute care inpatient US hospitals (including territories) with a complete claims history for the 12 months prior to admission. Additional details are provided in S.9 Denominator Details.	This claims-based measure can be used in either of two patient cohorts: (1) patients aged 65 years or older or (2) patients aged 40 years or older. We have explicitly tested the measure in both age groups. The cohort includes admissions for patients discharged from the hospital with either a principal discharge diagnosis of COPD (see codes below) OR a principal discharge diagnosis of respiratory failure (see codes below) with a secondary discharge diagnosis of acute exacerbation of COPD (see codes below) and with a complete claims history for the 12 months prior to admission. The measure is currently publicly

		years and those aged 65+ years.	complete claims history for the 12 months prior to admission. The measure will be publicly reported by CMS for those patients 65 years and older who are Medicare FFS beneficiaries admitted to non-federal hospitals. Additional details are provided in S.9 Denominator Details.	Administration (VA) hospitals. Additional details are provided in S.9 Denominator Details.		reported by CMS for those patients 65 years and older who are Medicare FFS beneficiaries admitted to non-federal hospitals. Additional details are provided in S.9 Denominator Details.
Denominator Details	To be included in the measure cohort used in public reporting, patients must meet the following additional inclusion criteria: 1. Enrolled in Medicare fee-for-service (FFS) Part A and Part B Medicare for the 12 months prior to the date of admission; and enrolled in Part A during the index admission; 2. Aged 65 or over; 3. Discharged alive from a non-federal	This outcome measure does not have a traditional numerator and denominator like a core process measure (e.g., percentage of adult patients with diabetes aged 18-75 years receiving one or more hemoglobin A1c tests per year); thus, we use this field to define the measure cohort. The denominator includes patients aged 18 years and	To be included in the measure cohort used in public reporting, patients must meet the following inclusion criteria: 1. Principal discharge diagnosis of pneumonia, including aspiration pneumonia; or Principal discharge diagnosis of sepsis (not including severe sepsis), with a secondary discharge diagnosis of pneumonia (including	To be included in the measure cohort used in public reporting, patients must meet the following additional inclusion criteria: 1.Having a principal discharge diagnosis of heart failure; 2.Enrolled in Medicare FFS Part A and Part B for the 12 months prior to the date of the admission, and enrolled in Part A during the index admission; 3. Aged 65 or over;	To be included in the measure cohort patients must be: 1. Enrolled in Medicare fee-for-service (FFS) Part A for the 12 months prior to the date of admission and during the index admission; 2. Aged 65 or over; 3. Discharged alive from a non-federal short-term acute care hospital; and 4. Not transferred to another acute care facility.	To be included in the measure cohort used in public reporting, patients must meet the following inclusion criteria: 1. Principal discharge diagnosis of COPD or principal discharge diagnosis of respiratory failure with a secondary discharge diagnosis of COPD with exacerbation 2. Enrolled in Medicare fee-for-service (FFS)

	acute care hospital; and, 4. Have a qualifying elective primary THA/TKA procedure; elective primary THA/TKA procedures defined as those procedures without any of the following: •Femur, hip, or pelvic fractures coded in principal or secondary discharge diagnosis fields of the index admission; •Partial hip arthroplasty (PHA) procedures with a concurrent THA/TKA; •Revision procedures with a concurrent THA/TKA; •Resurfacing procedures with a concurrent THA/TKA; •Mechanical complication coded in the principal discharge diagnosis field;	older with a principal discharge diagnosis of AMI (defined by the ICD-9 or ICD-10 codes below). The measure is currently publicly reported by CMS for those 65 years and older who are either Medicare FFS beneficiaries admitted to non-federal hospitals or patients admitted to VA hospitals. To be included in the measure cohort used in public reporting, patients must meet the following additional inclusion criteria: enrolled in Part A and Part B Medicare for the 12 months prior to the date of admission, and enrolled in Part A during the index admission (this criterion does not apply to patients discharged from VA hospitals); not transferred to another acute care	aspiration pneumonia) coded as POA but no secondary discharge diagnosis of severe sepsis. 2. Enrolled in Medicare fee-for-service (FFS) 3. Aged 65 or over 4. Not transferred from another acute care facility 5. Enrolled in Part A and Part B Medicare for the 12 months prior to the date of admission, and enrolled in Part A during the index admission. This measure can also be used for an all-payer population aged 18 years and older. We have explicitly tested the measure in both patients aged 18 years and older; and those aged 65 years or over (see Testing Attachment for details). International Classification of Diseases, 9th	4.Discharged alive from a non-federal short-term acute care hospital; and 5.Not transferred to another acute care facility. This measure can also be used for an all-payer population aged 18 years and older. We have explicitly tested the measure in both patients aged 18 years and older and those aged 65 years or older (see Testing Attachment for details). International Classification of Diseases, 9th Revision, Clinical Modification (ICD-9-CM) codes used to define the cohort for each measure are: ICD-9-CM codes used to define HF: 402.01 Malignant hypertensive heart disease with heart failure 402.11 Benign hypertensive heart	The measure aggregates the ICD-9 principal diagnosis and all procedure codes of the index admission into clinically coherent groups of conditions and procedures (condition categories or procedure categories) using the AHRQ CCS. There are a total of 285 mutually exclusive AHRQ condition categories, most of which are single, homogenous diseases such as pneumonia or acute myocardial infarction. Some are aggregates of conditions, such as “other bacterial infections.” There are a total of 231 mutually exclusive procedure categories. Using the AHRQ CCS procedure and condition categories, the	3. Aged 65 or over 4. Discharged alive from a non-federal acute care hospital 5. Not transferred from another acute care facility 6. Enrolled in Part A and Part B Medicare for the 12 months prior to the date of admission, and enrolled in Part A during the index admission. This measure can also be used for an all-payer population aged 40 years and older. We have explicitly tested the measure in both patients aged 40 years and older and those aged 65 years or older (see Testing Attachment for details). International Classification of Diseases, 9th Revision, Clinical Modification (ICD-9-CM) codes used to define the cohort for each measure are:

	•Malignant neoplasm of the pelvis, sacrum, coccyx, lower limbs, or bone/bone marrow or a disseminated malignant neoplasm coded in the principal discharge diagnosis field; •Removal of implanted devices/prostheses; or •Transfer from another acute care facility for the THA/TKA This measure can also be used for an all-payer population aged 18 years and older. We have explicitly tested the measure in both patients aged 18 years and older and those aged 65 years or older (see Testing Attachment for details, 2b4.11). International Classification of Diseases, 9th Revision, Clinical	facility; and alive at discharge. ICD-9-CM codes that define the patient cohort: 410.00 AMI (anterolateral wall) – episode of care unspecified 410.01 AMI (anterolateral wall) – initial episode of care 410.10 AMI (other anterior wall) – episode of care unspecified 410.11 AMI (other anterior wall) – initial episode of care 410.20 AMI (inferolateral wall) – episode of care unspecified 410.21 AMI (inferolateral wall) – initial episode of care 410.30 AMI (inferoposterior wall) – episode of care unspecified 410.31 AMI (inferoposterior	Revision, Clinical Modification (ICD-9-CM) codes used to define the cohort for each measure are: ICD-9 codes that define patients with pneumonia: 480.0 Pneumonia due to adenovirus 480.1 Pneumonia due to respiratory syncytial virus 480.2 Pneumonia due to parainfluenza virus 480.3 Pneumonia due to SARS-associated coronavirus 480.8 Pneumonia due to other virus not elsewhere classified 480.9 Viral pneumonia, unspecified 481 Pneumococcal pneumonia 482.0 Pneumonia due to Klebsiella pneumoniae 482.1 Pneumonia due to Pseudomonas	disease with heart failure 402.91 Unspecified hypertensive heart disease with heart failure 404.01 Hypertensive heart and chronic kidney disease, malignant, with heart failure and with chronic kidney disease stage I through stage IV, or unspecified 404.03 Hypertensive heart and chronic kidney disease, malignant, with heart failure and with chronic kidney disease stage V or end stage renal disease 404.11 Hypertensive heart and chronic kidney disease, benign, with heart failure and with chronic kidney disease stage I through stage IV, or unspecified 404.13 Hypertensive heart	measure assigns each index hospitalization to one of five mutually exclusive specialty cohorts: surgery/gynecology, cardiorespiratory, cardiovascular, neurology, and medicine. The rationale behind this organization is that conditions typically cared for by the same team of clinicians are expected to experience similar added (or reduced) levels of readmission risk. The measure first assigns admissions with qualifying AHRQ procedure categories to the Surgery/Gynecology Cohort. This cohort includes admissions likely cared for by surgical or gynecological teams. The measure then sorts admissions into one of the four	ICD-9-CM codes used to define COPD: 491.21Obstructive chronic bronchitis with (acute) exacerbation 491.22 Obstructive chronic bronchitis with acute bronchitis 491.8 Other chronic bronchitis 491.9 Unspecified chronic bronchitis 492.8 Other emphysema 493.20 Chronic obstructive asthma, unspecified 493.21 Chronic obstructive asthma with status asthmaticus 493.22 Chronic obstructive asthma with (acute) exacerbation 496 Chronic airway obstruction, not elsewhere classified 518.81 Acute respiratory failure (Principal diagnosis when combined with a secondary

	Modification (ICD-9-CM) codes used to define the cohort for each measure are: ICD-9 codes used to define a THA or TKA: 81.51 Total Hip Arthroplasty 81.54 Total Knee Arthroplasty ICD-10 codes that define a THA or TKA: 0SR90J9 Replacement of Right Hip Joint with Synthetic Substitute, Cemented, Open Approach 0SR90JA Replacement of Right Hip Joint with Synthetic Substitute, Uncemented, Open Approach 0SR90JZ Replacement of Right Hip Joint with Synthetic Substitute, Open Approach	wall) – initial episode of care 410.40 AMI (other inferior wall) – episode of care unspecified 410.41 AMI (other inferior wall) – initial episode of care 410.50 AMI (other lateral wall) – episode of care unspecified 410.51 AMI (other lateral wall) – initial episode of care 410.60 AMI (true posterior wall) – episode of care unspecified 410.61 AMI (true posterior wall) – initial episode of care 410.70 AMI (subendocardial) – episode of care unspecified 410.71 AMI (subendocardial) – initial episode of care 410.80 AMI (other specified site) –	482.2 Pneumonia due to Hemophilus influenzae 482.30 Pneumonia due to Streptococcus, unspecified 482.31 Pneumonia due to Streptococcus, group A 482.32 Pneumonia due to Streptococcus, group B 482.39 Pneumonia due to other Streptococcus 482.40 Pneumonia due to Staphylococcus, unspecified 482.41Methicillin susceptible pneumonia due to Staphylococcus aureus 482.42Methicillin resistant pneumonia due to Staphylococcus aureus 482.49 Other Staphylococcus pneumonia	and chronic kidney disease, benign, with heart failure and chronic kidney disease stage V or end stage renal disease 404.91 Hypertensive heart and chronic kidney disease, unspecified, with heart failure and with chronic kidney disease stage I through stage IV, or unspecified 404.93 Hypertensive heart and chronic kidney disease, unspecified, with heart failure and chronic kidney disease stage V or end stage renal disease 428.0 Congestive heart failure, unspecified 428.1 Left heart failure 428.20 Systolic heart failure, unspecified 428.21 Acute systolic heart failure	remaining specialty cohorts based on the AHRQ diagnosis category of the principal discharge diagnosis: The Cardiorespiratory Cohort includes several condition categories with very high readmission rates such as pneumonia, chronic obstructive pulmonary disease, and heart failure. These admissions are combined into a single cohort because they are often clinically indistinguishable and patients are often simultaneously treated for several of these diagnoses. The Cardiovascular Cohort includes condition categories such as acute myocardial infarction that in large hospitals might be cared for by a separate	diagnosis of COPD with exacerbation [491.21, 491.22, 493.21, or 493.22]) 518.82 Other pulmonary insufficiency, not elsewhere classified (Principal diagnosis when combined with a secondary diagnosis of COPD with exacerbation [491.21, 491.22, 493.21, or 493.22]) 518.84 Acute and chronic respiratory failure (Principal diagnosis when combined with a secondary diagnosis of COPD with exacerbation [491.21, 491.22, 493.21, or 493.22]) 799.1 Respiratory arrest (Principal diagnosis when combined with a secondary diagnosis of COPD with exacerbation [491.21, 491.22, 493.21, or 493.22]) ICD-9-CM codes used to define

	0SRB0J9 Replacement of Left Hip Joint with Synthetic Substitute, Cemented, Open Approach 0SRB0JA Replacement of Left Hip Joint with Synthetic Substitute, Uncemented, Open Approach 0SRB0JZ Replacement of Left Hip Joint with Synthetic Substitute, Open Approach 0SRC07Z Replacement of Right Knee Joint with Autologous Tissue Substitute, Open Approach 0SRC0JZ Replacement of Right Knee Joint with Synthetic Substitute, Open Approach 0SRC0KZ Replacement of Right Knee Joint with Nonautologous	episode of care unspecified 410.81 AMI (other specified site) – initial episode of care 410.90 AMI (unspecified site) – episode of care unspecified 410.91 AMI (unspecified site) – initial episode of care ICD-10 Codes that define the patient cohort: I2109 ST elevation (STEMI) myocardial infarction involving other coronary artery of anterior wall I2119 ST elevation (STEMI) myocardial infarction involving other coronary artery of inferior wall I2111 ST elevation (STEMI) myocardial infarction involving right coronary artery	482.81Pneumonia due to anaerobes 482.82Pneumonia due to escherichia coli 482.83 Pneumonia due to other gram-negative bacteria 482.84Pneumonia due to Legionnaires' disease 482.89Pneumonia due to other specified bacteria 482.9 Bacterial pneumonia, unspecified 483.0Pneumonia due to mycoplasma pneumoniae 483.1Pneumonia due to chlamydia 483.8Pneumonia due to other specified organism 485Bronchopneumonia, organism unspecified 486Pneumonia, organism unspecified 487.0Influenza with pneumonia 488.11 Influenza due to identified 2009 H1N1	428.22 Chronic systolic heart failure 428.23 Acute on chronic systolic heart failure 428.30 Diastolic heart failure, unspecified 428.31 Acute diastolic heart failure 428.32 Chronic diastolic heart failure 428.33 Acute on chronic diastolic heart failure 428.40 Combined systolic and diastolic heart failure, unspecified 428.41 Acute combined systolic and diastolic heart failure 428.42 Chronic combined systolic and diastolic heart failure 428.43 Acute on chronic combined systolic and diastolic heart failure 428.9 Heart failure, unspecified	cardiac or cardiovascular team. The Neurology Cohort includes neurologic condition categories such as stroke that in large hospitals might be cared for by a separate neurology team. The Medicine Cohort includes all non-surgical patients who were not assigned to any of the other cohorts. The full list of the specific diagnosis and procedure AHRQ CCS categories used to define the specialty cohorts are attached in data field S.2b (Data Dictionary or Code Table).	acute exacerbation of COPD: 491.21 Obstructive chronic bronchitis with (acute) exacerbation 491.22 Obstructive chronic bronchitis with acute bronchitis 493.21 Chronic obstructive asthma with status asthmaticus 493.22 Chronic obstructive asthma with (acute) exacerbation ICD-10-CM codes used to define COPD: J44.1 Chronic obstructive pulmonary disease with (acute) exacerbation J44.0 Chronic obstructive pulmonary disease with acute lower respiratory infection J41.8 Mixed simple and mucopurulent chronic bronchitis

	Tissue Substitute, Open Approach 0SRD07Z Replacement of Left Knee Joint with Autologous Tissue Substitute, Open Approach 0SRD0JZ Replacement of Left Knee Joint with Synthetic Substitute, Open Approach 0SRD0KZ Replacement of Left Knee Joint with Nonautologous Tissue Substitute, Open Approach 0SRT07Z Replacement of Right Knee Joint, Femoral Surface with Autologous Tissue Substitute, Open Approach 0SRT0JZ Replacement of Right Knee Joint, Femoral Surface with Synthetic Substitute, Open Approach 0SRT0KZ Replacement of Right Knee Joint,	I2119 ST elevation (STEMI) myocardial infarction involving other coronary artery of inferior wall I2129 ST elevation (STEMI) myocardial infarction involving other sites I214 Non-ST elevation (NSTEMI) myocardial infarction I213 ST elevation (STEMI) myocardial infarction of unspecified site An ICD-9 to ICD-10 crosswalk is attached in field S.2b. (Data Dictionary or Code Table).	influenza virus with pneumonia ICD-9 codes that define patients with aspiration pneumonia: 507.0Pneumonitis due to inhalation of food or vomitus ICD-9 codes that define patients with sepsis (not including severe sepsis [995.92 or 785.52]) (Cohort requires principal discharge diagnosis of sepsis combined with a secondary discharge diagnosis of pneumonia or aspiration pneumonia coded as POA but no secondary discharge diagnosis of severe sepsis): 038.0 Streptococcal septicemia 038.10 Staphylococcal septicemia, unspecified 038.11 Methicillin susceptible Staphylococcus aureus septicemia	ICD-10 Codes that define the patient cohort: I110 Hypertensive heart disease with heart failure I130 Hypertensive heart and chronic kidney disease with heart failure and stage 1 through stage 4 chronic kidney disease, or unspecified chronic kidney disease I132 Hypertensive heart and chronic kidney disease with heart failure and with stage 5 chronic kidney disease, or end stage renal disease I509 Heart failure, unspecified I501 Left ventricular failure I5020 Unspecified systolic (congestive) heart failure I5021 Acute systolic (congestive) heart failure I5022 Chronic systolic (congestive) heart failure		J42 Unspecified chronic bronchitis J43.9 Emphysema, unspecified J44.9 Chronic obstructive pulmonary disease, unspecified J96.00 Acute respiratory failure, unspecified whether with hypoxia or hypercapnia J96.90 Respiratory failure, unspecified, unspecified whether with hypoxia or hypercapnia J80 Acute respiratory distress syndrome J96.20 Acute and chronic respiratory failure, unspecified whether with hypoxia or hypercapnia R09.2 Respiratory arrest ICD-10-CM codes used to define acute exacerbation of COPD:

	Femoral Surface with Nonautologous Tissue Substitute, Open Approach 0SRU07Z Replacement of Left Knee Joint, Femoral Surface with Autologous Tissue Substitute, Open Approach 0SRU0JZ Replacement of Left Knee Joint, Femoral Surface with Synthetic Substitute, Open Approach 0SRU0KZ Replacement of Left Knee Joint, Femoral Surface with Nonautologous Tissue Substitute, Open Approach 0SRV07Z Replacement of Right Knee Joint, Tibial Surface with Autologous Tissue Substitute, Open Approach 0SRV0JZ Replacement of Right Knee Joint, Tibial Surface with Synthetic		038.12 Methicillin resistant Staphylococcus aureus septicemia 038.19 Other staphylococcal septicemia 038.2 Pneumococcal septicemia [Streptococcus pneumoniae septicemia] 038.3 Septicemia due to anaerobes 038.40 Septicemia due to gram-negative organism, unspecified 038.41 Septicemia due to hemophilus influenzae [H. influenzae] 038.42 Septicemia due to escherichia coli [E. coli] 038.43 Septicemia due to pseudomonas 038.44 Septicemia due to serratia 038.49 Other septicemia due to gram-negative organisms	I5023 Acute on chronic systolic (congestive) heart failure I5030 Unspecified diastolic (congestive) heart failure I5031 Acute diastolic (congestive) heart failure I5032 Chronic diastolic (congestive) heart failure I5033 Acute on chronic diastolic (congestive) heart failure I5040 Unspecified combined systolic (congestive) and diastolic (congestive) heart failure I5041 Acute combined systolic (congestive) and diastolic (congestive) heart failure I5042 Chronic combined systolic (congestive) and diastolic		J44.1 Chronic obstructive pulmonary disease with (acute) exacerbation J44.0 Chronic obstructive pulmonary disease with acute low respiratory infection An ICD-9 to ICD-10 crosswalk is attached in field S.2b. (Data Dictionary or Code Table).

	Substitute, Open Approach 0SRV0KZ Replacement of Right Knee Joint, Tibial Surface with Nonautologous Tissue Substitute, Open Approach 0SRW07Z Replacement of Left Knee Joint, Tibial Surface with Autologous Tissue Substitute, Open Approach 0SRW0JZ Replacement of Left Knee Joint, Tibial Surface with Synthetic Substitute, Open Approach 0SRW0KZ Replacement of Left Knee Joint, Tibial Surface with Nonautologous Tissue Substitute, Open Approach An ICD-9 to ICD-10 crosswalk is attached in field S.2b. (Data Dictionary or Code Table).		038.8 Other specified septicemias 038.9 Unspecified septicemia 995.91 Sepsis ---------- ---------- ---------- ---------- -- ICD-10 codes that define patients with pneumonia: J12.0 Adenoviral pneumonia J12.1 Respiratory syncytial virus pneumonia J12.2 Parainfluenza virus pneumonia J12.81 Pneumonia due to SARS-associated coronavirus J12.89 Other viral pneumonia J12.9 Viral pneumonia, unspecified J13 Pneumonia due to Streptococcus pneumoniae J18.1Lobar pneumonia,	(congestive) heart failure I5043 Acute on chronic combined systolic (congestive) and diastolic (congestive) heart failure An ICD-9 to ICD-10 crosswalk is attached in field S.2b. (Data Dictionary or Code Table).		

	Elective primary THA/TKA procedures are defined as those procedures without any of the following (For a full list of ICD-9 and ICD-10 codes defining the following see attached Data Dictionary, sheet "THA TKA Cohort Codes Part 2"): 1) Femur, hip, or pelvic fractures coded in principal or secondary discharge diagnosis fields of the index admission; 2) Partial hip arthroplasty (PHA) procedures with a concurrent THA/TKA; 3) Revision procedures with a concurrent THA/TKA; 4) Resurfacing procedures with a concurrent THA/TKA; 5) Mechanical complication coded in the principal		unspecified organism J15.0 Pneumonia due to Klebsiella pneumoniae J15.1 Pneumonia due to Pseudomonas J14 Pneumonia due to Hemophilus influenzae J15.4 Pneumonia due to other streptococci J15.3 Pneumonia due to streptococcus, group B J15.20 Pneumonia due to staphylococcus, unspecified J15.211 Pneumonia due to Methicillin susceptible staphylococcus J15.212 Pneumonia due to Methicillin resistant staphylococcus J15.29 Pneumonia due to other staphylococcus J15.8 Pneumonia due to other specified bacteria			

	discharge diagnosis field; 6) Malignant neoplasm of the pelvis, sacrum, coccyx, lower limbs, or bone/bone marrow or a disseminated malignant neoplasm coded in the principal discharge diagnosis field; 7) Removal of implanted devises/prostheses; and 8) Transfer status from another acute care facility for the THA/TKA.		J15.5 Pneumonia due to Escherichia coli J15.6 Pneumonia due to other aerobic Gram-negative bacteria A48.1 Legionnaires' disease J15.8 Pneumonia due to other specified bacteria J15.9 Unspecified bacterial pneumonia J15.7 Pneumonia due to Mycoplasma pneumoniae J16.0 Chlamydial pneumonia J16.8 Pneumonia due to other specified infectious organisms J18.0 Bronchopneumonia, unspecified organism J18.9 Pneumonia, unspecified organism J11.00 Influenza due to unidentified influenza virus with unspecified type of pneumonia			

			J12.9 Viral pneumonia, unspecified J10.08 Influenza due to other identified influenza virus ICD-10 codes that define patients with aspiration pneumonia: J69.0 Pneumonitis due to inhalation of food and vomit ICD-10 codes that define patients with sepsis (not including severe sepsis [ICD-9 995.92 or 785.52]) (Cohort requires principal discharge diagnosis of sepsis combined with a secondary discharge diagnosis of pneumonia or aspiration pneumonia coded as POA but no secondary discharge diagnosis of severe sepsis): A40.9 Streptococcal sepsis, unspecified A41.2 Sepsis due to unspecified staphylococcus			

			A41.01 Sepsis due to Methicillin susceptible Staphylococcus A41.02 Sepsis due to Methicillin resistant Staphylococcus A41.1 Sepsis due to other specified staphylococcus A40.3 Sepsis due to Streptococcus pneumoniae A41.4 Sepsis due to anaerobes A41.50 Gram-negative sepsis, unspecified A41.3 Sepsis due to Hemophilus influenzae A41.51 Sepsis due to Escherichia coli [E. coli] A41.52 Sepsis due to Pseudomonas A41.53 Sepsis due to Serratia A41.59 Other Gram-negative sepsis A41.89 Other specified sepsis			

			A41.9 Sepsis, unspecified organism An ICD-9 to ICD-10 crosswalk is attached in field S.2b. (Data Dictionary or Code Table).			
Exclusions	This measure excludes admissions for patients: 1) Without at least 30 days post-discharge enrollment in FFS Medicare; 2) Who were discharged against medical advice (AMA); 3) Admitted for the index procedure and subsequently transferred to another acute care facility; 4) Who had more than two THA/TKA procedure codes during the index hospitalization; or 5) Who had THA/TKA admissions within 30 days of a prior	For all cohorts, the measure excludes admissions for patients: -discharged against medical advice (AMA) (because providers did not have the opportunity to deliver full care and prepare the patient for discharge); -admitted and then discharged on the same day (because it is unlikely these are clinically significant AMIs); -admitted with AMI within 30 days of discharge from a qualifying index admission (Admissions within 30 days of discharge of an index admission will be	The readmission measures exclude index admissions for patients: 1. Discharged against medical advice (AMA); 2. Without at least 30 days post-discharge enrollment in FFS Medicare; 3. Admitted within 30 days of a prior index admission.	The readmission measures excludes admissions: 1. Ending in discharges against medical advice Rationale: Providers did not have the opportunity to deliver full care and prepare the patient for discharge. 2. Without at least 30 days of post-discharge enrollment in FFS Medicare Rationale: The 30-day readmission outcome cannot be assessed in this group since claims data are used to determine whether a patient was readmitted.	The measure excludes index admissions for patients: 1. Admitted to Prospective Payment System (PPS)-exempt cancer hospitals; 2. Without at least 30 days post-discharge enrollment in FFS Medicare; 3. Discharged against medical advice (AMA); 4. Admitted for primary psychiatric diagnoses; 5. Admitted for rehabilitation; or 6. Admitted for medical treatment of cancer.	The readmission measures exclude index admissions for patients: 1. Without at least 30 days post-discharge enrollment in FFS Medicare. 2. Discharged against medical advice (AMA); 3. Admitted within 30 days of a prior index admission.

	THA/TKA index admission.	considered readmissions. No admission is counted as a readmission and an index admission. The next eligible admission after the 30-day time period following an index admission will be considered another index admission.) For Medicare FFS patients, the measure additionally excludes admissions for patients: -without at least 30 days post-discharge enrollment in FFS Medicare (because the 30-day readmission outcome cannot be assessed in this group).		3. Occurring within 30 days of discharge from an index admission Rationale: This exclusion ensures that no hospitalization will be considered as both a readmission and an index admission within the same measure. 4. With a procedure code for LVAD implantation or heart transplantation either during the index admission or in the 12 months prior to the index admission Rationale: Patients with these procedures are a highly-selected group of patients with a different risk of the readmission outcome.		
Exclusion Details	This measure excludes index admissions for patients: 1. Without at least 30 days of post-	For all cohorts, the measure excludes: • Discharges against medical advice (AMA), which is identified by	1. Discharges against medical advice (AMA) are identified using the discharge disposition	1. Discharges against medical advice are identified using the discharge disposition	1. Admitted to a PPS-exempt cancer hospital, identified by the Medicare provider ID.	1. Admissions without at least 30 days post-discharge enrollment in FFS Medicare are determined by

	discharge enrollment in FFS Medicare as determined by examining the Medicare Enrollment Database (EDB). Rationale: The 30-day readmission outcome cannot be assessed in this group since claims data are used to determine whether a patient was readmitted. 2. Who were discharged against medical advice (AMA), which is identified by examining the discharge destination indicator in claims data. Rationale: Providers did not have the opportunity to deliver full care and prepare the patient for discharge. 3. Admitted for the index procedure and subsequently transferred to	examining the discharge destination indicator in claims data. • Index admissions for patients admitted and then discharged on the same day are identified when the admission and discharge dates are equal. • AMI admissions within 30 days of discharge from a qualifying index admission, which are identified by comparing the discharge date from the index admission with the readmission date. For Medicare FFS patients, the measure additionally excludes: • Admissions without at least 30 days post-discharge enrollment in FFS Medicare, which is determined by examining the Medicare	indicator in claims data. 2. Admissions without at least 30 days post-discharge enrollment in FFS Medicare are determined by examining the Medicare Enrollment Database (EDB). 3. Pneumonia admissions within 30 days of discharge from a qualifying pneumonia index admission are identified by comparing the discharge date from the index admission with subsequent admission dates.	indicator in claims data. 2. Admissions without at least 30 days post-discharge enrollment in FFS Medicare are determined by examining the Medicare Enrollment Database (EDB). 3. Admissions within 30 days of discharge from a qualifying index admission are identified by comparing the discharge date from the index admission with subsequent admission dates. 4. Procedure codes for LVAD implantation or heart transplantation are identified by the corresponding codes included in claims data. The list of codes used is attached in field S.2b. (Data Dictionary or Code Table).	2. Admissions without at least 30 days post-discharge enrollment in FFS Medicare are determined using data captured in the Medicare Enrollment Database (EDB). 3. Discharges against medical advice (AMA) are identified using the discharge disposition indicator in claims data. 4. Admitted for primary psychiatric disease, identified by a principal diagnosis in one of the specific AHRQ CCS categories listed in the attached data dictionary. 5. Admitted for rehabilitation care, identified by the specific ICD-9 diagnosis codes included in CCS 254 (Rehabilitation care; fitting of proestheses; and	examining the Medicare Enrollment Database (EDB). 2. Discharges against medical advice (AMA) are identified using the discharge disposition indicator in claims data. 3. COPD admissions within 30 days of discharge from a qualifying COPD index admission are identified by comparing the discharge date from the index admission with subsequent admission dates.

	antoher acute care facility, which are defined as when a patient with an inpatient hospital admission (with at least one qualifying THA/TKA procedure) is discharged from an acute care hospital and admitted to another acute care hospital on the same or next day. Rationale: Patients admitted for the index procedure and subsequently transferred to another acute care facility are excluded, as determining which hospital the readmission outcome should be attributed to is difficult. 4. Who had more than two THA/TKA procedure codes during the index hospitalization, which is identified by examining	Enrollment Database (EDB)			adjustment of devices). 6. Admitted for medical treatment of cancer, identified by the specific AHRQ CCS categories listed in the attached data dictionary.	

	procedure codes in the claims data. Rationale: Although clinically possible, it is highly unlikely that patients would receive more than two elective THA/TKA procedures in one hospitalization, which may reflect a coding error. 5. Who had THA/TKA admissions within 30 days prior to THA/TKA index admission. Rationale: Additional THA/TKA admissions within 30 days are excluded as index admissions because they are part of the outcome. A single admission does not count as both an index admission and a readmission for another index admission.					
Risk Adjustment	Statistical risk model Our approach to risk adjustment is	Statistical risk model Our approach to risk adjustment is	Statistical risk model Our approach to risk adjustment is	Statistical risk model Our approach to risk adjustment is	Statistical risk model Our approach to risk adjustment is	Statistical risk model Our approach to risk adjustment is

	tailored to and appropriate for a publicly reported outcome measure, as articulated in the American Heart Association (AHA) Scientific Statement, "Standards for Statistical Models Used for Public Reporting of Health Outcomes" (Krumholz et al., 2006). The measure employs a hierarchical logistic regression model to create a hospital-level 30-day RSRR. In brief, the approach simultaneously models data at the patient and hospital levels to account for the variance in patient outcomes within and between hospitals (Normand & Shahian, 2007). At the patient level, the model adjusts the log-odds of readmission within 30 days of discharge	tailored to and appropriate for a publicly reported outcome measure, as articulated in the American Heart Association (AHA) Scientific Statement, "Standards for Statistical Models Used for Public Reporting of Health Outcomes" (Krumholz et al., 2006). The measure employs a hierarchical logistic regression model to create a hospital-level 30-day RSRR. In brief, the approach simultaneously models two levels (patient and hospital) to account for the variance in patient outcomes within and between hospitals (Normand & Shahian, 2007). At the patient level, the model adjusts the log-odds of readmission within	tailored to and appropriate for a publicly reported outcome measure, as articulated in the American Heart Association (AHA) Scientific Statement, "Standards for Statistical Models Used for Public Reporting of Health Outcomes" (Krumholz et al., 2006). The measure employs a hierarchical logistic regression model to create a hospital-level 30-day RSRR. In brief, the approach simultaneously models data at the patient and hospital levels to account for the variance in patient outcomes within and between hospitals (Normand & Shahian, 2007). At the patient level, the model adjusts the log-odds of readmission within 30 days of	tailored to and appropriate for a publicly reported outcome measure, as articulated in the American Heart Association (AHA) Scientific Statement, "Standards for Statistical Models Used for Public Reporting of Health Outcomes" (Krumholz et al., 2006). The measure employs a hierarchical logistic regression model to create a hospital-level 30-day RSRR. In brief, the approach simultaneously models data at the patient and hospital levels to account for the variance in patient outcomes within and between hospitals (Normand & Shahian, 2007). At the patient level, the model adjusts the log-odds of readmission within 30 days of discharge	tailored to and appropriate for a publicly reported outcome measure, as articulated in the American Heart Association (AHA) Scientific Statement, "Standards for Statistical Models Used for Public Reporting of Health Outcomes" (Krumholz et al., 2006). The measure employs a hierarchical logistic regression model to create a hospital-level 30-day RSRR. In brief, the approach simultaneously models data at the patient and hospital levels to account for the variance in patient outcomes within and between hospitals (Normand & Shahian, 2007). At the patient level, the model adjusts the log-odds of readmission within 30 days of discharge	tailored to and appropriate for a publicly reported outcome measure, as articulated in the American Heart Association (AHA) Scientific Statement, "Standards for Statistical Models Used for Public Reporting of Health Outcomes" (Krumholz et al., 2006). The measure employs a hierarchical logistic regression model to create a hospital-level 30-day, all-cause, RSRR. In brief, the approach simultaneously models data at the patient and hospital levels to account for the variance in patient outcomes within and between hospitals (Normand & Shahian, 2007). At the patient level, the model adjusts the log-odds of readmission within 30 days of discharge

	for age and selected clinical covariates. At the hospital level, the approach models the hospital-specific intercepts as arising from a normal distribution. The hospital intercept represents the underlying risk of readmission at the hospital, after accounting for patient risk. If there were no differences among hospitals, then after adjusting for patient risk, the hospital intercepts should be identical across all hospitals. Candidate and Final Risk-adjustment Variables: Candidate variables were patient-level risk-adjustors that were expected to be predictive of readmission, based on empirical analysis, prior literature, and clinical judgment, including age and indicators of	30 days of discharge for age, sex, and selected clinical covariates. The second level models the hospital-specific intercepts as arising from a normal distribution. The hospital intercept represents the underlying risk of readmission at the hospital, after accounting for patient risk. Candidate and Final Risk-adjustment Variables: Candidate variables were patient-level risk-adjustors that were expected to be predictive of readmission, based on empirical analysis, prior literature, and clinical judgment, including age, sex, and indicators of comorbidity and disease severity. For each patient, covariates are obtained from claims records	admission for age, sex, and selected clinical covariates. At the hospital level, the approach models the hospital-specific intercepts as arising from a normal distribution. The hospital intercept represents the underlying risk of readmission at the hospital, after accounting for patient risk. If there were no differences among hospitals, then after adjusting for patient risk, the hospital intercepts should be identical across all hospitals. Candidate and Final Risk-adjustment Variables: Candidate variables were patient-level risk-adjustors that were expected to be predictive of readmission, based on empirical analysis, prior literature, and clinical judgment,	for age and selected clinical covariates. At the hospital level, the approach models the hospital-specific intercepts as arising from a normal distribution. The hospital intercept represents the underlying risk of readmission at the hospital, after accounting for patient risk. If there were no differences among hospitals, then after adjusting for patient risk, the hospital intercepts should be identical across all hospitals. Candidate and Final Risk-adjustment Variables: Candidate variables were patient-level risk-adjustors that were expected to be predictive of readmission, based on empirical analysis, prior literature, and clinical judgment, including age and indicators of	for age and selected clinical covariates. At the hospital level, the approach models the hospital-specific intercepts as arising from a normal distribution. The hospital intercept represents the underlying risk of readmission at the hospital, after accounting for patient risk. If there were no differences among hospitals, then after adjusting for patient risk, the hospital intercepts should be identical across all hospitals. We use a fixed, common set of variables in all our models for simplicity and ease of data collection and analysis. However, we estimate a hierarchical logistic regression model for each specialty cohort separately, and the coefficients associated with	for age and selected clinical covariates. At the hospital level, the approach models the hospital-specific intercepts as arising from a normal distribution. The hospital intercept represents the underlying risk of readmission at the hospital, after accounting for patient risk. If there were no differences among hospitals, then after adjusting for patient risk, the hospital intercepts should be identical across all hospitals. Candidate and Final Risk-adjustment Variables: Candidate variables were patient-level risk-adjustors that were expected to be predictive of readmission, based on empirical analysis, prior literature, and clinical judgment, including age and indicators of

	comorbidity and disease severity. For each patient, covariates are obtained from claims records extending 12 months prior to and including the index admission. For the measure currently implemented by CMS, these risk adjusters are identified using both inpatient and outpatient Medicare FFS claims data. However, in the all-payer hospital discharge database measure, the risk-adjustment variables can be obtained only from inpatient claims in the prior 12 months and the index admission. The model adjusts for case-mix differences based on the clinical status of patients at the time of admission. We use condition categories (CCs),	extending 12 months prior to and including the index admission. For the measure currently implemented by CMS, these risk-adjusters are identified using both inpatient and outpatient Medicare FFS claims data. However, in the all-payer hospital discharge database measure, the risk-adjustment variables can be obtained only from inpatient claims in the prior 12 months and the index admission. (This was tested explicitly in our all-payer testing, as many all-payer datasets do not include outpatient claims.) The model adjusts for case-mix differences based on the clinical status of patients at the time of admission. We use condition	including age, sex, and indicators of comorbidity and disease severity. For each patient, covariates are obtained from claims records extending 12 months prior to and including the index admission. For the measure currently implemented by CMS, these risk-adjusters are identified using both inpatient and outpatient Medicare FFS claims data. However, in the all-payer hospital discharge database measure, the risk-adjustment variables can be obtained only from inpatient claims in the prior 12 months and the index admission. The model adjusts for case-mix differences based on the clinical status of patients at the time of admission. We use	comorbidity and disease severity. For each patient, covariates are obtained from claims records extending 12 months prior to and including the index admission. For the measure currently implemented by CMS, these risk adjusters are identified using both inpatient and outpatient Medicare FFS claims data. However, in the all-payer hospital discharge database measure, the risk-adjustment variables can be obtained only from inpatient claims in the prior 12 months and the index admission. The model adjusts for case-mix differences based on the clinical status of patients at the time of admission. We use condition categories (CCs),	each variable may vary across specialty cohorts. Candidate and Final Risk-adjustment Variables: Candidate variables were patient-level risk-adjustors that were expected to be predictive of readmission, based on empirical analysis, prior literature, and clinical judgment, including age and indicators of comorbidity and disease severity. For each patient, covariates are obtained from claims records extending 12 months prior to and including the index admission. For the measure currently implemented by CMS, these risk-adjusters are identified using inpatient Medicare FFS claims data. The model adjusts for case-mix	comorbidity and disease severity. For each patient, covariates are obtained from claims records extending 12 months prior to and including the index admission. For the measure currently implemented by CMS, these risk-adjusters are identified using both inpatient and outpatient Medicare FFS claims data. However, in the all-payer hospital discharge database measure, the risk-adjustment variables can be obtained only from inpatient claims in the prior 12 months and the index admission. The model adjusts for case-mix differences based on the clinical status of patients at the time of admission. We use condition categories (CCs), which are

	which are clinically meaningful groupings of more than 15,000 ICD-9-CM diagnosis codes (Pope et al., 2000). A file that contains a list of the ICD-9-CM codes and their groupings into CCs is attached in data field S.2b (Data Dictionary or Code Table). In addition, only comorbidities that convey information about the patient at admission or in the 12 months prior, and not complications that arise during the course of the index hospitalization, are included in the risk adjustment. Hence, we do not risk adjust for CCs that may represent adverse events of care when they are only recorded in the index admission. The final set of risk-adjustment variables is:	categories (CCs), which are clinically meaningful groupings of more than 15,000 ICD-9-CM diagnosis codes (Pope et al., 2000). A file that contains a list of the ICD-9-CM codes and their groupings into CCs is attached in data field S.2b (Data Dictionary or Code Table). In addition, only comorbidities that convey information about the patient at admission or in the 12 months prior, and not complications that arise during the course of the index hospitalization, are included in the risk adjustment. Hence, we do not risk adjust for CCs that may represent adverse events of care and that are only recorded in the index admission. The final set of risk adjustment	condition categories (CCs), which are clinically meaningful groupings of more than 15,000 ICD-9-CM diagnosis codes (Pope et al., 2000). A file that contains a list of the ICD-9-CM codes and their groupings into CCs is attached in data field S.2b (Data Dictionary or Code Table). In addition, only comorbidities that convey information about the patient at admission or in the 12 months prior, and not complications that arise during the course of the index hospitalization, are included in the risk adjustment. Hence, we do not risk adjust for CCs that may represent adverse events of care when they are only recorded in the index admission.	which are clinically meaningful groupings of more than 15,000 ICD-9-CM diagnosis codes (Pope et al., 2000). A file that contains a list of the ICD-9-CM codes and their groupings into CCs is attached in data field S.2b (Data Dictionary or Code Table). In addition, only comorbidities that convey information about the patient at admission or in the 12 months prior, and not complications that arise during the course of the index hospitalization, are included in the risk adjustment. Hence, we do not risk adjust for CCs that may represent adverse events of care when they are only recorded in the index admission. The final set of risk-adjustment variables is:	differences based on the clinical status of patients at the time of admission. We use condition categories (CCs), which are clinically meaningful groupings of more than 15,000 ICD-9-CM diagnosis codes (Pope et al., 2000). A file that contains a list of the ICD-9-CM codes and their groupings into CCs is attached in data field S.2b (Data Dictionary or Code Table). In addition, only comorbidities that convey information about the patient at admission or in the 12 months prior, and not complications that arise during the course of the index hospitalization, are included in the risk adjustment. Hence, we do not risk adjust for CCs that may represent adverse events of	clinically meaningful groupings of more than 15,000 ICD-9-CM diagnosis codes (Pope et al., 2000). A file that contains a list of the ICD-9-CM codes and their groupings into CCs is attached in data field S.2b (Data Dictionary or Code Table). In addition, only comorbidities that convey information about the patient at admission or in the 12 months prior, and not complications that arise during the course of the index hospitalization, are included in the risk adjustment. Hence, we do not risk adjust for CCs that may represent adverse events of care when they are only recorded in the index admission. The final set of risk adjustment variables is: Demographics

	Demographics Age-65 (years, continuous) for patients aged 65 or over cohorts; or Age (years, continuous) for patients aged 18 and over cohorts Male (%) THA/TKA Procedure Index admissions with an elective THA procedure Number of procedures (two vs. one) Clinical Risk Factors Other congenital deformity of hip (joint) (ICD-9 code 755.63) Post traumatic osteoarthritis (ICD-9 codes 716.15, 716.16) Morbid obesity (ICD-9 code 278.01) History of infection (CC 1, 3-6) Metastatic cancer or acute leukemia (CC 7) Cancer (CC 8-12) Diabetes mellitus (DM) or DM	variables is: Demographics: Male Age (For Medicare FFS patients, the age variable is defined as "Age-65" [years above 65, continuous]. For all-payer populations, the age variable is treated as a continuous variable with values of 18 and over) Comorbidities: CC 15-20, 119-120 Diabetes mellitus (DM) and DM complications CC 47 Iron deficiency and other anemias and blood disease CC 80 Congestive heart failure CC 86 Valvular and rheumatic heart disease CC108 COPD CC130 End-stage renal disease or dialysis CC136 Other urinary tract disorders CC 92-93	The final set of risk adjustment variables is: Demographics Male Age-65 (years, continuous) for patients aged 65 or over cohorts; or Age (years, continuous) for patients aged 18 and over cohorts. Comorbidities History of Coronary Artery Bypass Graft (CABG) (ICD-9 codes V45.81, 36.10–36.16) History of infection (CC1, 3-6) Septicemia/sepsis (CC 2) Metastatic cancer or acute leukemia (CC 7) Lung, upper digestive tract, and other severe cancers (CC 8) Other major cancers (CC 9-10) Diabetes mellitus (DM) or DM complications (CC 15-19, 119-120)	Demographics Age-65 (years, continuous) for patients aged 65 or over cohorts; or Age (years, continuous) for patients aged 18 and over cohorts; Male (%) Comorbidities History of Coronary Artery Bypass Graft (CABG) surgery (ICD-9 diagnosis code V45.81; ICD-9 procedure codes 36.10-36.16) Cardio-respiratory failure and shock (CC 79) Congestive heart failure (CC 80) Acute coronary syndrome (CC 81-82) Coronary atherosclerosis or angina (CC 83-84) Valvular or rheumatic heart disease (CC 86) Specified arrhythmias and other heart rhythm disorders (CC 92-93)	care when they are only recorded in the index admission. The models also include a condition-specific indicator for all AHRQ CCS categories with sufficient volume (defined as those with more than 1,000 admissions nationally each year for Medicare FFS data) as well as a single indicator for conditions with insufficient volume in each model. The final set of risk adjustment variables are listed in the attached Data Dictionary. Demographics Age-65 (years, continuous) for patients aged 65 or over cohorts; or Age (years, continuous) for patients aged 18 and over cohorts Comorbidities Metastatic cancer or acute leukemia (CC 7)	Age-65 (years, continuous) for patients aged 65 or over cohorts; or Age (years, continuous) for patients aged 18 and over cohorts. Comorbidities History of mechanical ventilation (ICD-9 procedure codes: 93.90, 96.70, 96.71, 96.72) Sleep apnea (ICD-9 diagnosis codes: 327.20, 327.21, 327.23, 327.27, 327.29, 780.51, 780.53, 780.57) Respirator dependence/respiratory failure (CC 77-78) Cardio-respiratory failure and shock (CC 79) Congestive heart failure (CC 80) Acute coronary syndrome (CC 81-82) Chronic atherosclerosis or angina (CC 83-84)

	complications (CC 15-20, 119-120) Protein-calorie malnutrition (CC 21) Disorders of fluid/electrolyte/acid-base (CC 22-23) Rheumatoid arthritis and inflammatory connective tissue disease (CC 38) Severe hematological disorders (CC 44) Dementia or other specified brain disorders (CC 49, 50) Major psychiatric disorders (CC 54-56) Hemiplegia, paraplegia, paralysis, functional disability (CC 67-69, 100-102, 177-178) Polyneuropathy (CC 71) Congestive heart failure (CC 80) Coronary atherosclerosis or angina (CC 83-84) Hypertension (CC 89, 91)	Arrhythmias CC 111-113 Pneumonia CC 131 Renal failure CC 104-106 Vascular or circulatory disease CC 22-23 Disorders of fluid/electrolyte/acid-base CC 84 Coronary atherosclerosis/other chronic ischemic heart disease CC 1,3-6 History of infection CC 97-99,103 Cerebrovascular disease CC 7 Metastatic cancer and acute leukemia CC 8-12 Cancer CC 148-149 Decubitus ulcer or chronic skin ulcer CC 49-50 Dementia and other specified brain disorders (senility) CC 83 Angina pectoris, old myocardial infarction CC 95-96 Stroke CC 110 Asthma CC 81-82 Acute	Protein-calorie malnutrition (CC 21) Disorders of fluid/electrolyte/acid-base (CC 22-23) Other gastrointestinal disorders (CC 36) Severe hematological disorders (CC 44) Iron deficiency or other unspecified anemias and blood disease (CC 47) Dementia or other specified brain disorders (CC 49-50) Drug/alcohol abuse/dependence/psychosis (CC 51-53) Major psychiatric disorders (CC 54-56) Other psychiatric disorders (CC 60) Hemiplegia, paraplegia, paralysis, functional disability (CC 67-69, 100-102, 177-178) Cardio-respiratory failure or shock (CC 78-79) Congestive heart failure (CC 80)	Other or unspecified heart disease (CC 94) Vascular or circulatory disease (CC 104-106) Metastatic cancer or acute leukemia (CC 7) Cancer (CC 8-12) Diabetes mellitus (DM) or DM complications (CC 15-19, 119-120) Protein-calorie malnutrition (CC 21) Disorders of fluid/electrolyte/acid-base (CC 22-23) Liver or biliary disease (CC 25-30) Peptic ulcer, hemorrhage, other specified gastrointestinal disorders (CC 34) Other gastrointestinal disorders (CC 36) Severe hematological disorders (CC 44) Iron deficiency or other unspecified anemias and blood disease (CC 47)	Severe cancer (CC 8-9) Other cancers (CC 10-12) Severe hematological disorders (CC 44) Coagulation defects and other specified hematological disorders (CC 46) Iron deficiency or other unspecified anemias and blood disease (CC 47) End-stage liver disease (CC 25-26) Pancreatic disease (CC 32) Dialysis status (CC 130) Renal failure (CC 131) Transplants (CC 128, 174) Severe infection (CC 1, 3-5) Other infectious diseases and pneumonias (CC 6, 111-113) Septicemia/shock (CC 2) Congestive heart failure (CC 80)	Specified arrhythmias and other heart rhythm disorders (CC 92-93) Other and unspecified heart disease (CC 94) Vascular or circulatory disease (CC 104-106) Fibrosis of lung and other chronic lung disorder (CC 109) Pneumonia (CC 111-113) History of infection (CC 1, 3-6) Metastatic cancer and acute leukemia (CC 7) Lung, upper digestive tract, and other severe cancers (CC 8) Lymphatic, head and neck, brain, and other major cancers; breast, colorectal and other cancers and tumors; other respiratory and heart neoplasms (CC 9-11)

	Specified arrhythmias and other heart rhythm disorders (CC 92-93) Stroke (CC 95-96) Vascular or circulatory disease (CC 104-106) Chronic obstructive pulmonary disease (COPD) (CC 108) Pneumonia (CC 111-113) Dialysis status (CC 130) Renal failure (CC 131) Decubitus ulcer or chronic skin ulcer (CC 148-149) Cellulitis, local skin infection (CC 152) Other injures (CC 162) Major symptoms, abnormalities (CC 166) References: Krumholz HM, Brindis RG, Brush JE, et al. 2006. Standards for Statistical Models Used for Public Reporting of Health Outcomes: An	coronary syndrome CC 67-69,100-102,177-178 Hemiplegia, paraplegia, paralysis, functional disability CC 21 Protein-calorie malnutrition Anterior myocardial infarction (ICD-9-CM 410.00-410.19) Other location of myocardial infarction (ICD-9-CM 410.20-410.69) History of CABG (ICD-9-CM V45.81, 36.10-36.16) History of PTCA (ICD-9-CM V45.82, 00.66, 36.01, 36.02, 36.05, 36.06, 36.07) References: Krumholz HM, Brindis RG, Brush JE, et al. 2006. Standards for Statistical Models Used for Public Reporting of Health Outcomes: An American Heart Association Scientific Statement From the Quality of Care and Outcomes	Acute coronary syndrome (CC 81-82) Coronary atherosclerosis or angina (CC 83-84) Valvular or rheumatic heart disease (CC 86) Specified arrhythmias and other heart rhythm disorders (CC 92-93) Stroke (CC 95-96) Vascular or circulatory disease (CC 104-106) Chronic obstructive pulmonary disease (COPD) (CC 108) Fibrosis of lung or other chronic lung disorders (CC 109) Asthma (CC 110) Pneumonia (CC 111-113) Pleural effusion/pneumothorax (CC 114) Other lung disorders (CC 115) End-stage renal disease or dialysis (CC 129-130)	Dementia or other specified brain disorders (CC 49-50) Drug/alcohol abuse/dependence/ psychosis (CC 51-53) Major psychiatric disorders (CC 54-56) Depression (CC 58) Other psychiatric disorders (CC 60) Hemiplegia, paraplegia, paralysis, functional disability (CC 67-69, 100-102, 177-178) Stroke (CC 95-96) Chronic Obstructive Pulmonary Disease (COPD) (CC 108) Fibrosis of lung or other chronic lung disorders (CC 109) Asthma (CC 110) Pneumonia (CC 111-113) Dialysis status (CC 130) Renal failure (CC 131) Nephritis (CC 132) Other urinary tract disorders (CC 136)	Coronary atherosclerosis or angina, cerebrovascular disease (CC 81-84, 89, 98-99, 103-106) Specified arrhythmias and other heart rhythm disorders (CC 92-93) Cardio-respiratory failure or shock (CC 79) Chronic obstructive pulmonary disease (COPD) (CC 108) Fibrosis of lung or other chronic lung disorders (CC 109) Protein-calorie malnutrition (CC 21) Disorders of fluid/electrolyte/acid-base (CC 22-23) Rheumatoid arthritis and inflammatory connective tissue disease (CC 38) Diabetes mellitus (DM) or DM complications (CC 15-20, 119-120) Decubitus ulcer or chronic skin ulcer (CC 148-149)	Other digestive and urinary neoplasms (CC 12) Diabetes mellitus (DM) or DM complications (CC 15-20, 119-120) Protein-calorie malnutrition (CC 21) Disorders of fluid/electrolyte/acid-base (CC 22-23) Other endocrine/metabolic/nutritional disorders (CC 24) Pancreatic disease (CC 32) Peptic ulcer, hemorrhage, other specified gastrointestinal disorders (CC 34) Other gastrointestinal disorders (CC 36) Severe hematological disorders (CC 44) Iron deficiency and other/unspecified anemia and blood disease (CC 47) Dementia or other specified brain disorders (CC 49-50)

	American Heart Association Scientific Statement From the Quality of Care and Outcomes Research Interdisciplinary Writing Group: Cosponsored by the Council on Epidemiology and Prevention and the Stroke Council Endorsed by the American College of Cardiology Foundation. Circulation 113: 456-462. Normand S-LT, Shahian DM. 2007. Statistical and Clinical Aspects of Hospital Outcomes Profiling. Stat Sci 22 (2): 206-226. Available in attached Excel or csv file at S.2b	Research Interdisciplinary Writing Group: Cosponsored by the Council on Epidemiology and Prevention and the Stroke Council Endorsed by the American College of Cardiology Foundation. Circulation 113: 456-462. Normand S-LT, Shahian DM. 2007. Statistical and Clinical Aspects of Hospital Outcomes Profiling. Stat Sci 22(2): 206-226. Pope GC, et al. 2000. Principal Inpatient Diagnostic Cost Group Models for Medicare Risk Adjustment. Health Care Financing Review 21(3): 93-118.	Renal failure (CC 131) Urinary tract infection (CC 135) Other urinary tract disorders (CC 136) Decubitus ulcer or chronic skin ulcer (CC 148-149) Vertebral fractures (CC 157) Other injuries (CC 162) Respirator dependence/tracheostomy (CC 77) References: Krumholz HM, Brindis RG, Brush JE, et al. 2006. Standards for Statistical Models Used for Public Reporting of Health Outcomes: An American Heart Association Scientific Statement From the Quality of Care and Outcomes Research Interdisciplinary Writing Group: Cosponsored by the Council on Epidemiology and	Decubitus ulcer or chronic skin ulcer (CC 148-149) References: Krumholz HM, Brindis RG, Brush JE, et al. 2006. Standards for Statistical Models Used for Public Reporting of Health Outcomes: An American Heart Association Scientific Statement From the Quality of Care and Outcomes Research Interdisciplinary Writing Group: Cosponsored by the Council on Epidemiology and Prevention and the Stroke Council Endorsed by the American College of Cardiology Foundation. Circulation 113: 456-462. Normand S-LT, Shahian DM. 2007. Statistical and Clinical Aspects of Hospital Outcomes	Hemiplegia, paraplegia, paralysis, functional disability (CC 67-69, 100-102, 177-178) Seizure disorders and convulsions (CC 74) Respirator dependence/tracheostomy status (CC 77) Drug/alcohol psychosis or dependence (CC 51-52) Psychiatric comorbidity (CC 54-56, 58, 60) Hip fracture/dislocation (CC 158) Principal Diagnoses Refer to the 2015 Measure Updates and Specifications: Hospital-Wide All-Cause Unplanned Readmission - Version 4.0 referenced here for the full lists of principal diagnosis AHRQ CCS categories included in each specialty	Drug/alcohol psychosis or dependence (CC 51-52) Major psychiatric disorders (CC 54-56) Depression (CC 58) Anxiety disorders (CC 59) Other psychiatric disorders (CC 60) Hemiplegia, paraplegia, paralysis, functional disability (CC 67-69, 100-102, 177-178) Polyneuropathy (CC 71) Stroke (CC 95-96) Renal failure (CC 131) Decubitus ulcer or chronic skin ulcer (CC 148-149) Cellulitis, local skin infection (CC 152) Vertebral fractures (CC 157) References: Krumholz HM, Brindis RG, Brush JE, et al. 2006. Standards for Statistical Models Used for Public Reporting of Health

			Prevention and the Stroke Council Endorsed by the American College of Cardiology Foundation. Circulation 113: 456-462. Normand S-LT, Shahian DM. 2007. Statistical and Clinical Aspects of Hospital Outcomes Profiling. Stat Sci 22 (2): 206-226. Pope GC, et al. 2000. Principal Inpatient Diagnostic Cost Group Models for Medicare Risk Adjustment. Health Care Financing Review 21(3): 93-118. Available in attached Excel or csv file at S.2b	Profiling. Stat Sci 22 (2): 206-226. Available in attached Excel or csv file at S.2b	cohort risk adjustment model. References: Krumholz HM, Brindis RG, Brush JE, et al. 2006. Standards for Statistical Models Used for Public Reporting of Health Outcomes: An American Heart Association Scientific Statement From the Quality of Care and Outcomes Research Interdisciplinary Writing Group: Cosponsored by the Council on Epidemiology and Prevention and the Stroke Council Endorsed by the American College of Cardiology Foundation. Circulation 113: 456-462. Normand S-LT, Shahian DM. 2007. Statistical and Clinical Aspects of Hospital Outcomes Profiling. Stat Sci 22 (2): 206-226.	Outcomes: An American Heart Association Scientific Statement From the Quality of Care and Outcomes Research Interdisciplinary Writing Group: Cosponsored by the Council on Epidemiology and Prevention and the Stroke Council Endorsed by the American College of Cardiology Foundation. Circulation 113: 456-462. Normand S-LT, Shahian DM. 2007. Statistical and Clinical Aspects of Hospital Outcomes Profiling. Stat Sci 22 (2): 206-226. Pope GC, et al. 2000. Principal Inpatient Diagnostic Cost Group Models for Medicare Risk Adjustment. Health Care Financing Review 21(3): 93-118.

					Pope GC, et al. 2000. Principal Inpatient Diagnostic Cost Group Models for Medicare Risk Adjustment. Health Care Financing Review 21(3): 93-118. Available in attached Excel or csv file at S.2b	Available in attached Excel or csv file at S.2b
Stratification	N/A	Results of this measure will not be stratified.	N/A	N/A	N/A	N/A
Type Score	Rate/proportion better quality = lower score	Rate/proportion better quality = lower score	Rate/proportion better quality = lower score	Rate/proportion better quality = lower score	Rate/proportion better quality = lower score	Rate/proportion better quality = lower score
Algorithm	The measure estimates hospital-level 30-day all-cause RSRRs following elective primary THA/TKA using hierarchical logistic regression models. In brief, the approach simultaneously models data at the patient and hospital levels to account for variance in patient outcomes within and between	The measure employs a hierarchical logistic regression model to create a hospital-level 30-day RSRR. In brief, the approach simultaneously models two levels (patient and hospital) to account for the variance in patient outcomes within and between hospitals (Normand & Shahian, 2007).	The measure estimates hospital-level 30-day, all-cause, RSRRs following hospitalization for pneumonia using hierarchical logistic regression models. In brief, the approach simultaneously models data at the patient and hospital levels to account for variance in patient outcomes within	The measure estimates hospital-level 30-day all-cause RSRRs following hospitalization for HF using hierarchical logistic regression models. In brief, the approach simultaneously models data at the patient and hospital levels to account for variance in patient outcomes within	The measure estimates hospital-level 30-day all-cause RSRRs using hierarchical logistic regression models. In brief, the approach simultaneously models data at the patient and hospital levels to account for variance in patient outcomes within and between hospitals (Normand et al., 2007). At the	The measure estimates hospital-level 30-day, all-cause, RSRRs following hospitalization for COPD using hierarchical logistic regression models. In brief, the approach simultaneously models data at the patient and hospital levels to account for variance in patient outcomes within

	hospitals (Normand and Shahian, 2007). At the patient level, it models the log-odds of readmission within 30 days of discharge using age, sex, selected clinical covariates, and a hospital-specific intercept. At the hospital level, it models the hospital-specific intercepts as arising from a normal distribution. The hospital intercept represents the underlying risk of a readmission at the hospital, after accounting for patient risk. The hospital-specific intercepts are given a distribution to account for the clustering (non-independence) of patients within the same hospital. If there were no differences among hospitals after adjusting for patient risk, the hospital intercepts	At the patient level, the model adjusts the log-odds of readmission within 30 days of discharge for age, sex, and selected clinical covariates. The second level models the hospital-specific intercepts as arising from a normal distribution. The hospital intercept represents the underlying risk of readmission at the hospital, after accounting for patient risk. The hospital-specific intercepts are given a distribution in order to account for the clustering (non-independence) of patients within the same hospital. If there were no differences among hospitals, then after adjusting for patient risk, the hospital intercepts should be identical across all hospitals. The RSRR is calculated as the	and between hospitals (Normand and Shahian, 2007). At the patient level, it models the log-odds of readmission within 30 days of index admission using age, sex, selected clinical covariates, and a hospital-specific intercept. At the hospital level, it models the hospital-specific intercepts as arising from a normal distribution. The hospital intercept represents the underlying risk of a readmission at the hospital, after accounting for patient risk. The hospital-specific intercepts are given a distribution to account for the clustering (non-independence) of patients within the same hospital. If there were no differences among hospitals, then after adjusting for	and between hospitals (Normand and Shahian, 2007). At the patient level, it models the log-odds of readmission within 30 days of discharge from the index admission using age, selected clinical covariates, and a hospital-specific intercept. At the hospital level, it models the hospital-specific intercepts as arising from a normal distribution. The hospital intercept represents the underlying risk of a readmission at the hospital, after accounting for patient risk. The hospital-specific intercepts are given a distribution to account for the clustering (non-independence) of patients within the same hospital. If there were no differences among hospitals, then after adjusting for	patient level, it models the log-odds of hospital readmission within 30 days of discharge using age, selected clinical covariates, and a hospital-specific effect. At the hospital level, the approach models the hospital-specific effects as arising from a normal distribution. The hospital effect represents the underlying risk of a readmission at the hospital, after accounting for patient risk. The hospital-specific effects are given a distribution to account for the clustering (non-independence) of patients within the same hospital (Normand et al., 2007). If there were no differences among hospitals, then after adjusting for patient risk, the hospital effects	and between hospitals (Normand and Shahian, 2007). At the patient level, it models the log-odds of readmission within 30 days of discharge from the index admission using age, selected clinical covariates, and a hospital-specific intercept. At the hospital level, it models the hospital-specific intercepts as arising from a normal distribution. The hospital intercept represents the underlying risk of a readmission at the hospital, after accounting for patient risk. The hospital-specific intercepts are given a distribution to account for the clustering (non-independence) of patients within the same hospital. If there were no differences among hospitals, then after adjusting for

	should be identical across all hospitals. The RSRR is calculated as the ratio of the number of "predicted" to the number of "expected" readmission at a given hospital, multiplied by the national observed readmission rate. For each hospital, the numerator of the ratio is the number of readmissions within 30 days predicted on the basis of the hospital's performance with its observed case mix, and the denominator is the number of readmissions expected based on the nation's performance with that hospital's case mix. This approach is analogous to a ratio of "observed" to "expected" used in other types of statistical analyses. It conceptually	ratio of the number of "predicted" to the number of "expected" readmissions, multiplied by the national unadjusted readmission rate. For each hospital, the numerator of the ratio ("predicted") is the number of readmissions within 30 days predicted on the basis of the hospital's performance with its observed case mix, and the denominator ("expected") is the number of readmissions expected on the basis of the nation's performance with that hospital's case mix. This approach is analogous to a ratio of "observed" to "expected" used in other types of statistical analyses. It conceptually allows for a comparison of a particular hospital's	patient risk, the hospital intercepts should be identical across all hospitals. The RSRR is calculated as the ratio of the number of "predicted" to the number of "expected" readmission at a given hospital, multiplied by the national observed readmission rate. For each hospital, the numerator of the ratio is the number of readmissions within 30 days predicted on the basis of the hospital's performance with its observed case mix; and the denominator is the number of readmissions expected based on the nation's performance with that hospital's case mix. This approach is analogous to a ratio of "observed" to "expected" used in other types of	patient risk, the hospital intercepts should be identical across all hospitals. The RSRR is calculated as the ratio of the number of "predicted" to the number of "expected" readmission at a given hospital, multiplied by the national observed readmission rate. For each hospital, the numerator of the ratio is the number of readmissions within 30 days predicted on the basis of the hospital's performance with its observed case mix, and the denominator is the number of readmissions expected based on the nation's performance with that hospital's case mix. This approach is analogous to a ratio of "observed" to "expected" used in other types of	should be identical across all hospitals. Admissions are assigned to one of five mutually exclusive specialty cohort groups consisting of related conditions or procedures. For each specialty cohort group, the standardized readmission ratio (SRR) is calculated as the ratio of the number of "predicted" readmissions to the number of "expected" readmissions at a given hospital. For each hospital, the numerator of the ratio is the number of readmissions within 30 days predicted based on the hospital's performance with its observed case mix and service mix, and the denominator is the number of readmissions expected based on	patient risk, the hospital intercepts should be identical across all hospitals. The RSRR is calculated as the ratio of the number of "predicted" to the number of "expected" readmission at a given hospital, multiplied by the national observed readmission rate. For each hospital, the numerator of the ratio is the number of readmissions within 30 days predicted on the basis of the hospital's performance with its observed case mix; and the denominator is the number of readmissions expected based on the nation's performance with that hospital's case mix. This approach is analogous to a ratio of "observed" to "expected" used in other types of

	allows for a comparison of a particular hospital's performance given its case mix to an average hospital's performance with the same case mix. Thus, a lower ratio indicates lower-than-expected readmission rates or better quality, and a higher ratio indicates higher-than-expected readmission rates or worse quality. The "predicted" number of readmissions (the numerator) is calculated by using the coefficients estimated by regressing the risk factors and the hospital-specific intercept on the risk of readmission. The estimated hospital-specific intercept is added to the sum of the estimated regression coefficients multiplied by the patient	performance given its case mix to an average hospital's performance with the same case mix. Thus, a lower ratio indicates lower-than-expected readmission or better quality and a higher ratio indicates higher-than-expected readmission or worse quality. The "predicted" number of readmissions (the numerator) is calculated by regressing the risk factors and the hospital-specific intercept on the risk of readmission. The estimated regression coefficients are then multiplied by the patient characteristics in the hospital. The results are then transformed and summed over all patients attributed to the hospital to get a value. The	statistical analyses. It conceptually allows for a comparison of a particular hospital's performance given its case mix to an average hospital's performance with the same case mix. Thus, a lower ratio indicates lower-than-expected readmission rates or better quality, and a higher ratio indicates higher-than-expected readmission rates or worse quality. The "predicted" number of readmissions (the numerator) is calculated by using the coefficients estimated by regressing the risk factors and the hospital-specific intercept on the risk of readmission. The estimated hospital-specific intercept is added to the sum of the estimated regression coefficients	statistical analyses. It conceptually allows for a comparison of a particular hospital's performance given its case mix to an average hospital's performance with the same case mix. Thus, a lower ratio indicates lower-than-expected readmission rates or better quality, and a higher ratio indicates higher-than-expected readmission rates or worse quality. The "predicted" number of readmissions (the numerator) is calculated by using the coefficients estimated by regressing the risk factors and the hospital-specific intercept on the risk of readmission. The estimated hospital-specific intercept is added to the sum of the estimated regression coefficients	the nation's performance with that hospital's case mix and service mix. This approach is analogous to a ratio of "observed" to "expected" used in other types of statistical analyses. It conceptually allows a particular hospital's performance, given its case mix and service mix, to be compared to an average hospital's performance with the same case mix and service mix. Thus, a lower ratio indicates lower-than-expected readmission rates or better quality, while a higher ratio indicates higher-than-expected readmission rates or worse quality. For each specialty cohort, the "predicted" number of readmissions (the numerator) is calculated by using the coefficients	statistical analyses. It conceptually allows for a comparison of a particular hospital's performance given its case mix to an average hospital's performance with the same case mix. Thus, a lower ratio indicates lower-than-expected readmission rates or better quality, and a higher ratio indicates higher-than-expected readmission rates or worse quality. The "predicted" number of readmissions (the numerator) is calculated by using the coefficients estimated by regressing the risk factors and the hospital-specific intercept on the risk of readmission. The estimated hospital-specific intercept is added to the sum of the estimated regression coefficients

	characteristics. The results are transformed and summed over all patients attributed to a hospital to get a predicted value. The "expected" number of readmissions (the denominator) is obtained in the same manner, but a common intercept using all hospitals in our sample is added in place of the hospital-specific intercept. The results are transformed and summed over all patients in the hospital to get an expected value. To assess hospital performance for each reporting period, we re-estimate the model coefficients using the years of data in that period. This calculation transforms the ratio of predicted over expected into a rate that is compared to	"expected" number of readmissions (the denominator) is obtained by regressing the risk factors and a common intercept on the readmission outcome using all hospitals in our sample. The estimated regression coefficients are then multiplied by the patient characteristics in the hospital. The results are then transformed and summed over all patients in the hospital to get a value. To assess hospital performance for each reporting period, we re-estimate the model coefficients using the years of data in that period. Reference: Normand S-LT, Shahian DM. 2007. Statistical and Clinical Aspects of Hospital Outcomes	multiplied by the patient characteristics. The results are transformed and summed over all patients attributed to a hospital to get a predicted value. The "expected" number of readmissions (the denominator) is obtained in the same manner, but a common intercept using all hospitals in our sample is added in place of the hospital-specific intercept. The results are transformed and summed over all patients in the hospital to get an expected value. To assess hospital performance for each reporting period, we re-estimate the model coefficients using the years of data in that period. This calculation transforms the ratio of predicted over	multiplied by the patient characteristics. The results are transformed and summed over all patients attributed to a hospital to get a predicted value. The "expected" number of readmissions (the denominator) is obtained in the same manner, but a common intercept using all hospitals in our sample is added in place of the hospital-specific intercept. The results are transformed and summed over all patients in the hospital to get an expected value. To assess hospital performance for each reporting period, we re-estimate the model coefficients using the years of data in that period. This calculation transforms the ratio of predicted over	estimated by regressing the risk factors (found in Table D.9) and the hospital-specific effect on the risk of readmission. The estimated hospital-specific effect for each cohort is added to the sum of the estimated regression coefficients multiplied by patient characteristics. The results are log transformed and summed over all patients attributed to a hospital to get a predicted value. The "expected" number of readmissions (the denominator) is obtained in the same manner, but a common effect using all hospitals in our sample is added in place of the hospital-specific effect. The results are log transformed and summed over all patients in the	multiplied by the patient characteristics. The results are transformed and summed over all patients attributed to a hospital to get a predicted value. The "expected" number of readmissions (the denominator) is obtained in the same manner, but a common intercept using all hospitals in our sample is added in place of the hospital-specific intercept. The results are transformed and summed over all patients in the hospital to get an expected value. To assess hospital performance for each reporting period, we re-estimate the model coefficients using the years of data in that period. This calculation transforms the ratio of predicted over

	the national observed readmission rate. The hierarchical logistic regression models are described fully in the original methodology report (Grosso et al., 2012). References: Grosso L, Curtis J, Geary L, et al. Hospital-level 30-Day All-Cause Risk-Standardized Readmission Rate Following Elective Primary Total Hip Arthroplasty (THA) And/Or Total Knee Arthroplasty (TKA) Measure Methodology Report. 2012. Normand S-LT, Shahian DM. 2007. Statistical and Clinical Aspects of Hospital Outcomes Profiling. Stat Sci 22(2): 206-226. Available in attached appendix at A.1	Profiling. Stat Sci 22(2): 206-226. Available at measure-specific web page URL identified in S.1	expected into a rate that is compared to the national observed readmission rate. The hierarchical logistic regression models are described fully in the original methodology report (Krumholz et al., 2008). Reference: Krumholz H, Normand S-LT, Keenan P, et al. Hospital 30-Day Pneumonia Readmission Measure Methodology. 2008. Normand S-LT, Shahian DM. 2007. Statistical and Clinical Aspects of Hospital Outcomes Profiling. Stat Sci 22(2): 206-226. Available in attached appendix at A.1	expected into a rate that is compared to the national observed readmission rate. The hierarchical logistic regression models are described fully in the original methodology report (Grosso et al., 2011). References: Keenan PS, Normand SL, Lin Z, et al. An administrative claims measure suitable for profiling hospital performance on the basis of 30-day all-cause readmission rates among patients with heart failure. Circulation. Cardiovascular Quality and Outcomes. Sep 2008;1(1):29-37. Normand S-LT, Shahian DM. 2007. Statistical and Clinical Aspects of Hospital Outcomes Profiling. Stat Sci	hospital to get an expected value. To assess hospital performance for each reporting period, we re-estimate the model coefficients using the data in that period. The specialty cohort SRRs are then pooled for each hospital using a volume-weighted geometric mean to create a hospital-wide composite SRR. The composite SRR is multiplied by the national observed readmission rate to produce the RSRR. The statistical modeling approach is described fully in Appendix A and in the original methodology report (Horwitz et al., 2012). References: Horwitz L, Partovian C, Lin Z, et al. Hospital-Wide All-Cause Unplanned	expected into a rate that is compared to the national observed readmission rate. The hierarchical logistic regression models are described fully in the original methodology report (Grosso et al., 2011). Reference: Grosso L, Lindenauer P, Wang C, et al. Hospital-level 30-day Readmission Following Admission for an Acute Exacerbation of Chronic Obstructive Pulmonary Disease. 2011. Normand S-LT, Shahian DM. 2007. Statistical and Clinical Aspects of Hospital Outcomes Profiling. Stat Sci 22(2): 206-226. Available in attached appendix at A.1

				22(2): 206-226. Available in attached appendix at A.1	Readmission Measure: Final Technical Report. 2012; http://www.qualitynet.org/dcs/BlobServer?blobkey=id&blobnocache=true&blobwhere=1228889825199&blobheader=multipart%2Foctet-stream&blobheadername1=Content-Disposition&blobheadervalue1=attachment%3Bfilename%3DDryRun_HWR_TechReport_081012.pdf&blobcol=urldata&blobtable=MungoBlobs. Accessed 30 April, 2014. Normand S-LT, Shahian DM. 2007. Statistical and Clinical Aspects of Hospital Outcomes Profiling. Stat Sci 22(2): 206-226. Available in attached appendix at A.1	
Submission items	5.1 Identified measures: 0330 : Hospital 30-day, all-cause, risk-standardized	0730 : Acute Myocardial Infarction (AMI) Mortality Rate 0704 :	5.1 Identified measures: 0708 : Proportion of Patients with Pneumonia that	5.1 Identified measures: 0505 : Hospital 30-day all-cause risk-standardized	5.1 Identified measures: 0695 : Hospital 30-Day Risk-Standardized Readmission Rates	5.1 Identified measures: 0701 : Functional Capacity in COPD patients before and after

	readmission rate (RSRR) following heart failure (HF) hospitalization 0505 : Hospital 30-day all-cause risk-standardized readmission rate (RSRR) following acute myocardial infarction (AMI) hospitalization. 0506 : Hospital 30-day, all-cause, risk-standardized readmission rate (RSRR) following pneumonia hospitalization 1550 : Hospital-level risk-standardized complication rate (RSCR) following elective primary total hip arthroplasty (THA) and/or total knee arthroplasty (TKA) 1789 : Hospital-Wide All-Cause Unplanned Readmission Measure (HWR) 1891 : Hospital 30-day, all-cause, risk-standardized	0330 : Hospital 30-day, all-cause, risk-standardized readmission rate (RSRR) following heart failure (HF) hospitalization 0506 : Hospital 30-day, all-cause, risk-standardized readmission rate (RSRR) following pneumonia hospitalization 0230 : Hospital 30-day, all-cause, risk-standardized mortality rate (RSMR) following acute myocardial infarction (AMI) hospitalization for patients 18 and older 1551 : Hospital-level 30-day risk-standardized readmission rate (RSRR) following elective primary total hip arthroplasty (THA) and/or total knee arthroplasty (TKA) 1768 : Plan All-Cause Readmissions (PCR) 1789 : Hospital-	have a Potentially Avoidable Complication (during the episode time window) 0468 : Hospital 30-day, all-cause, risk-standardized mortality rate (RSMR) following pneumonia hospitalization 0231 : Pneumonia Mortality Rate (IQI #20) 0279 : Bacterial Pneumonia Admission Rate (PQI 11) 2579 : Hospital-level, risk-standardized payment associated with a 30-day episode of care for pneumonia 1789 : Hospital-Wide All-Cause Unplanned Readmission Measure (HWR) 5a.1 Are specs completely harmonized? No	readmission rate (RSRR) following acute myocardial infarction (AMI) hospitalization. 0506 : Hospital 30-day, all-cause, risk-standardized readmission rate (RSRR) following pneumonia hospitalization 1551 : Hospital-level 30-day risk-standardized readmission rate (RSRR) following elective primary total hip arthroplasty (THA) and/or total knee arthroplasty (TKA) 1891 : Hospital 30-day, all-cause, risk-standardized readmission rate (RSRR) following chronic obstructive pulmonary disease (COPD) hospitalization 1789 : Hospital-Wide All-Cause Unplanned Readmission Measure (HWR)	following Percutaneous Coronary Intervention (PCI) 0329 : Risk-Adjusted 30-Day All-Cause Readmission Rate 0330 : Hospital 30-day, all-cause, risk-standardized readmission rate (RSRR) following heart failure (HF) hospitalization 0505 : Hospital 30-day all-cause risk-standardized readmission rate (RSRR) following acute myocardial infarction (AMI) hospitalization. 0506 : Hospital 30-day, all-cause, risk-standardized readmission rate (RSRR) following pneumonia hospitalization 0171 : Acute Care Hospitalization During the First 60 Days of Home Health 0173 : Emergency Department Use	Pulmonary Rehabilitation 0709 : Proportion of patients with a chronic condition that have a potentially avoidable complication during a calendar year. 0070 : Coronary Artery Disease (CAD): Beta-Blocker Therapy-Prior Myocardial Infarction (MI) or Left Ventricular Systolic Dysfunction (LVEF <40%) 0275 : Chronic Obstructive Pulmonary Disease (COPD) or Asthma in Older Adults Admission Rate (PQI 05) 1561 : Relative Resource Use for People with COPD (RCO) 1789 : Hospital-Wide All-Cause Unplanned Readmission Measure (HWR) 1893 : Hospital 30-Day, all-cause, risk-

	readmission rate (RSRR) following chronic obstructive pulmonary disease (COPD) hospitalization 5a.1 Are specs completely harmonized? Yes 5a.2 If not completely harmonized, identify difference, rationale, impact: We did not include in our list of related measures any non-outcome measures (for example, process measures) with the same target population as our measure. Because this is an outcome measure, clinical coherence of the cohort takes precedence over alignment with related non-outcome measures. Furthermore, non-outcome measures are limited due to broader patient	Wide All-Cause Unplanned Readmission Measure (HWR) 1891 : Hospital 30-day, all-cause, risk-standardized readmission rate (RSRR) following chronic obstructive pulmonary disease (COPD) hospitalization 2431 : Hospital-level, risk-standardized payment associated with a 30-day episode-of-care for Acute Myocardial Infarction (AMI) 2473 : Hospital 30-day Risk-standardized Acute Myocardial Infarction (AMI) Mortality eMeasure 5a.1 Are specs completely harmonized? Yes 5a.2 If not completely harmonized, identify difference, rationale, impact:	5a.2 If not completely harmonized, identify difference, rationale, impact: We did not include in our list of related measures any non-outcome (e.g., process) measures with the same target population as our measure. Because this is an outcome measure, clinical coherence of the cohort takes precedence over alignment with related non-outcome measures. Furthermore, non-outcome measures are limited due to broader patient exclusions. This is because they typically only include a specific subset of patients who are eligible for that measure (for example, patients who receive a specific medication or undergo a specific procedure).	0229 : Hospital 30-day, all-cause, risk-standardized mortality rate (RSMR) following heart failure (HF) hospitalization for patients 18 and older 5a.1 Are specs completely harmonized? No 5a.2 If not completely harmonized, identify difference, rationale, impact: We did not include in our list of related measures any non-outcome (e.g., process) measures with the same target population as our measure. Because this is an outcome measure, clinical coherence of the cohort takes precedence over alignment with related non-outcome measures. Furthermore, non-outcome measures	without Hospitalization During the First 60 Days of Home Health 1551 : Hospital-level 30-day all-cause risk-standardized readmission rate (RSRR) following elective primary total hip arthroplasty (THA) and total knee arthroplasty (TKA) 1768 : Plan All-Cause Readmissions (PCR) 1891 : Hospital 30-day, all-cause, risk-standardized readmission rate (RSRR) following chronic obstructive pulmonary disease (COPD) hospitalization 5a.1 Are specs completely harmonized? No 5a.2 If not completely harmonized, identify difference,	standardized mortality rate (RSMR) following chronic obstructive pulmonary disease (COPD) hospitalization 5a.1 Are specs completely harmonized? No 5a.2 If not completely harmonized, identify difference, rationale, impact: We did not include in our list of related measures any non-outcome (e.g., process) measures with the same target population as our measure. Because this is an outcome measure, clinical coherence of the cohort takes precedence over alignment with related non-outcome measures. Furthermore, non-outcome measures are limited due to broader patient

	exclusions. This is because they typically only include a specific subset of patients who are eligible for that measure (for example, patients who receive a specific medication or undergo a specific procedure). 5b.1 If competing, why superior or rationale for additive value: N/A	We did not include in our list of related measures any non-outcome (e.g., process) measures with the same target population as our measure. Our measure cohort was heavily vetted by clinical experts, a technical expert panel, and a public comment period. Additionally, the measure, with the specified cohort, has been publicly reported since 2009. Because this is an outcome measure, clinical coherence of the cohort takes precedence over alignment with related non-outcome measures. Furthermore, non-outcome measures are limited due to broader patient exclusions. This is because they typically only include a specific subset of patients who are eligible for	5b.1 If competing, why superior or rationale for additive value: N/A	are limited due to broader patient exclusions. This is because they typically only include a specific subset of patients who are eligible for that measure (for example, patients who receive a specific medication or undergo a specific procedure). 5b.1 If competing, why superior or rationale for additive value: N/A	rationale, impact: This measure and the National Committee for Quality Assurance (NCQA) Plan All-Cause Readmissions (PCR) Measure #1768 are related measures, but are not competing because they don't have the same measure focus and same target population. In addition, both have been previously harmonized to the extent possible under the guidance of the National Quality Forum Steering Committee in 2011. Each of these measures has different specifications. NCQA's Measure #1768 counts the number of inpatient stays for patients aged 18 and older during a measurement year that were followed by an acute readmission for any	exclusions. This is because they typically only include a specific subset of patients who are eligible for that measure (for example, patients who receive a specific medication or undergo a specific procedure). 5b.1 If competing, why superior or rationale for additive value: N/A

		that measure (for example, patients who receive a specific medication or undergo a specific procedure). 5b.1 If competing, why superior or rationale for additive value: N/A			diagnosis to any hospital within 30 days. It contrasts this count with a calculation of the predicted probability of an acute readmission. NCQA's measure is intended for quality monitoring and accountability at the health plan level. This measure estimates the risk-standardized rate of unplanned, all-cause readmissions to a hospital for any eligible condition within 30 days of hospital discharge for patients aged 18 and older. The measure will result in a single summary risk-adjusted readmission rate for conditions or procedures that fall under five specialties: surgery/gynecology, general medicine, cardiorespiratory, cardiovascular, and neurology. This measure is specified	

					for evaluating hospital performance. However, despite these differences in cohort specifications, both measures under NQF guidance have been harmonized to the extent possible through modifications such as exclusion of planned readmissions. We did not include in our list of related measures any non-outcome (e.g., process) measures with the same target population as our measure. Because this is an outcome measure, clinical coherence of the cohort takes precedence over alignment with related non-outcome measures. Furthermore, non-outcome measures are limited due to broader patient exclusions. This is because they	

					typically only include a specific subset of patients who are eligible for that measure (for example, patients who receive a specific medication or undergo a specific procedure). 5b.1 If competing, why superior or rationale for additive value: N/A	

Comparison of NQF #0351, #0352, #0353

	0351 Death Rate Among Surgical Inpatients with Serious Treatable Complications (PSI 04)	0352 Failure to Rescue In-Hospital Mortality (risk adjusted)	0353 Failure to Rescue 30-Day Mortality (risk adjusted)
Steward	Agency for Healthcare Research and Quality	The Children's Hospital of Philadelphia	The Children's Hospital of Philadelphia
Description	In-hospital deaths per 1,000 surgical discharges, among patients ages 18 through 89 years or obstetric patients, with serious treatable complications (shock/cardiac arrest, sepsis, pneumonia, deep vein thrombosis/ pulmonary embolism or gastrointestinal hemorrhage/acute ulcer). Includes metrics for the number of discharges for each type of complication. Excludes cases transferred to an acute care facility. A risk-adjusted rate is available. The risk-adjusted rate of PSI 04 relies on	Percentage of patients who died with documented or undocumented complications in the hospital	Percentage of patients who died with documented or undocumented complications within 30 days from admission

	stratum-specific risk models. The stratum-specific models are combined to calculate an overall risk-adjusted rate.		
Type	Outcome	Outcome	Outcome
Data Source	Administrative claims While the measure is tested and specified using data from the Healthcare Cost and Utilization Project (HCUP) (see section 1.1 and 1.2 of the measure testing form), the measure specifications for numerators, denominators and observed rates and software are Available at measure-specific web page URL identified in S.1 Attachment PSI04_Technical_Specifications_v6.0_160527.xlsx	Claims	Claims
Level	Facility	Facility, Health Plan, Integrated Delivery System, Other, Population: Community, County or City, Population: Regional and State	Facility, Health Plan, Integrated Delivery System, Other, Population: Community, County or City, Population: Regional and State
Setting	Hospital/Acute Care Facility	Hospital	Hospital
Numerator Statement	Number of deaths (DISP=20) among cases meeting the inclusion and exclusion rules for the denominator.	Patients who died with a complication plus patients who died without documented complications. Death is defined as death in the hospital. All patients in an FTR analysis have developed a complication (by definition) or died without a documented complication. Complicated patient has at least one of the complications defined in Appendix B/D (see attachment and website http://www.research.chop.edu/programs/cor/node/26). Complications are defined using the secondary ICD9/ICD10 diagnosis	Patients who died with a complication plus patients who died without documented complications. Death is defined as death within 30 days from admission. All patients in an FTR analysis have developed a documented complication (by definition) or died without a documented complication. Complicated patient has at least one of the complications defined in Appendix B (see attachment and website http://www.research.chop.edu/programs/cor/node/26). Complications are defined

		and procedure codes and the DRG code of the current admission. Comorbidities are defined in Appendix C/E (see attachment and website http://www.research.chop.edu/programs/cor/node/26) using secondary ICD9/ICD10 diagnosis codes of the current admission and primary or secondary ICD9/ICD10 diagnosis codes of previous admission within 90 days of the admission date of the current admission. *When Current Procedural Terminology (CPT) codes are available, the definition of complications and comorbidities are augmented to include them.	using the secondary ICD9 diagnosis and procedure codes and the DRG code of the current admission. Comorbidities are defined in Appendix C/E (see attachment and website http://www.research.chop.edu/programs/cor/node/26) using secondary ICD9/ICD10 diagnosis codes of the current admission and primary or secondary ICD9/ICD10 diagnosis codes of previous admission within 90 days of the admission date of the current admission. *When Current Procedural Terminology (CPT) codes are available, the definitions of complications and comorbidities are augmented to include them
Numerator Details	Please see attached excel file in S.2b. for version 6.0 specifications.	General Surgery, Orthopedic and Vascular patients in specific DRGs with complications who died and patients who died without documented complications. Death is defined as death in the hospital.	General Surgery, Orthopedic and Vascular patients in specific DRGs with complications who died and patients who died without documented complications. Death is defined as death within 30 days from admission.
Denominator Statement	Surgical discharges, for patients ages 18 through 89 years or MDC 14 (pregnancy, childbirth, and puerperium), with all of the following: • any-listed ICD-9-CM or ICD-10-PCS procedure codes for an operating room procedure; and • the principal procedure occurring within 2 days of admission or an admission type of elective (ATYPE=3); and	General Surgery, Orthopedic and Vascular patients in specific DRGs with complications plus patients in specific General Surgery, Orthopedic and Vascular DRGs who died in the hospital without complications. Inclusions: adult patients admitted for one of the procedures in the General Surgery, Orthopedic or Vascular DRGs (see attachment and Appendix A http://www.research.chop.edu/programs/cor/node/26).	General Surgery, Orthopedic and Vascular patients in specific DRGs with complications plus patients who died in the hospital without complications. Inclusions: adult patients admitted for one of the procedures in the General Surgery, Orthopedic or Vascular DRGs (see attachment and Appendix A at http://www.research.chop.edu/programs/cor/node/26)

	• meet the inclusion and exclusion criteria for STRATUM_SHOCK (shock or cardiac arrest), STRATUM_SEPSIS (sepsis), STRATUM_PNEUMONIA (pneumonia), STRATUM_DVT (deep vein thrombosis or pulmonary embolism), or STRATUM_GI_HEM (gastrointestinal hemorrhage or acute ulcer) STRATUM_SHOCK (shock or cardiac arrest) • any secondary ICD-9-CM or ICD-10-CM diagnosis codes or any-listed ICD-9-CM or ICD-10-PCS procedure codes for shock or cardiac arrest STRATUM_SEPSIS (sepsis) • any secondary ICD-9-CM or ICD-10-CM diagnosis codes for sepsis. STRATUM_PNEUMONIA (pneumonia) • any secondary ICD-9-CM or ICD-10-CM diagnosis codes for pneumonia or pneumonitis. STRATUM_DVT (deep vein thrombosis or pulmonary embolism) • any secondary ICD-9-CM or ICD-10-CM diagnosis codes for deep vein thrombosis or pulmonary embolism. STRATUM_GI_HEM (gastrointestinal hemorrhage or acute ulcer)		

	• any secondary ICD-9-CM or ICD-10-CM diagnosis codes for gastrointestinal hemorrhage or acute ulcer. Surgical discharges are defined by specific MS-DRG codes and ICD-9-CM/ICD-10-PCS codes indicating "major operating room procedures."		
Denominator Details	Please see attached excel file in S.2b. for version 6.0 specifications.	Adult patients admitted for one of the procedures in the General Surgery, Orthopedic or Vascular DRGs (see attachment and Appendix A at http://www.research.chop.edu/programs/cor/node/26) who developed an in hospital complication and those who died without a documented complication.	Adult patients admitted for one of the procedures in the General Surgery, Orthopedic or Vascular DRGs (see attachment and Appendix A at http://www.research.chop.edu/programs/cor/node/26) who developed an in hospital complication and those who died without a documented complication.
Exclusions	Exclude cases: • transferred to an acute care facility (DISP = 2) • with missing discharge disposition (DISP=missing), gender (SEX=missing), age (AGE=missing), quarter (DQTR=missing), year (YEAR=missing), or principal diagnosis (DX1=missing)	Patients over age 90, under age 18. Those over 90 are excluded due to the increased likelihood that these patients will have DNR orders. This could introduce a bias towards increased failure-to-rescue due to DNR status census, potentially disproportionately penalizing hospitals for deaths that were out of their control. If DNR status were included in the dataset, it could be used as a more accurate exclusion criteria variable. Patients over age 90, under age 18. Those over 90 are excluded due to the increased likelihood that these patients will have DNR orders. This could introduce a bias towards increased failure-to-rescue due to DNR status census, potentially disproportionately penalizing hospitals for deaths that were out of their control. If DNR status were included in the dataset, it could be used as a more accurate exclusion criteria variable.	Patients over age 90, under age 18. Those over 90 are excluded due to the increased likelihood that these patients will have DNR orders. This could introduce a bias towards increased failure-to-rescue due to DNR status census, potentially disproportionately penalizing hospitals for deaths that were out of their control. If DNR status were included in the dataset, it could be used as a more accurate exclusion criteria variable.

Exclusion Details	Please see attached excel file in S.2b. for version 6.0 specifications.	N/A	N/A
Risk Adjustment	Statistical risk model	Statistical risk model	Statistical risk model
Stratification	Please see attached excel file in S.2b. for version 6.0 specifications.	Complicated patient has at least one of the complications defined in Appendix B/D (http://www.research.chop.edu/programs/cor/node/26). Complications are defined using the secondary ICD9/ICD10 diagnosis and procedure codes and the DRG code of the current admission. When Current Procedural Terminology (CPT) codes are available, the definition of complications and comorbidities are augmented to include them.	Complicated patient has at least one of the complications defined in Appendix B/D (http://www.research.chop.edu/programs/cor/node/26). Complications are defined using the secondary ICD9/ICD10 diagnosis and procedure codes and the DRG code of the current admission. When Current Procedural Terminology (CPT) codes are available, the definition of complications and comorbidities are augmented to include them.
Type Score	Rate/proportion	Rate/proportion	Rate/proportion
Algorithm	The observed rate is the number of discharge records where the patient experienced the PSI adverse event divided by the number of discharge records at risk for the event. The expected rate is a comparative rate that incorporates information about a reference population that is not part of the user's input dataset – what rate would be observed if the expected level of care observed in the reference population and estimated with risk adjustment regression models, were applied to the mix of patients with demographic and comorbidity distributions observed in the user's dataset. The expected rate is calculated only for risk-adjusted indicators. The following descriptions are for the expected rate and risk-adjusted rate.	Patients admitted to an acute care facility with a stay characterized by a principal procedure and DRG of interest as outlined in the attached Appendix A that can also be found on the website (http://www.research.chop.edu/programs/cor/node/26). Those patients both alive and without complications were excluded, as were any below 18 years of age or above 90 years old. Cases meeting the target criteria were therefore between the ages of 18-90 years old, admitted to an acute care facility for a DRG of interest, and had a complication or died without a documented complication in the hospital. The event of interest is death. Failure-to-Rescue is the rate of deaths in the hospital in the target case population.	Patients admitted to an acute care facility with a stay characterized by a principal procedure and DRG of interest as outlined in the attached Appendix A that can also be found on the website (http://www.research.chop.edu/programs/cor/node/26). Those patients both alive and without complications were excluded, as were any below 18 years of age or above 90 years old. Cases meeting the target criteria were therefore between the ages of 18-90 years old, admitted to an acute care facility for a DRG of interest, and had a complication or died without a documented complication within 30 days of admission. The event of interest is death. Failure-to-Rescue is the rate of deaths within 30 days of admission in the target case population.

	These rates are calculated using models for each individual stratum. The expected rate is estimated using the stratum specific model for each record using a generalized estimating equations (GEE) approach to account for correlation at the hospital or provider level. Records are assigned to the stratum for which they qualify with the highest observed mortality rate. The risk-adjusted rate is a comparative rate that also incorporates information about a reference population that is not part of the input dataset – what rate would be observed if the level of care observed in the user's dataset were applied to a mix of patients with demographics and comorbidities distributed like the reference population? The risk-adjusted rate for the overall PSI 04 is calculated as the observed to expected ratio multiplied by the reference population rate, where the observed and expected values are summed across five strata (categories) of PSI 04 risk. This approach differs from other AHRQ Patient Safety Indicators without strata, in that each discharge-record's expected value is computed using one of five distinct stratum-specific risk adjustment models that correspond to an assigned PSI 04 stratum. The five PSI 04 strata group records together based on secondary diagnoses that represent complications of care, and		

	place the patient at risk of death (which is the numerator of PSI 04). The smoothed rate is the weighted average of the risk-adjusted rate from the user's input dataset and the rate observed in the reference population; the smoothed rate is calculated with a shrinkage estimator to result in a rate near that from the user's dataset if the provider's rate is estimated in a stable fashion with minimal noise, or to result in a rate near that of the reference population if the variance of the estimated rate from the input dataset is large compared with the hospital-to-hospital variance estimated from the reference population. Thus, the smoothed rate is a weighted average of the risk-adjusted rate and the reference population rate, where the weight is the signal-to-noise ratio. In practice, the smoothed rate brings rates toward the mean, and tends to do this more so for outliers (such as rural hospitals). For additional information, please see the supplemental materials for the AHRQ QI Empirical Methods.		
Submission items	5.1 Identified measures: 0352 : Failure to Rescue In-Hospital Mortality (risk adjusted) 0353 : Failure to Rescue 30-Day Mortality (risk adjusted)	5.1 Identified measures: 0351 : Death Rate among Surgical Inpatients with Serious Treatable Complications (PSI 04) 0353 : Failure to Rescue 30-Day Mortality (risk adjusted)	5.1 Identified measures: 0351 : Death Rate among Surgical Inpatients with Serious Treatable Complications (PSI 04) 0352 : Failure to Rescue In-Hospital Mortality (risk adjusted)

	5a.1 Are specs completely harmonized? No 5a.2 If not completely harmonized, identify difference, rationale, impact: NQF 0353 uses 30-day mortality (dated from the date of the surgical admission), regardless of location, for the numerator. This is a different outcome from in-hospital mortality, and is only available in a very limited number of data sets, so NQF 0353 is a related (not competing) measure. NQF 0352 is a measure of in-hospital mortality, similar to PSI 04 (NQF 0351), but it has a different target population, so NQF 0352 is a related (not competing) measure. Specifically, the denominator for NQF 0352 and NQF 0353 is limited to surgical MS-DRGs in MDC 6 (Digestive System), MDC 7 (Hepatobiliary), MDC 9 (Skin, subcutaneous tissue, breast), MDC 10 (Endocrine, nutritional, metabolic), MDC 8 (Musculoskeletal and connective tissue), and MDC 5 (Circulatory system). By contrast, the denominator for PSI 04 (NQF 0351) also includes patients undergoing transplantation, neurosurgical, ophthalmologic, otolaryngologic (ENT), pulmonary/respiratory, urologic, gynecologic, hematologic, infection-related, trauma-related, and burn-related major procedures (if they otherwise qualify for the denominator). Therefore, the clinical/specialty breadth of the current measure is substantially greater than that of NQF 0352. Although	5a.1 Are specs completely harmonized? No 5a.2 If not completely harmonized, identify difference, rationale, impact: 0351 identifies a subpopulation with treatable complications and defines the numerator as only those deaths with this type of complication. In essence, the difference with 0351 hinges on what are labeled as serious, treatable complications and whether they can be distinguished from other complications. As such, 50% of deaths are excluded using this definition resulting in lower reliability and in addition is susceptible to gaming. 0353 limits the time period for which death occurs to the first 30-days of an admission. 5b.1 If competing, why superior or rationale for additive value:	5a.1 Are specs completely harmonized? No 5a.2 If not completely harmonized, identify difference, rationale, impact: 0351 identifies a subpopulation with treatable complications and defines the numerator as only those deaths with this type of complication. In essence, the difference with 0351 hinges on what are labeled as serious, treatable complications and whether they can be distinguished from other complications. As such, 50% of deaths are excluded using this definition resulting in lower reliability and in addition is susceptible to gaming. 0352 does not limit the time period for which death occurs to the first 30-days of an admission. 5b.1 If competing, why superior or rationale for additive value:

	all three of these measures are focused on "surgical patients between ages 18 and 90 admitted to an acute care hospital," the available risk-adjustment for NQF 0352 and NQF 0353 is based on Medicare fee-for-service claims data, which greatly limits the usefulness of these two measures for users with all-payer data sets (i.e., hospitals and hospital systems/associations, state and regional health data agencies, regional quality collaboratives and other "report card" sponsors, and researchers using HCUP or similar data). By contrast, the publicly available risk-adjustment for PSI 04 (NQF 0351) is based on all-payer data from 34 US states. The target population for PSI 04 (NQF 0351) is substantially broader than the target population for NQF 0352 and NQF 0353, as described above. Another key difference in denominator specifications is that PSI 04 (NQF 0351) only includes patients who experienced one or more of five broad categories of perioperative or postoperative complications, as defined by the strata. By contrast, the denominators of NQF 0352 and NQF 0353 include patients with a much wider set of 38 perioperative or postoperative complications. More importantly, in-hospital death after surgery automatically qualifies a patient for the denominator of NQF 0352, regardless whether the patient had any reported complication. As a result, the numerator of NQF 0352 includes ALL in-hospital deaths after eligible operations, whereas		

	the numerator of PSI 04 (NQF 0351) only includes in-hospital deaths that follow one or more of the stratum-defining complications. Previous studies suggest that PSI 04 (NQF 0351) captures about 42-49% of all in-hospital deaths after qualifying operations, whereas NQF 0352 captures 100% of these deaths. The clinical rationale for this difference is that focusing on a narrower subset of deaths provides an easier target for quality improvement efforts and makes the indicator more sensitive to nursing-related quality of care (i.e., nurses are presumably less likely to be able to "rescue" patients from sudden unexpected deaths or "planned" deaths, in which physicians' orders and/or advance directives do not allow cardiopulmonary resuscitation or similar efforts). Specifically, a 2007 analysis cited in the Testing Form showed that the omega ratio summarizing the contribution of patient characteristics at the discharge-level versus hospital-level variables for explaining PSI04 (NQF 0351) was 57, compared with omega ratios of 189 for the overall risk-adjusted surgical mortality rate and 128 for NQF 0352. In other words, NQF 0352 is more heavily influenced by patient characteristics, whereas PSI 04 (NQF 0351) better isolates the hospital quality effect (albeit at the price of lower reliability, given that it only captures 42-49% of all in-hospital deaths after qualifying operations).		

	5b.1 If competing, why superior or rationale for additive value:		

Comparison of NQF #1519, #0118, #0439

	1519 Statin Therapy at Discharge after Lower Extremity Bypass (LEB)	0118 Anti-Lipid Treatment Discharge	0439 STK-06: Discharged on Statin Medication
Steward	Society for Vascular Surgery	The Society of Thoracic Surgeons	The Joint Commission
Description	Percentage of patients aged 18 years and older undergoing infrainguinal lower extremity bypass who are prescribed a statin medication at discharge. This measure is proposed for both hospitals and individual providers.	Percent of patients aged 18 years and older undergoing isolated CABG who were discharged on a lipid lowering statin	This measure captures the proportion of ischemic stroke patients who are prescribed a statin medication at hospital discharge. This measure is a part of a set of eight nationally implemented measures that address stroke care (STK-1: Venous Thromboembolism (VTE) Prophylaxis, STK-2: Discharged on Antithrombotic Therapy, STK-3: Anticoagulation Therapy for Atrial Fibrillation/Flutter, STK-4: Thrombolytic Therapy, STK-5: Antithrombotic Therapy By End of Hospital Day 2, STK-8: Stroke Education, and STK-10: Assessed for Rehabilitation) that are used in The Joint Commission's hospital accreditation and Disease-Specific Care certification programs.
Type	Process	Process	Process
Data Source	Electronic Clinical Data : Registry The Society for Vascular Surgery Vascular Quality Initiative Registry The Vascular Study Group of New England Registry Attachment LEB-defs-v.01.09_v1.doc	Electronic Clinical Data : Registry STS Adult Cardiac Surgery Database Version 2.73; STS Adult Cardiac Surgery Database Version 2.8 went live on July 1, 2014. Available at measure-specific web page URL identified in S.1 No data dictionary	Electronic Clinical Data, Paper Medical Records Each data element in the data dictionary includes suggested data sources. The data are collected using contracted Performance Measurement Systems (vendors) that develop data collection tools based on the measure specifications. The tools are verified and tested by Joint

			Commission staff to confirm the accuracy and conformance of the data collection tool with the measure specifications. The vendor may not offer the measure set to hospitals until verification has been passed. No data collection instrument provided Attachment Appendix_A.1-635878758534627046.xls
Level	Facility, Clinician : Group/Practice, Clinician : Individual	Facility, Clinician : Group/Practice	Facility, Population : National
Setting	Hospital/Acute Care Facility	Hospital/Acute Care Facility	Hospital/Acute Care Facility
Numerator Statement	Patients undergoing infrainguinal lower extremity bypass who are prescribed a statin medication at discharge.	Number of patients undergoing isolated CABG who were discharged on a lipid lowering statin	Ischemic stroke patients prescribed statin medication at hospital discharge
Numerator Details	ANY registry that includes anatomic details or CPT procedure codes is required to identify patients for numerator inclusion. The Society for Vascular Surgery Vascular Quality Initiative (SVS VQI) and the Vascular Study Group of New England (VSGNE)are examples of registries which capture detailed anatomic information, but the measure is not limited to these registries. It could also be used by other registries that capture this same information. No other registries are required for computation. Infrainguinal lower extremity bypass is defined as a bypass beginning at or below the external iliac artery and extending into the ipsilateral leg. It includes procedures with CPT codes 35656, 35556, 35583, 35666, 35566, 35585, 35671, 35571, 35587. The numerator is calculated as the number of patients age 18 and over undergoing	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"	One data element is used to calculate the numerator: • Statin Medication Prescribed at Discharge – Documentation that a statin medication was prescribed at hospital discharge. Allowable values: Yes, No/UTD or unable to determine from medical record documentation. Patients are eligible for the numerator population when the allowable value equals “yes” for the data element.

	such a procedure who are prescribed a statin medication at the time of discharge, which is also captured in the above registries.		
Denominator Statement	All patients aged 18 years and older undergoing lower extremity bypass as defined above who are discharged alive, excluding those patients who are intolerant to statins.	All patients undergoing isolated CABG	Ischemic stroke patients
Denominator Details	ANY registry that includes anatomic details or CPT procedure codes is required to identify patients for denominator inclusion. The Society for Vascular Surgery Vascular Quality Initiative and the Vascular Study Group of New England are examples of registries that capture detailed anatomic information, but the measure is not limited to these registries. Infrainguinal lower extremity bypass is defined as a bypass beginning at or below the external iliac artery and extending into the ipsilateral leg. It includes procedures with CPT codes 35656, 35556, 35583, 35666, 35566, 35585, 35671, 35571, 35587. Only patients who are discharged alive are included in the denominator, and patients who are intolerant to statins are excluded, as described below.	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.	Nine data elements are used to calculate the denominator: 1. Admission Date – The month, day and year of admission to acute inpatient care. 2. Birthdate - The month, day and year the patient was born. 3. Clinical Trial - Documentation that during this hospital stay the patient was enrolled in a clinical trial in which patients with stroke were being studied. Allowable values: Yes or No/UTD. 4. Comfort Measures Only – The earliest day the physician/APN/PA documented comfort measures only after hospital arrival. Allowable values: 1 (Day 0 or 1); 2 (Day 2 or after); 3 (Timing Unclear); 4 (Not Documented/UTD). 5. Discharge Date – The month day and year the patient was discharged from acute care, left against medical advice or expired during the stay. 6. Discharge Disposition – The place or setting to which the patient was discharged on the day of hospital discharge. 7. Elective Carotid Intervention – Documentation demonstrates that the

			current admission is solely for the performance of an elective carotid intervention (e.g., elective carotid endarterectomy, angioplasty, carotid stenting). Allowable values: Yes or No/UTD. 8. ICD-10-CM Principal Diagnosis Code - The International Classification of Diseases, Tenth Revision, Clinical Modification (ICD-10-CM) code associated with the diagnosis established after study to be chiefly responsible for occasioning the admission of the patient for this hospitalization. 9. Reason For Not Prescribing Statin Medication at Discharge – Documentation of a reason for not prescribing a statin medication at discharge. Allowable values: Yes or No/UTD. Population: Discharges with ICD-10-CM Principal Diagnosis Code for ischemic stroke as defined in Appendix A, Table 8.1.
Exclusions	Chart documentation that patient was not an eligible candidate for statin therapy due to known drug intolerance, or patient died before discharge.	Cases are removed from the denominator if there was an in-hospital mortality or if discharge anti-lipid treatment was contraindicated.	•Less than 18 years of age •Length of Stay > 120 days •Comfort measures only documented •Enrolled in clinical trials related to stroke •Admitted for elective carotid intervention •Discharged to another hospital •Left against medical advice •Expired •Discharged to home for hospice care •Discharged to a health care facility for hospice care •Documented reason for not prescribing statin medication at discharge

Exclusion Details	Chart documentation that patient was not an eligible candidate for statin therapy due to known drug intolerance, or patient died before discharge. These data are captured in the SVS VQI and VSGNE registries.	Mortality Discharge Status (MtDCStat), Mortality Date (MtDate), and Discharge Date (DischDt) indicate an in-hospital mortality; DCLipid is marked as "Contraindicated"	• The patient age in years is equal to the Discharge Date minus the Birthdate. Patients less than 18 years are excluded. • The Length of Stay (LOS) in days is equal to the Discharge Date minus the Admission Date. If the LOS is greater than 120 days, the patient is excluded. • Patients with Comfort Measures Only allowable value of 1 (Day 0 or 1), 2 (Day 2 or after), and 3 (Timing unclear) are excluded. • Patients are excluded if "Yes" is selected for Clinical Trial. • Patients with ICD-10-PCS procedure codes for carotid intervention procedures as identified in Appendix A, Table 8.3,, if medical record documentation states that the patient was admitted for the elective performance of this procedure are excluded. • Patients with Discharge Disposition allowable value of 2 (Hospice-Home), 3 (Hospice-Health Care Facility), 4 (Acute Care Facility), 6 (Expired), or 7 (Left Against Medical Advice/AMA) are excluded. • Patients are excluded if "Yes" is selected for Reason For Not Prescribing Statin Medication at Discharge.
Risk Adjustment	No risk adjustment or risk stratification NA	No risk adjustment or risk stratification N/A	No risk adjustment or risk stratification Not applicable.
Stratification	Not required	N/A	Not applicable, the measure is not stratified.
Type Score	Rate/proportion	Rate/proportion better quality = higher score	Rate/proportion better quality = higher score

Algorithm	All patients age 18 and older undergoing infrainguinal LEB who were prescribed statin at discharge divided by (all patients over 18 undergoing infrainguinal LEB minus those intolerant to statins minus those who died before discharge).	Please refer to numerator and denominator sections for detailed information. No diagram provided	1. Start processing. Run cases that are included in the Stroke (STK) Initial Patient Population and pass the edits defined in the Transmission Data Processing Flow: Clinical through this measure. 2. Check ICD-10-CM Principal Diagnosis Code a. If the ICD-10-CM Principal Diagnosis Code is not on Table 8.1, the case will proceed to a Measure Category Assignment of B and will not be in the Measure Population. Stop processing. b. If the ICD-10-CM Principal Diagnosis Code is on Table 8.1, continue processing and proceed to Discharge Disposition. 3. Check Discharge Disposition a. If Discharge Disposition equals 2, 3, 4, 6, 7 the case will proceed to a Measure Category Assignment of B and will not be in the Measure Population. Stop processing. b. If Discharge Disposition equals 1, 5, 8, continue processing and proceed to Comfort Measures Only. 4. Check Comfort Measures Only a. If Comfort Measures Only is missing, the case will proceed to a Measure Category Assignment of X and will be rejected. Stop processing. b. If Comfort Measures Only equals 1, 2, or 3, the case will proceed to a Measure Category Assignment of B and will not be in the Measure Population. Stop processing. c. If Comfort Measures Only equals 4, continue processing and proceed to Clinical Trial. 5. Check Clinical Trial

			a. If Clinical Trial is missing, the case will proceed to a Measure Category Assignment of X and will be rejected. Stop processing. b. If Clinical Trial equals Yes, the case will proceed to a Measure Category Assignment of B and will not be in the measure population. Stop processing. c. If Clinical Trial equals No, continue processing and proceed to Elective Carotid Intervention. 6. Check admitted for Elective Carotid Intervention a. If Elective Carotid Intervention is missing, the case will proceed to a Measure Category Assignment of X and will be rejected. Stop processing. b. If Elective Carotid Intervention equals Yes, the case will proceed to a Measure Category Assignment of B and will not be in the Measure Population. Stop processing. c. If Elective Carotid Intervention equals No, continue processing and proceed to Pre-Arrival Lipid-Lowering Agent. 7. Check Statin Medication Prescribed at Discharge a. If Statin Medication Prescribed at Discharge is missing, the case will proceed to a Measure Category Assignment of X and will be rejected. Stop processing. b. If Statin Medication Prescribed at Discharge equals Yes, the case will proceed to a Measure Category Assignment of E and will be in the Numerator Population. Stop processing.

			c. If Statin Medication Prescribed at Discharge equals No, continue processing and check Reason for Not Prescribing Statin Medication at Discharge. 8. Check Reason for Not Prescribing Statin Medication at Discharge a. If Reason for Not Prescribing Statin Medication at Discharge is missing, the case will proceed to a Measure Category Assignment of X and will be rejected. Stop processing. b. If Reason for Not Prescribing Statin Medication at Discharge equals Yes, the case will proceed to a Measure Category Assignment of B and will not be in the Measure Population. Stop processing. c. If Reason for Not Prescribing Statin Medication at Discharge equals No, the case will proceed to a Measure Category Assignment of D and will be in the Measure Population. Stop processing. Available at measure-specific web page URL identified in S.1
Submission items	5.1 Identified measures: 5a.1 Are specs completely harmonized? 5a.2 If not completely harmonized, identify difference, rationale, impact: 5b.1 If competing, why superior or rationale for additive value: Related Measures: 0118 Antilipid therapy at discharge 0439 Discharged on statin medication	5.1 Identified measures: 5a.1 Are specs completely harmonized? Yes 5a.2 If not completely harmonized, identify difference, rationale, impact: N/A 5b.1 If competing, why superior or rationale for additive value: N/A	5.1 Identified measures: 0639 : Statin Prescribed at Discharge 0074 : Chronic Stable Coronary Artery Disease: Lipid Control 0547 : Diabetes and Medication Possession Ratio for Statin Therapy 0543 : Adherence to Statin Therapy for Individuals with Cardiovascular Disease 0545 : Adherence to Statins for Individuals with Diabetes Mellitus 0118 : Anti-Lipid Treatment Discharge 1519 : Statin Therapy at Discharge after Lower Extremity Bypass (LEB)

			5a.1 Are specs completely harmonized? No 5a.2 If not completely harmonized, identify difference, rationale, impact: Three statin therapy measures were identified from the NQF database. All three measures address target diagnoses other than ischemic stroke or specific surgical procedures for patients 18 years or older: 0074 Coronary Artery Disease; 0118 isolated Coronary Artery Bypass Graft (CABG); and, 1519 Lower Extremity Bypass (LEB). Measure 1519 addresses inpatient organizational performance.. The other two measures, 0074 and 0118 are provider-level measures in the ambulatory care setting. 5b.1 If competing, why superior or rationale for additive value: Not Applicable

Appendix G: Pre-Evaluation Comments

Comments received as of July 14, 2016.

Topic	Commenter	Comment
2998: Infection rate of bicondylar tibia plateau fractures	Submitted by Mr. Scott Reid representing Smith & Nephew	Smith & Nephew strongly supports quality measure #2998, titled "Infection rate of bicondylar tibia plateau fractures", as this measure would focus efforts around infection prevention and clinical protocols for this vulnerable patient group at high risk of infection. An infection rate reported to approach 30% is a significant burden. Efforts to lower this risk through mitigation of modifiable risk factors and application of evidence-based risk reduction strategies should be encouraged. One treatment strategy proven to mitigate infection risk in a level 1 study of tibial plateau fractures was negative pressure wound therapy (NPWT). In a prospective randomized trial of 263 fractures in 249 patients with tibial plateau, pilon and calcaneal fractures, patients randomized to NPWT experienced a statistically significant reduction in infection rates (23 infections in control group vs. 14 in the treatment arm; P=.049) (Stannard et al, 2012). Of 117 tibial plateau fractures, the largest subgroup, there was a two-fold higher relative risk of infection in the control group; that is, infection was identified in 9/55 (16.3%) of control compared to 5/62 (8.1%) of NPWT treated fractures. Among all fractures, the relative risk of developing an infection was 1.9 times higher in the control group than in those treated with NPWT. Additionally, significantly fewer NPWT treated fractures experienced wound dehiscence after discharge compared to the control group, 20/122 (16.5%) compared to 12/141 (8.6%), respectively, and, there was a trend for patients with NPWT treated fractures to be discharged sooner, 2.5 days compared to 3.0 days. NPWT delivers negative pressure suction through a closed system beneath a sealed adhesive film to promote wound healing through multiple mechanisms of action. With respect to the measure specifications, we support the numerator and denominator statements, but would suggest that the rationale should include both a reference to the 2012 study Stannard JP et al. Incisional Negative Pressure Wound Therapy After High-Risk Lower Extremity Fractures. *J Orthop Trauma*2012 Jan; 26(1):37-42, and specific reference to treatments such as NPWT that have been shown to lower the risk of infections for patients experiencing tibia plateau fractures. In sum, we believe this measure would advance patient care and we urge the NQF to endorse this measure.

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