Surgery, Spring 2018 Cycle: CDP Report

DRAFT REPORT FOR ~~COMMENT~~CSAC REVIEW

~~August 7, 2018~~October 23, 2018

NATIONAL QUALITY FORUM

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Contents

Surgery, Spring 2018 Cycle

DRAFT REPORT FOR COMMENT

Executive Summary

Millions of Americans undergo surgical procedures each year, and the rate of these procedures is increasing annually, with 51.4 million inpatient procedures performed in 2010.[1] Surgery is a daunting prospect for patients, who, along with their families, are increasingly seeking information from publicly reported quality measures to make decisions about surgical care. 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. Given the rapid growth in surgery and surgical procedures, there is growing need to identify and endorse meaningful measures that will improve quality and health outcomes.

The National Quality Forum (NQF) has endorsed surgical measures through a variety of projects since 2004 with the National Voluntary Consensus Standards for Cardiac Surgery. The measures in NQF's surgery endorsement project focus on key surgical care processes across an array of procedure types that include outcomes for general and subspecialty surgical procedures, including cardiac, orthopedic, ophthalmological, and vascular surgeries and procedures, and all phases of perioperative care. Many of the measures 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 specific procedure areas like pediatrics, and in specialty areas—in which quality measurement is in its early stages—including orthopedic surgery, bariatric surgery, neurosurgery, obstetrics, and gynecology. Gaps also remain for measures that assess overall surgical quality, shared accountability, and patient focus.

For this project, the Standing Committee evaluated two measures undergoing maintenance review against NQF's standard evaluation criteria and recommended both for endorsement. The two measures are:

- 2063 Performing Cystoscopy at the Time of Hysterectomy for Pelvic Organ Prolapse to Detect Lower Urinary Tract Injury
- 2558 Hospital, All-Cause, 30-Day, Risk Standardized Mortality Rate (RSMR) Following Coronary Artery Bypass Graft (CABG) Surgery

Brief summaries of the measures currently under review are included in the body of the report; detailed summaries of the Committee's discussion and ratings of the criteria for each measure are in Appendix A.

Introduction

Given the increasing rates and costs associated with inpatient and outpatient surgeries in the United States, performance measurement and reporting provide an opportunity to improve the safety and quality of care received by Americans undergoing surgery and surgical procedures. In 2010, 51.4 million inpatient procedures and 53.3 million surgical and nonsurgical procedures were performed in U.S. ambulatory surgery centers (43 percent of all same-day surgery).[1] In 2014, there were 17.2 million hospital visits that included at least one surgery.[2] Of these surgeries, over half occurred in a hospital-owned ambulatory surgical center.[2]

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

With the continued growth in the outpatient surgery market, monitoring and assessing the quality of the services provided has never held greater importance.

NQF Portfolio of Performance Measures for Surgery

The Surgery Standing Committee (Appendix C) oversees NQF's portfolio of Surgery measures (Appendix B) that includes measures for perioperative safety, cardiac surgery, vascular surgery, colorectal surgery, and a range of other clinical and procedural subtopics. This portfolio contains 63 measures: 12 process measures, 40 outcome and resource use measures, four structural measures, and seven composite measure (see table below).

Table 1. NQF Surgery Portfolio of Measures

	Process	Outcome/Resource Use	Structure	Composite
Abdominal and Colorectal surgery	1	1	–	–
Anesthesia	–	1	–	–
Cardiac Surgery	5	16	3	7
General Surgery	–	3	–	–
Cross-cutting (Inpatient & Outpatient Surgery)	–	1	–	–
Cross-Cutting (Inpatient Surgery)	–	1	–	–
Cross-Cutting (Outpatient Surgery)	–	2	–	–
Orthopedic Surgery	–	3	–	–
Ophthalmology	–	5	–	–

	Process	Outcome/Resource Use	Structure	Composite
Thoracic Surgery	–	1	1	–
Urogynecology/Gynecology	4	–	–	–
Vascular Surgery	2	6	–	–
Total	12	40	4	7

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

Surgery Measure Evaluation

On June 28, 2018 the Surgery Standing Committee evaluated two measures undergoing maintenance review against NQF's standard evaluation criteria.

Table 2. Surgery Measure Evaluation Summary

	Maintenance	New	Total
Measures under consideration	2	0	2
Measures recommended for endorsement	2	0	2
Reasons for not recommending	Importance – 0 Scientific Acceptability – 0 Use – 0 Overall Suitability – 0 Competing Measure – 0	Importance – 0 Scientific Acceptability – 0 Overall Suitability – 0 Competing Measure – 0	0

Comments Received Prior to Committee Evaluation

NQF solicits comments on endorsed measures on an ongoing basis through the Quality Positioning System (QPS). In addition, NQF solicits comments for a continuous 16-week period during each evaluation cycle via an online tool located on the project webpage. For this evaluation cycle, the commenting period opened on May 8, 2018 and will close on September 5, 2018. As of June 19, two comments were submitted and shared with the Committee prior to the measure evaluation meeting(s) (Appendix F). All submitted comments were provided to the Committee prior to its initial deliberations during the measure evaluation web meeting.

Summary of Measure Evaluation

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

Urogynecology

2063 Performing Cystoscopy at the Time of Hysterectomy for Pelvic Organ Prolapse to Detect Lower Urinary Tract Injury (American Urogynecologic Society): Recommended

Description: Percentage of patients who undergo cystoscopy to evaluate for lower urinary tract injury at the time of hysterectomy for pelvic organ prolapse. **Measure Type**: Process; **Level of Analysis**: Clinician: Group/Practice, Clinician: Individual; **Setting of Care**: Inpatient/Hospital; **Data Source**: Paper Medical Records, Registry Data

This process measure, originally endorsed in 2014, calculates the percentage of patients who undergo cystoscopy to evaluate lower urinary tract injury during hysterectomy for pelvic organ prolapse. Using cystoscopy to detect lower urinary tract injuries during hysterectomy can reduce morbidity, readmissions, and costs of care. Although the Committee highlighted the importance of outcome measures, they agreed there is a strong link between this process measure and the outcome, a decrease in lower urinary tract injury. Overall, the Committee agreed that the measure met NQF's evaluation criteria and recommended it for continued endorsement. The Committee agreed that the measure met the scientific acceptability criterion and did not have any concerns with the feasibility of the measure or the usability and use criterion.

Cardiac Surgery

2558 Hospital 30-Day, All-Cause, Risk-Standardized Mortality Rate (RSMR) Following Coronary Artery Bypass Graft (CABG) Surgery (Centers for Medicare & Medicaid Services/Yale CORE): Recommended

Description: The measure estimates a hospital-level, risk-standardized mortality rate (RSMR) for patients discharged from the hospital following a qualifying isolated CABG procedure. Mortality is defined as death from any cause within 30 days of the procedure date of an index CABG admission. An index CABG admission is the hospitalization for a qualifying isolated CABG procedure considered for the mortality outcome. The measure was developed using Medicare Fee-for-Service (FFS) patients 65 years and older and was tested in all-payer patients 18 years and older. **Measure Type**: Outcome; **Level of Analysis**: Facility; **Setting of Care**: Inpatient/Hospital; **Data Source**: Claims

This outcome measure, originally endorsed in 2015, aims to improve patient outcomes by providing patients, physicians, hospitals, and policy makers with information about hospital-level, risk-standardized mortality rates following hospitalization for a qualifying isolated coronary artery bypass graft (CABG) procedure. CABG is a common procedure associated with considerable morbidity, mortality, and healthcare spending. Several factors such as pre-operative patient selection, surgical timing post-coronary event, intraoperative conduct, and other aspects of postoperative care can have an impact on operative mortality. The Committee agreed that the measure met the scientific acceptability criterion and did not have any concerns with the feasibility of the measure or the usability

and use criterion. Committee members agreed that identifying institutions' performance based on the patient case mix can promote hospital quality improvement and better inform consumers about care quality. Overall, the Committee agreed that the measure met NQF evaluation criteria and recommended it for continued endorsement.

Measures Withdrawn from Consideration

Three measures previously endorsed by NQF have not been re-submitted for maintenance of endorsement. Endorsement for these measures will be removed.

Table 3. Measures Withdrawn from Consideration

Measure	Reason for withdrawal
0178 Improvement in Status of Surgical Wounds	The developer states that the measure "is becoming limited in its ability to discriminate among providers' performance and exhibits poor usability with fewer than 50% of agencies with at least 20 episodes."
2052 Reduction of Complications Through the Use of Cystoscopy During Surgery for Stress Urinary Incontinence	Lack of resources to maintain
1536 Cataracts: Improvement in Patient's Visual Function within 90 Days Following Cataract Surgery	Developer is working on a new instrument to measure visual function

References

1 Centers for Disease Control and Prevention. NHDS - Selected Tables. National Hospital Discharge Survey. https://www.cdc.gov/nchs/nhds/nhds_tables.htm. Last accessed February 2018.

2 Steiner CA, Karaca Z, Moore BJ, et al. Surgeries in Hospital-Based Ambulatory Surgery and Hospital Inpatient Settings, 2014: Statistical Brief #223. In: *Healthcare Cost and Utilization Project (HCUP) Statistical Briefs*. Rockville, MD: Agency for Healthcare Research and Quality; 2006. http://www.ncbi.nlm.nih.gov/books/NBK442035/. Last accessed February 2018.

3 Munnich EL, Parente ST. Procedures take less time at ambulatory surgery centers, keeping costs down and ability to meet demand up. *Health Aff*. 2014;33(5):764-769.

4 Farrell D, Jensen E, Kochner B, et al. *Accounting for the Cost of US Health Care: A New Look at Why Americans Spend More*. McKinsey Global Institute; 2008. https://www.mckinsey.com/industries/healthcare-systems-and-services/our-insights/accounting-for-the-cost-of-us-health-care. Last accessed February 2018.

5 Manohar A, Cheung K, Wu CL, et al. Burden incurred by patients and their caregivers after outpatient surgery: a prospective observational study. *Clin Orthop*. 2014;472(5):1416-1426.

6 Fox JP, Vashi AA, Ross JS, et al. Hospital-based, acute care after ambulatory surgery center discharge. *Surgery*. 2014;155(5):743-753.

Appendix A: Details of Measure Evaluation

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

Measures Recommended

2063 Performing Cystoscopy at the Time of Hysterectomy for Pelvic Organ Prolapse to Detect Lower Urinary Tract Injury

Submission | Specifications

Description: Percentage of patients who undergo cystoscopy to evaluate for lower urinary tract injury at the time of hysterectomy for pelvic organ prolapse.

Numerator Statement: Numerator is the number of patients in whom an intraoperative cystoscopy was performed to evaluate for lower urinary tract injury at the time of hysterectomy for pelvic organ prolapse.

Denominator Statement: The number of patients undergoing hysterectomy for pelvic organ prolapse (identified by CPT codes for hysterectomy and ICD9/10 diagnoses of prolapse as listed in S.9).

Exclusions: None

Adjustment/Stratification: No risk adjustment or risk stratification

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

Setting of Care: Inpatient/Hospital

Type of Measure: Process

Data Source: Paper Medical Records, Registry Data

Measure Steward: American Urogynecologic Society

STANDING COMMITTEE MEETING [June 28, 2018]

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

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

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

Rationale:

- This measure is based on evidence that routine cystoscopy increases identification of urinary tract injuries intraoperatively. The Committee also discussed new evidence by Teeluckdharry et al. 2015 that showed 0.2 per thousand (0.02%) of ureteral injuries were recognized at time of hysterectomy performed for prolapse without cystoscopy compared to 10.8 per thousand (0.18%) ureteral injuries recognized with cystoscopy. The Committee also discussed the 2017 American College of Obstetricians and Gynecologist (ACOG) Practice Bulletin on Pelvic Organ Prolapse (Level C evidence) that stated routine cystoscopy during pelvic organ prolapse surgery is recommended when the surgical procedure performed is associated with a significant risk of injury to the bladder or ureter. Finally, the Committee reviewed evidence from an academic study by Chi et al. 2016 that showed that with universal cystoscopy, the unrecognized ureteral injury rate decreased from 0.7% to 0.1%. The Committee stated that performing routine cystoscopy could prevent any delayed complications.

- Committee members noted that this was a process measure and questioned why the developer did not develop an outcome measure to address pelvic organ prolapse. The developer responded that an outcome measure would be desirable, but the outcome is so rare that an outcome measure is not needed. Committee members then questioned the importance of the process measure. The developer clarified that five percent of injuries can go undetected and that the completion of this process is the appropriate action to take for high risk surgeries.
- Committee members also questioned what injury the measure addressed (i.e., ureteral kinking/injury or bladder injury). The developer clarified that the cystoscopy provides information on bladder injuries and whether there is diminished or altered flow through the ureter.
- The Committee agreed that the evidence supported this measure.
- The developer provided performance data from the AUGS Urogynecology Quality Registry (AQUIRE) for 16 providers (503 patients) who submitted 2017 data to Merit-Based Incentive Payment System (MIPS). Cystoscopy procedures ranged from 88.24% to 100%. The overall registry average, which includes providers who did not submit data to MIPS, is 94.7%.
- Ultimately, Committee members agreed that the measure met the performance gap subcriteria.

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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-0; M-15; L-0; I-0**; 2b. Validity: **H-0; M-16; L-0; I-0**

Rationale:

- The measure calculates the percentage of patients who undergo cystoscopy to evaluate lower urinary tract injury during hysterectomy for pelvic organ prolapse. A Committee member questioned whether prolapses were graded. The developer clarified that prolapses are graded but the grade of prolapse is not relevant for this measure.
- Reliability testing was conducted by comparing chart-abstracted data and billing documents to self-reported performance rates in the AQUIRE registry. The developer calculated the physician-to-physician variance for data in the registry and the variance from the abstracted charts. Physician to physician variance was similar within the registry data set (variance=0.0012222) and the chart review data set (variance=0).
- Validity testing was conducted on 638 patient records. Chi square tests evaluated the differences between the percentage of patients who have an injury detected compared to those who did not have concurrent cystoscopy; readmissions rates due to all cause among those who did and did not have cystoscopy; and rate of readmission among those who do and do not have a lower urinary tract injury detected with intraoperative cystoscopy.
- Cystoscopy was performed in 84.5% of procedures. Women who had cystoscopy were more likely than those who did not have cystoscopy to have an injury detected (6.9% of women who had cystoscopy and 0% of those who did not). Readmission rates due to all causes did not differ among women who did and did not have cystoscopy (4.8% vs 5.1%) and the readmission rate among women who had a lower urinary tract injury was lower than that observed among those who did not have an injury (2.7% vs 5%).
- Overall, the Committee did not have any major concerns regarding the reliability or validity of the measure and agreed that the measure met these criteria.

3. Feasibility: H-0; M-13; L-3; 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 the data elements are routinely generated, used during care delivery and the measure is feasible to implement.

4. Usability and Use: The maintenance measure meets the Use subcriterion

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

4a. Use**: Pass-16; No Pass-0**; 4b. Usability: **H-0; M-13; L-3; I-0**

Rationale:

- This measure is currently used in the Centers for Medicare & Medicaid Services the Merit-based Incentive Payment System (MIPS). The developer indicated that the measure will be publically reported in the Qualified Clinical Data Registry (QCDR) in 2018.

5. Related and Competing Measures

- No related or competing measures noted.

Standing Committee Recommendation for Endorsement: **Yes-15**; **No-0**

6. Public and Member Comment

Five comments were submitted supporting the Committee's decision to recommend the measure for endorsement.

7. Consensus Standards Approval Committee (CSAC) Endorsement Decision: Yes-X; No-X

8. Appeals

2558 Hospital 30-Day, All-Cause, Risk-Standardized Mortality Rate (RSMR) Following Coronary Artery Bypass Graft (CABG) Surgery

Submission | Specifications

Description: The measure estimates a hospital-level, risk-standardized mortality rate (RSMR) for patients discharged from the hospital following a qualifying isolated CABG procedure. Mortality is defined as death from any cause within 30 days of the procedure date of an index CABG admission. An index CABG admission is the hospitalization for a qualifying isolated CABG procedure considered for the mortality outcome. The measure was developed using Medicare Fee-for-Service (FFS) patients 65 years and older and was tested in all-payer patients 18 years and older.

Numerator Statement: The outcome for this measure is 30-day all-cause mortality. Mortality is defined as death for any reason within 30 days of the procedure date from the index admission for patients 18 and older discharged from the hospital after undergoing isolated CABG surgery.

Denominator Statement: 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 tested the measure in both age groups.

The cohort includes admissions for patients who receive a qualifying isolated CABG procedure (see the attached Data Dictionary) and with a complete claims history for the 12 months prior to admission. CMS publicly reports this measure for those patients 65 years or older who are Medicare FFS beneficiaries admitted to non-federal hospitals.

If a patient has more than one qualifying isolated CABG admission in a year, the first CABG admission is selected for inclusion in the measure and the subsequent CABG admission(s) are excluded from the cohort.

Exclusions: The CABG surgery mortality measure excludes index admissions for patients:

1. With inconsistent or unknown vital status or other unreliable demographic (age and gender) data; or,

2. Discharged against medical advice (AMA).

For patients with more than one qualifying CABG surgery admission in the measurement period, the first CABG admission is selected for inclusion in the measure and the subsequent CABG admission(s) are excluded from the cohort.

Adjustment/Stratification: Statistical risk model

Level of Analysis: Facility

Setting of Care: Inpatient/Hospital

Type of Measure: Outcome

Data Source: Claims

Measure Steward: Centers for Medicare & Medicaid Services

STANDING COMMITTEE MEETING [June 28, 2018]

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-8; L-0; I-0**;

Rationale:

- The Committee agreed that the measure is supported by evidence that aspects of perioperative, intra and perioperative, and post-operative care practices can reduce 30-day mortality rates following coronary artery bypass graft (CABG) surgery.
- The developer provided performance data from 1,185 hospitals and 138,661 admissions from July 1, 2013 to June 30, 2016. Reported hospital-level risk-standardized mortality rate was 3.3%, ranging from 1.3% - 7.4%. The Committee agreed there is a gap based on the performance data presented by the developer.
- The developer provided performance data for July 2013 – June 2016 by proportion of dual eligible patients, African-American patients, and by the proportion of patients with the Agency for Healthcare Research and Quality (AHRQ) socioeconomic status (SES) Index Scores equal to or below 42.6. Median scores were higher in hospitals with higher proportions of dual eligible patients and in hospitals with higher proportions of patients with SES index scores.
- Ultimately, Committee members agreed that the measure met both the evidence and performance gap subcriteria.

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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 the Scientific Methods Panel evaluation**; 2b. Validity: **Accepted the Scientific Methods Panel evaluation**

<u>Rationale</u>:

- The measure estimates a hospital-level, risk-standardized mortality rate (RSMR) for patients discharged from the hospital following a qualifying isolated CABG procedure. The Committee did not have any concerns that the measure as specified could be consistently implemented.
- Reliability testing was conducted at the performance measure score level. A test-retest approach was performed with the correlation coefficient being 0.35, which the Committee stated was sufficient for reliability. Overall, the Committee did not have any major concerns regarding the reliability of the measure and noted that the NQF Scientific Methods Panel was satisfied with the reliability analyses for the measure. The Committee accepted the Methods Panel's evaluation and did not have a separate vote for reliability of the measure.
- Validity was conducted at the measure score level. Face validity was also assessed by a Technical Expert Panel using a six-point scale obtained from the mortality measure as specified, to provide an accurate distinction between good and bad quality of care. Overall, the Committee did not have any major concerns regarding the validity of the measure and noted that the NQF Scientific Methods Panel was satisfied with the validity analyses for the measure. The Committee accepted the Methods Panel's evaluation and did not have a separate vote for validity of the measure.

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3. Feasibility: H-11; M-4; 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 agreed that the data elements are routinely generated, used during care delivery and the measure is feasible to implement.

4. Usability and Use: The maintenance measure meets the Use subcriterion

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

4a. Use**: Pass-15; No Pass-0**; 4b. Usability: **H-14; M-1; L-0; I-0**

Rationale:

- This measure is currently publicly reported and used in CMS Hospital Inpatient Quality Reporting (IQR) program, and has been finalized for the Hospital Value-Based Purchasing (VBP) program.
- The developer indicated that the median risk-standardized mortality rate decreased by 0.1 absolute percentage points from July 2013-June 2014 (median – 3.1%) to July 2015-June 2016 (median – 3.0%).
- Committee members noted that performance results for this measure are considered useful for both accountability and performance improvement activities.

5. Related and Competing Measures

- This measure is related to:
    - #0119: Risk-Adjusted Operative Mortality for CABG
- The measure under review has the same target population and measure focus as NQF 0119 Risk Adjusted Operative Mortality for CABG (STS). The developer reported that they have sought to harmonize components of the measure with #0119. Potential areas of harmonization include, target patient population, age, isolated CABG, period of observation, and included hospitals. Measure #2558 assesses death within 30 days of the procedure date. In contrast, measure #0119 assesses both deaths occurring during CABG hospitalization (in-hospital death, even if after 30 days) and deaths occurring within 30 days of procedure date. Additionally, measure #2558 captures all qualifying Medicare FFS patients undergoing CABG regardless of whether their hospital or surgeon participates in the STS registry as required for #0119.

Standing Committee Recommendation for Endorsement: **Yes-15**; **No-0**

6. Public and Member Comment

Three comments were submitted for this measure and all were supportive of the Committee's continued endorsement recommendation. One comment submitted suggested that the measure should have empirical validity testing and that the developer explore the underlying relationship between factors like poverty or neighborhood deprivation on mortality.

The developer provided the following response:

> We mainly assessed the validity of the CABG mortality measure (NQF #-2558) using a systematic assessment of face validity. As we noted in the submission materials, we convened a Technical Expert Panel with (TEP), which included individuals with a range of perspectives including clinicians, consumers, and purchasers, as well as individuals with experience in quality improvement, performance measurement, and health care disparities.

Separate from this assessment of face validity, we also validated the CABG mortality measure against New York registry data (New York State Cardiac Surgery Reporting System (CSRS) from the New York Department of Health), which served as empiric validity testing of both the risk model and the hospital level score. Specifically, we compared the performance of the risk model and hospitals risk-standardized outcome rates calculated from the measure which is risk adjusted using claims, with the performance and hospital RSRRs calculated from the registry-based CABG mortality measure, which uses data abstracted from patients' medical records for risk adjustment. The results of these amylases show that the claims-adjusted model performs similarly and characterizes hospital performance similarly to the measure adjusted using data from patients' medical records. This analysis is not submitted as an assessment of the measure's validity. Rather, it is supplemental information presented to the committee for consideration.

In addition, we note that mortality as an outcome allows for a broad view of quality of care that encompasses more than what can be captured by individual process-of-care measures. Specifically, mortality is the primary negative outcome associated with a surgical procedure. Many aspects of peri-operative care, intra- and peri-operative practices and several aspects of post-operative care, including prevention of and response to complications and coordinated transitions to the outpatient environment, have been shown to impact CABG mortality. A number of recent studies have demonstrated that improvements in care can reduce 30-day mortality rates (see NQF Evidence Form for more detail.

We thank the Henry Ford Health System for this thoughtful comment. We did not examine the underlying relationship between factors like poverty or neighborhood deprivation and mortality as an outcome. There are currently no national data sources that make this information available at the level of the individual beneficiary. Therefore, we are limited to the use of data mapped to census block group as a proxy for patient-level information or the use of binary variables such as the dual eligibility for Medicare and Medicaid benefits which does not lend itself to analysis of the extremes. However, CMS remains committed to examining alternative solutions that better reflect the balance of hospital- and patient-level influences on hospital outcome measures for socioeconomically disadvantaged groups and we will examine this suggestion in the future.

Committee members were satisfied with the developer's response to the public comments and upheld its decision to recommend the measure for endorsement.

7. Consensus Standards Approval Committee (CSAC) Endorsement Decision: Yes-X; No-X

8. Appeals

Appendix B: Surgery Portfolio—Use in Federal Programs[a]

NQF #	Title	Federal Programs: Finalized or Implemented as of December 30, 2017
0225	At least 12 regional lymph nodes are removed and pathologically examined for resected colon cancer	N/A
0456	Participation in a Systematic National Database for General Thoracic Surgery	N/A
0564/3056	Cataracts: Complications within 30 Days Following Cataract Surgery Requiring Additional Surgical Procedures	• Hospital Outpatient Quality Reporting (Rescinded) • Medicare and Medicaid Electronic Health Record Incentive Program for Eligible Professionals (No Status) • Merit-Based Incentive Payment System (MIPS) Program (Finalized)
0565/3057	Cataracts: 20/40 or Better Visual Acuity within 90 Days Following Cataract Surgery	• Medicare and Medicaid Electronic Health Record Incentive Program for Eligible Professionals (No Status) • Merit-Based Incentive Payment System (MIPS) Program (Finalized)
1536	Cataracts: Improvement in Patient's Visual Function within 90 Days Following Cataract Surgery	• Ambulatory Surgical Center Quality Reporting (Implemented) • Hospital Compare (Implemented) • Hospital Outpatient Quality Reporting (Implemented) • Medicare Physician Quality Reporting System (Implemented) • Physician Feedback/Quality Resource Use Report (Implemented) • Physician Value-Based Payment Modifier (Implemented) • Merit-Based Incentive Payment System (MIPS) Program (Finalized)
1790	Risk-Adjusted Morbidity and Mortality for Lung Resection for Lung Cancer	N/A
3294	STS Lobectomy for Lung Cancer Composite Score	N/A
3357	Facility Level 7-Day Hospital Visits after General Surgery Procedures Performed at Ambulatory Surgical Centers	N/A

[a] Per CMS Measure Inventory as of 07/16/2018

NQF #	Title	Federal Programs: Finalized or Implemented as of December 30, 2017
3366	Hospital Visits after Urology Ambulatory Surgical Center Procedures	N/A
0697	Risk Adjusted Case Mix Adjusted Elderly Surgery Outcomes Measure	N/A
0706	Risk Adjusted Colon Surgery Outcome Measure	N/A
0127	Preoperative Beta Blockade	N/A
0134	Use of Internal Mammary Artery (IMA) in Coronary Artery Bypass Graft (CABG)	• Medicare Physician Quality Reporting System (Implemented) • Physician Feedback/Quality Resource Use Report (Implemented) • Physician Value-Based Payment Modifier (Implemented) • Merit-Based Incentive Payment System (MIPS) Program (Finalized)
1519	Statin Therapy at Discharge after Lower Extremity Bypass (LEB)	• Medicare Physician Quality Reporting System (Implemented) • Physician Feedback/Quality Resource Use Report (Implemented) • Physician Value-Based Payment Modifier (Implemented) • Merit-Based Incentive Payment System (MIPS) Program (Finalized)
1523	Rate of Open Repair of Abdominal Aortic Aneurysms (AAA) Where Patients Are Discharged Alive	• Medicare Physician Quality Reporting System (Implemented) • Physician Feedback/Quality Resource Use Report (Implemented) • Physician Value-Based Payment Modifier (Implemented) • Merit-Based Incentive Payment System (MIPS) Program (Finalized)
1534	In-hospital mortality following elective EVAR of AAAs	N/A
1540	Postoperative Stroke or Death in Asymptomatic Patients undergoing Carotid Endarterectomy	• Medicare Physician Quality Reporting System (Implemented) • Physician Feedback/Quality Resource Use Report (Implemented) • Physician Value-Based Payment Modifier (Implemented) Merit-Based Incentive Payment System (MIPS) Program (Finalized)

NQF #	Title	Federal Programs: Finalized or Implemented as of December 30, 2017
1550	Hospital-level risk-standardized complication rate (RSCR) following elective primary total hip arthroplasty (THA) and/or total knee arthroplasty (TKA)	• Hospital Compare (Implemented) • Hospital Inpatient Quality Reporting (Implemented) • Hospital Value-Based Purchasing (Finalized)
1551	Hospital-level 30-day, all-cause risk-standardized readmission rate (RSRR) following elective primary total hip arthroplasty (THA) and/or total knee arthroplasty (TKA)	• Hospital Compare (Implemented) • Hospital Inpatient Quality Reporting (Implemented) • Hospital Readmission Reduction Program (Implemented)
0114	Risk-Adjusted Postoperative Renal Failure	• Medicare Physician Quality Reporting System (Implemented) • Physician Feedback/Quality Resource Use Report (Implemented) • Physician Value-Based Payment Modifier (Implemented) • Merit-Based Incentive Payment System (MIPS) Program (Finalized)
0115	Risk-Adjusted Surgical Re-exploration	• Medicare Physician Quality Reporting System (Implemented) • Physician Feedback/Quality Resource Use Report (Implemented) • Physician Value-Based Payment Modifier (Implemented) • Merit-Based Incentive Payment System (MIPS) Program (Finalized)
0117	Beta Blockade at Discharge	N/A
0118	Anti-Lipid Treatment Discharge	N/A
0119	Risk-Adjusted Operative Mortality for CABG	• Merit-Based Incentive Payment System (MIPS) Program (Finalized)
0120	Risk-Adjusted Operative Mortality for Aortic Valve Replacement (AVR)	N/A
0121	Risk-Adjusted Operative Mortality for Mitral Valve (MV) Replacement	N/A

NQF #	Title	Federal Programs: Finalized or Implemented as of December 30, 2017
0122	Risk-Adjusted Operative Mortality for Mitral Valve (MV) Replacement + CABG Surgery	N/A
0123	Risk-Adjusted Operative Mortality for Aortic Valve Replacement (AVR) + CABG Surgery	N/A
0127	Preoperative Beta Blockade	N/A
0129	Risk-Adjusted Postoperative Prolonged Intubation (Ventilation)	• Medicare Physician Quality Reporting System (Implemented) • Physician Feedback/Quality Resource Use Report (Implemented) • Physician Value-Based Payment Modifier (Implemented) • Merit-Based Incentive Payment System (MIPS) Program (Finalized
0130	Risk-Adjusted Deep Sternal Wound Infection	• Medicare Physician Quality Reporting System (Implemented) • Physician Feedback/Quality Resource Use Report (Implemented) • Physician Value-Based Payment Modifier (Implemented) • Merit-Based Incentive Payment System (MIPS) Program (Finalized)
0131	Risk-Adjusted Stroke/Cerebrovascular Accident	• Medicare Physician Quality Reporting System (Implemented) • Physician Feedback/Quality Resource Use Report (Implemented) • Physician Value-Based Payment Modifier (Implemented) • Merit-Based Incentive Payment System (MIPS) Program (Finalized)
0134	Use of Internal Mammary Artery (IMA) in Coronary Artery Bypass Graft (CABG)	• Medicare Physician Quality Reporting System (Implemented) • Physician Feedback/Quality Resource Use Report (Implemented) • Physician Value-Based Payment Modifier (Implemented) • Merit-Based Incentive Payment System (MIPS) Program (Finalized)

NQF #	Title	Federal Programs: Finalized or Implemented as of December 30, 2017
0236	Coronary Artery Bypass Graft (CABG): Preoperative Beta-Blocker in Patients with Isolated CABG Surgery	• Medicare Physician Quality Reporting System (Implemented) • Physician Feedback/Quality Resource Use Report (Implemented) • Physician Value-Based Payment Modifier (Implemented) • Merit-Based Incentive Payment System (MIPS) Program (Finalized)
0339	RACHS-1 Pediatric Heart Surgery Mortality Rate (PDI 06)	N/A
0340	RACHS-1 Pediatric Heart Surgery Volume (PDI 7)	N/A
0354	Hip Fracture Mortality Rate (IQI 19)	N/A
0357	Abdominal Aortic Aneurysm (AAA) Repair Volume (IQI 4)	N/A
0359	Abdominal Aortic Aneurysm (AAA) Repair Mortality Rate (IQI 11)	• Hospital Inpatient Quality Reporting (Removed)
0365	Pancreatic Resection Mortality Rate (IQI 9)	N/A
0366	Pancreatic Resection Volume (IQI 2)	N/A
0465	Perioperative Anti-platelet Therapy for Patients undergoing Carotid Endarterectomy	• Medicare Physician Quality Reporting System (Implemented) • Physician Feedback/Quality Resource Use Report (Implemented) • Physician Value-Based Payment Modifier (Implemented) • Merit-Based Incentive Payment System (MIPS) Program (Finalized)
0533	Postoperative Respiratory Failure Rate (PSI 11)	• Hospital Inpatient Quality Reporting (Removed)
0564	Cataracts: Complications within 30 Days Following Cataract Surgery Requiring Additional Surgical Procedures	• Hospital Outpatient Quality Reporting (Rescinded) • Medicare and Medicaid Electronic Health Record Incentive Program for Eligible Professionals (No Status) • Merit-Based Incentive Payment System (MIPS) Program (Finalized)
0696	STS CABG Composite Score (Composite Measure)	N/A

NQF #	Title	Federal Programs: Finalized or Implemented as of December 30, 2017
0697	Risk Adjusted Case Mix Adjusted Elderly Surgery Outcomes Measure	N/A
0706	Risk Adjusted Colon Surgery Outcome Measure	N/A
0732	Surgical Volume for Pediatric and Congenital Heart Surgery: Total Programmatic Volume and Programmatic Volume Stratified by the 5 STAT Mortality Categories	N/A
0733	Operative Mortality Stratified by the 5 STAT Mortality Categories	• Merit-Based Incentive Payment System (MIPS) Program (Finalized)
0734	Participation in a National Database for Pediatric and Congenital Heart Surgery	N/A
1501	Risk-Adjusted Operative Mortality for Mitral Valve (MV) Repair	N/A
1502	Risk-Adjusted Operative Mortality for Mitral Valve (MV) Repair + CABG Surgery	N/A
1543	Postoperative Stroke or Death in Asymptomatic Patients undergoing Carotid Artery Stenting (CAS)	• Medicare Physician Quality Reporting System (Implemented) • Physician Feedback/Quality Resource Use Report (Implemented) • Physician Value-Based Payment Modifier (Implemented) • Merit-Based Incentive Payment System (MIPS) Program (Finalized)
1790	Risk-Adjusted Morbidity and Mortality for Lung Resection for Lung Cancer	N/A
2038	Performing vaginal apical suspension at the time of hysterectomy to address pelvic organ prolapse	• Medicare and Medicaid Electronic Health Record Incentive Program for Eligible Professionals (Declined) • Medicare Physician Quality Reporting System (Declined) • Physician Compare (Declined) • Physician Value-Based Payment Modifier (Declined) • Medicare Shared Savings Program (Declined)

NQF #	Title	Federal Programs: Finalized or Implemented as of December 30, 2017
2063	Performing cystoscopy at the time of hysterectomy for pelvic organ prolapse to detect lower urinary tract injury	• Medicare Physician Quality Reporting System (Implemented) • Physician Feedback/Quality Resource Use Report (Implemented) • Physician Value-Based Payment Modifier (Implemented) • Merit-Based Incentive Payment System (MIPS) Program (Finalized)
2558	Hospital 30-Day, All-Cause, Risk-Standardized Mortality Rate (RSMR) Following Coronary Artery Bypass Graft (CABG) Surgery	• Hospital Compare (Implemented) • Hospital Inpatient Quality Reporting (Implemented) • Hospital Value-Based Purchasing (Finalized)
2561	STS Aortic Valve Replacement (AVR) Composite Score (Composite Measure)	N/A
2563	STS Aortic Valve Replacement (AVR) + Coronary Artery Bypass Graft (CABG) Composite Score (Composite Measure)	N/A
2677	Preoperative evaluation for stress urinary incontinence prior to hysterectomy for pelvic organ prolapse	N/A
2681	Perioperative Temperature Management	• Medicare Physician Quality Reporting System (Implemented) • Physician Feedback/Quality Resource Use Report (Implemented) • Physician Value-Based Payment Modifier (Implemented) • Merit-Based Incentive Payment System (MIPS) Program (Finalized)
2683	Risk-Adjusted Operative Mortality for Pediatric and Congenital Heart Surgery	N/A
2687	Hospital Visits after Hospital Outpatient Surgery	• Hospital Outpatient Quality Reporting (Finalized)

NQF #	Title	Federal Programs: Finalized or Implemented as of December 30, 2017
3030	STS Individual Surgeon Composite Measure for Adult Cardiac Surgery (Composite Measure)	N/A
3031	STS Mitral Valve Repair/Replacement (MVRR) Composite Score (Composite Measure)	N/A
3032	STS Mitral Valve Repair/Replacement (MVRR) + Coronary Artery Bypass Graft (CABG) Composite Score (Composite Measure)	N/A

Appendix C: Surgery Standing Committee and NQF Staff

STANDING COMMITTEE

Lee Fleisher, MD (Co-Chair)
Professor and Chair of Anesthesiology, University of Pennsylvania/American Society of Anesthesiologists
Philadelphia, Pennsylvania

William Gunnar, MD, JD (Co-Chair)
Director, National Surgery Program Office, Veterans Health Administration
Washington, DC

Karl Bilimoria, MD, MS
John B. Murphy Professor of Surgery; Vice President - Quality, Northwestern Medicine; Director, Surgical Outcomes & Quality Improvement Center (SOQIC); Vice Chair for Quality, Department of Surgery, Feinberg School of Medicine, Northwestern University
Chicago, Illinois

Robert Cima, MD, MA
Professor of Surgery, Mayo Clinic
Rochester, Minnesota

Richard Dutton, MD, MBA
Chief Quality Officer, United States Anesthesia Partners
Park Ridge, Illinois

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

Frederick Grover, MD
Professor of Cardiothoracic Surgery, University of Colorado School of Medicine
Aurora, Colorado

John Handy, MD
Thoracic Surgeon, American College of Chest Physicians
Portland, Oregon

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

Clifford Ko, MD, MS, MSHS, FACS
Director, Division of Research and Optimal Patient Care, American College of Surgeons/Professor of Surgery, Department of Surgery, UCLA School of Medicine, American College of Surgeons/UCLA School of Medicine
Chicago, Illinois

Barbara Levy, MD, FACOG, FACS
Vice President, Health Policy, American College of Obstetricians and Gynecologists
Washington, DC

Barry Markman, MD
Senior Medical Director Medicaid, Aetna
Las Vegas, Nevada

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

Amy Moyer
Manager of Value Measurement, The Alliance
Fitchburg, Wisconsin

Keith Olsen, PharmD, FCCP, FCCM
Professor and Dean, College of Pharmacy, University of Arkansas for Medical Sciences
Omaha, Nebraska

Lynn Reede, DNP, MBA, CRNA
Senior Director, Professional Practice, American Association of Nurse Anesthetists
Park Ridge, Illinois

Christopher Saigal, MD, MPH
Professor, UCLA
Los Angeles, California

Salvatore T. Scali, MD
Assistant Professor of Vascular Surgery, University of Florida-Gainesville
Gainesville, Florida

Allan Siperstein, MD
Chairman Endocrine Surgery, Cleveland Clinic
Cleveland, Ohio

Joshua D. Stein, MD, MS
Associate Professor, University of Michigan, Department of Ophthalmology & Visual Sciences, Department of Health Management & Policy, Director, Center for Eye Policy and Innovation
Ann Arbor, Michigan

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

Melissa Thomason, MS, PMP
Patient/Family Advisor, Vidant Health
Pinetops, North Carolina

Barbee Whitaker, PhD
Director, American Association of Blood Banks
Bethesda, Maryland

A.J. Yates, MD
Associate Professor and Vice Chairman for Quality Management, Department of Orthopedic Surgery, University of Pittsburgh Medical Center
Pittsburgh, Pennsylvania

NQF STAFF

Elisa Munthali, MPH
Senior Vice President, Quality Measurement

Melissa Marinelarena, RN, MPA, CPHQ
Senior Director

Kathryn Goodwin, MS
Senior Project Manager

Christy Skipper, MS
Project Manager

Mauricio Menendez, MS
Project Analyst

Appendix D: Measure Specifications

2063 Performing Cystoscopy at the Time of Hysterectomy for Pelvic Organ Prolapse to Detect Lower Urinary Tract Injury

STEWARD

American Urogynecologic Society

DESCRIPTION

Percentage of patients who undergo cystoscopy to evaluate for lower urinary tract injury at the time of hysterectomy for pelvic organ prolapse.

TYPE

Process

DATA SOURCE

Paper Medical Records, Registry Data

LEVEL

Clinician : Group/Practice, Clinician : Individual

SETTING

Inpatient/Hospital

NUMERATOR STATEMENT

Numerator is the number of patients in whom an intraoperative cystoscopy was performed to evaluate for lower urinary tract injury at the time of hysterectomy for pelvic organ prolapse.

NUMERATOR DETAILS

The number of patients undergoing hysterectomy for pelvic organ prolapse (identified by CPT codes for hysterectomy and ICD9/10 diagnoses of prolapse as listed in S.9) who have concomitant cystoscopy identified upon review of the operative report in the electronic medical record or paper chart.

DENOMINATOR STATEMENT

The number of patients undergoing hysterectomy for pelvic organ prolapse (identified by CPT codes for hysterectomy and ICD9/10 diagnoses of prolapse as listed in S.9).

DENOMINATOR DETAILS

Hysterectomy (identified by CPT codes) performed for the indication of pelvic organ prolapse (identified by supporting ICD9/ICD10 codes)

The prolapse codes for ICD9 -> ICD-10 are, respectively:

618.01 -> N81.11, Cystocele, midline

N81.10, Cystocele, unspecified

618.02 -> N81.12, Cystocele, lateral

618.03 -> N81.0, Urethrocele

618.04 -> N81.6, Rectocele

618.05 -> N81.81, Perineocele

618.2 -> N81.2, Incomplete uterovaginal prolapse

618.3 -> N81.3, Complete uterovaginal prolapse

618.4 -> N81.4, Uterovaginal prolapse, unspecified

618.6 -> N81.5, Vaginal enterocele

618.7 -> N81.89, Old laceration of muscles of pelvic floor

618.81 -> N81.82, incompetence or weakening of pubocervical tissue

618.82 -> N81.83, incompetence or weakening of rectovaginal tissue

618.83 -> N81.84, pelvic muscle wasting

CPT codes for hysterectomy are:

57530 Trachelectomy

58150 Total Abdominal Hysterectomy (Corpus and Cervix), w/ or w/out Removal of Tube(s), w/ or w/out Removal of Ovary(s)

58152 Total Abdominal Hysterectomy (Corpus and Cervix), w/ or w/out Removal of Tube(s), w/ or w/out Removal of Ovary(s), with Colpo-Urethrocystopexy (e.g. Marshall-Marchetti-Krantz, Burch)

58180 Supracervical Abdominal Hysterectomy (Subtotal Hysterectomy), w/ or w/out Removal of Tube(s), w/ or w/out Removal of Ovary(s)

58260 Vaginal Hysterectomy, for Uterus 250 G or Less

58262 Vaginal Hysterectomy, for Uterus 250 G or Less, with Removal of Tube(s), and/or Ovary(s)

58263 Vaginal Hysterectomy, for Uterus 250 G or Less, with Removal of Tube(s), and/or Ovary(s), with Repair of Enterocele

58267 Vaginal Hysterectomy, for Uterus 250 G or Less, with Colpo-Urethrocystopexy (Marshall-Marchetti-Krantz Type, Pereyra Type), w/ or w/out Endoscopic Control

58270 Vaginal Hysterectomy, for Uterus 250 G or Less, with Repair of Enterocele

58275 Vaginal Hysterectomy, with Total or Partial Vaginectomy

58280 Vaginal Hysterectomy, with Total or Partial Vaginectomy, with Repair of Enterocele

58290 Vaginal Hysterectomy, for Uterus Greater than 250 G

58291 Vaginal Hysterectomy, for Uterus Greater than 250 G, with Removal of Tube(s) and/or Ovary(s)

58292 Vaginal Hysterectomy, for Uterus Greater than 250 G, with Removal of Tube(s) and/or Ovary(s), with Repair of Enterocele

58293 Vaginal Hysterectomy, for Uterus Greater than 250 G, with Colpo-Urethrocystopexy (Marshall-Marchetti-Krantz Type, Pereyra Type)

58294 Vaginal Hysterectomy, for Uterus Greater than 250 G, with Repair of Enterocele

58541 Laparoscopy, Surgical, Supracervical Hysterectomy, for Uterus 250 G or Less

58542 Laparoscopy, Surgical, Supracervical Hysterectomy, for Uterus 250 G or Less, with Removal of Tube(s) and/or Ovary(s)

58543 Laparoscopy, Surgical, Supracervical Hysterectomy, for Uterus Greater than 250 G

58544 Laparoscopy, Surgical, Supracervical Hysterectomy, for Uterus Greater than 250 G, with Removal of Tube(s) and/or Ovary(s)

58550 Laparoscopy, Surgical, with Vaginal Hysterectomy, for Uterus 250 G or Less

58552 Laparoscopy, Surgical, with Vaginal Hysterectomy, for Uterus 250 G or Less, with Removal of Tube(s) and/or Ovary(s)

58553 Laparoscopy, Surgical, with Vaginal Hysterectomy, for Uterus Greater than 250 G

58554 Laparoscopy, Surgical, with Vaginal Hysterectomy, for Uterus Greater than 250 G, with Removal of Tube(s) and/or Ovary(s)

58570 Laparoscopy, Surgical, with Total Hysterectomy, for Uterus 250 G or Less

58571 Laparoscopy, Surgical, with Total Hysterectomy, for Uterus 250 G or Less, with Removal of Tube(s) and/or Ovary(s)

58572 Laparoscopy, Surgical, with Total Hysterectomy, for Uterus Greater than 250 G

58573 Laparoscopy, Surgical, with Total Hysterectomy, for Uterus Greater than 250 G, with Removal of Tube(s) and/or Ovary(s)

EXCLUSIONS

There are no exclusions from the target population.

EXCLUSION DETAILS

There are no exclusions from the target population.

RISK ADJUSTMENT

No risk adjustment or risk stratification

128428| 142482| 144860| 141015| 142127

128428| 142482| 144860| 141015| 142127

STRATIFICATION

We do not plan to stratify the results.

TYPE SCORE

Rate/proportion better quality = higher score

ALGORITHM

1. Denominator: Patients of a specific surgeon or group undergoing hysterectomy or trachelectomy for diagnosis of prolapse as defined by CPT and ICD-9/10 codes are identified from administrative data.

2. Numerator: Electronic medical record or paper chart operative notes are reviewed to identify the performance of a cystoscopy at the time of the procedure identified in the denominator.

3. The numerator is divided by the denominator and multiplied by 100 to calculate a percentage (rate/proportion) 128428| 142482| 144860| 141015| 142127

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N/A

2558 Hospital 30-Day, All-Cause, Risk-Standardized Mortality Rate (RSMR) Following Coronary Artery Bypass Graft (CABG) Surgery

STEWARD

Centers for Medicare & Medicaid Services

DESCRIPTION

The measure estimates a hospital-level, risk-standardized mortality rate (RSMR) for patients discharged from the hospital following a qualifying isolated CABG procedure. Mortality is defined as death from any cause within 30 days of the procedure date of an index CABG admission. An index CABG admission is the hospitalization for a qualifying isolated CABG procedure considered for the mortality outcome. The measure was developed using Medicare Fee-for-Service (FFS) patients 65 years and older and was tested in all-payer patients 18 years and older.

TYPE

Outcome

DATA SOURCE

Claims Data sources for the Medicare FFS measure:

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.

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).

The American Community Survey (2008-2012): The American Community Survey data is collected annually and an aggregated 5-years data was used to calculate the AHRQ socioeconomic status (SES) composite index score.

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-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 older, 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 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.

LEVEL

Facility

SETTING

Inpatient/Hospital

NUMERATOR STATEMENT

The outcome for this measure is 30-day all-cause mortality. Mortality is defined as death for any reason within 30 days of the procedure date from the index admission for patients 18 and older discharged from the hospital after undergoing isolated CABG surgery.

NUMERATOR DETAILS

In the current publicly reported measure, we identify deaths for Medicare FFS patients 65 years or older in the Medicare Enrollment Database (EDB).

Outcome Attribution:

Attribution of the outcome in situations where a patient has multiple contiguous admissions, at least one of which involves a qualifying isolated CABG procedure is as follows:

1) If a patient undergoes a CABG procedure in the first hospital and is then transferred to a second hospital where there is no CABG procedure, the mortality outcome is attributed to the first hospital performing the index CABG procedure and the 30-day window starts with the date of index CABG procedure.

Rationale: A transfer following CABG is most likely due to a complication of the index procedure and that care provided by the hospital performing the CABG procedure likely dominates mortality risk even among transferred patients.

2) If a patient is admitted to a first hospital but does not receive a CABG procedure there and is then transferred to a second hospital where a CABG is performed, the mortality outcome is attributed to the second hospital performing the index CABG procedure and the 30-day window starts with the date of index CABG procedure.

Rationale: Care provided by the hospital performing the CABG procedure likely dominates mortality risk.

3) If a patient undergoes a CABG procedure in the first hospital and is transferred to a second hospital where another CABG procedure is performed, the mortality outcome is attributed to the first hospital performing the index (first) CABG procedure and the 30-day window starts with the date of index CABG procedure.

Rationale: A transfer following CABG is most likely due to a complication of the index procedure, and care provided by the hospital performing the index CABG procedure likely dominates mortality risk even among transferred patients.

DENOMINATOR STATEMENT

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 tested the measure in both age groups.

The cohort includes admissions for patients who receive a qualifying isolated CABG procedure (see the attached Data Dictionary) and with a complete claims history for the 12 months prior to admission. CMS publicly reports this measure for those patients 65 years or older who are Medicare FFS beneficiaries admitted to non-federal hospitals.

If a patient has more than one qualifying isolated CABG admission in a year, the first CABG admission is selected for inclusion in the measure and the subsequent CABG admission(s) are excluded from the cohort.

DENOMINATOR DETAILS

The measure included index admissions for patients:

1. Having a qualifying isolated CABG surgery during the index admission;

2. Enrolled in Medicare fee-for-service (FFS) Part A and Part B for the 12 months prior to the date of the index admission, and enrolled in Part A during the index admission; and,

3. Aged 65 or over.

Isolated CABG surgeries are defined as those CABG procedures performed without the following concomitant valve or other major cardiac, vascular, or thoracic procedures:

o Valve procedures;

o Atrial and/or ventricular septal defects;

o Congenital anomalies;

o Other open cardiac procedures;

o Heart transplants;

o Aorta or other non-cardiac arterial bypass procedures;

o Head, neck, intracranial vascular procedures; or,

o Other chest and thoracic procedures

International Classification of Diseases, 9th Revision, Clinical Modification (ICD-9) codes as well as International Classification of Disease, 10th Revision (ICD-10) codes used to define the cohort are listed in the attached Data Dictionary.

EXCLUSIONS

The CABG surgery mortality measure excludes index admissions for patients:

1. With inconsistent or unknown vital status or other unreliable demographic (age and gender) data; or,

2. Discharged against medical advice (AMA).

For patients with more than one qualifying CABG surgery admission in the measurement period, the first CABG admission is selected for inclusion in the measure and the subsequent CABG admission(s) are excluded from the cohort.

EXCLUSION DETAILS

The CABG surgery mortality measure excludes index admissions for patients:

1. With inconsistent or unknown vital status or other unreliable demographic (age and gender) data.

Rationale: We do not include stays for patients where the age (indicated in the claim) is greater than 115, where the gender (indicated in the claim) is neither male nor female, where the

admission date (indicated in the claim) is after the date of death in the Medicare Enrollment Database, or where the date of death (in the Medicare Enrollment Database) occurs before the date of discharge but the patient was discharged alive (indicated in the claim).

2. Discharged against medical advice (AMA).

Rationale: Providers did not have the opportunity to deliver full care and prepare the patient for discharge. This information is taken from the discharge disposition in the claim.

3. With more than one qualifying CABG surgery admission in the measurement period.

Rationale: CABG procedures are expected to last for several years without the need for revision or repeat revascularization. A repeat CABG procedure during the measurement period likely represents a complication of the original CABG procedure and is a clinically more complex and higher risk surgery. Therefore, we select the first CABG surgery admission for inclusion in the measure and exclude subsequent CABG surgery admissions (additional claims indicating a CABG procedure was performed within 30-days of the index CABG procedure) from the cohort.

RISK ADJUSTMENT

Statistical risk model

118210| 112469| 141592| 135810| 109921| 141015| 146637| 144762

118210| 112469| 141592| 135810| 109921| 141015| 146637| 144762

STRATIFICATION

N/A

TYPE SCORE

Rate/proportion better quality = lower score

ALGORITHM

The measure estimates hospital-level 30-day all-cause RSMRs for CABG surgery using a 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 mortality within 30 days of the procedure date using age, sex, 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 mortality 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 and Shahian, 2007). If there were no differences among hospitals, then after adjusting for patient risk, the hospital effects should be identical across all hospitals.

The RSMR is calculated as the ratio of the number of “predicted” deaths to the number of “expected” deaths at a given hospital, multiplied by the national observed mortality rate. For each hospital, the numerator of the ratio is the number of deaths within 30 days predicted based on the hospital’s performance with its observed case mix, and the denominator is the number of deaths 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 a particular hospital’s performance, given its case mix, to be compared to an average hospital’s performance with the same case mix. Thus, a lower

ratio indicates lower-than-expected mortality rates or better quality, while a higher ratio indicates higher-than-expected mortality rates or worse quality.

The “predicted” number of deaths (the numerator) is calculated by using the coefficients estimated by regressing the risk factors and the hospital-specific effect on the risk of mortality. The estimated hospital-specific effect 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 deaths (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 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 mortality rate. The hierarchical logistic regression models are described fully in the original methodology report (Suter et al. 2012).

Reference:

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

2. Suter L, Wang C, Araas M, et al. Hospital-Level 30-day All-Cause Mortality Following Coronary Artery Bypass Graft Surgery; Updated Measure Methodology Report. 2012 118210| 112469| 141592| 135810| 109921| 141015| 146637| 144762

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N/A

Appendix E1: Related and Competing Measures (tabular format)

Comparison of NQF 2558 and NQF 0119

	2558 Hospital 30-Day, All-Cause, Risk-Standardized Mortality Rate (RSMR) Following Coronary Artery Bypass Graft (CABG) Surgery	0119 Risk Adjusted Operative Mortality for CABG
Steward	Centers for Medicare & Medicaid Services	The Society of Thoracic Surgeons
Description	The measure estimates a hospital-level, risk-standardized mortality rate (RSMR) for patients discharged from the hospital following a qualifying isolated CABG procedure. Mortality is defined as death from any cause within 30 days of the procedure date of an index CABG admission. An index CABG admission is the hospitalization for a qualifying isolated CABG procedure considered for the mortality outcome. The measure was developed using Medicare Fee-for-Service (FFS) patients 65 years and older and was tested in all-payer patients 18 years and older.	Percent of patients aged 18 years and older undergoing isolated CABG who die, including both 1) all deaths occurring during the hospitalization in which the CABG was performed, even if after 30 days, and 2) those deaths occurring after discharge from the hospital, but within 30 days of the procedure
Type	Outcome	Outcome
Data Source	Claims Data sources for the Medicare FFS measure: 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. 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). The American Community Survey (2008-2012): The American Community Survey data is collected annually and an aggregated 5-years data was used to calculate the AHRQ socioeconomic status (SES) composite index score. Data sources for the all-payer testing: For our analyses to examine use in all-payer data, we used all-payer data from California.	Registry Data STS Adult Cardiac Surgery Database Version 2.81 (effective July 1, 2014); Version 2.9 (effective July 1, 2017)

	2558 Hospital 30-Day, All-Cause, Risk-Standardized Mortality Rate (RSMR) Following Coronary Artery Bypass Graft (CABG) Surgery	0119 Risk Adjusted Operative Mortality for CABG
	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-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 older, 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 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_2558_CABG_Mortality_Data_Dictionary_12-30-16_v1.0.xlsx	
Level	Facility	Facility, Clinician : Group/Practice
Setting	Inpatient/Hospital	Inpatient/Hospital
Numerator Statement	The outcome for this measure is 30-day all-cause mortality. Mortality is defined as death for any reason within 30 days of the procedure date from the index admission for patients 18 and older discharged from the hospital after undergoing isolated CABG surgery.	Number of patients undergoing isolated CABG who die, including both 1) all deaths occurring during the hospitalization in which the operation was performed, even if after 30 days, and 2) those deaths occurring after discharge from the hospital, but within 30 days of the procedure
Numerator Details	In the current publicly reported measure, we identify deaths for Medicare FFS patients 65 years or older in the Medicare Enrollment Database (EDB). Outcome Attribution:	Number of isolated CABG procedures with an operative mortality; Number of isolated CABG procedures in which Mortality [Mortalty (STS Adult Cardiac Surgery Database Version 2.9)] and Mortality Operative Death (MtOpD) are marked “yes.” Operative mortality is further verified by the following variables: Mortality Status at 30

	2558 Hospital 30-Day, All-Cause, Risk-Standardized Mortality Rate (RSMR) Following Coronary Artery Bypass Graft (CABG) Surgery	0119 Risk Adjusted Operative Mortality for CABG
	Attribution of the outcome in situations where a patient has multiple contiguous admissions, at least one of which involves a qualifying isolated CABG procedure is as follows: 1) If a patient undergoes a CABG procedure in the first hospital and is then transferred to a second hospital where there is no CABG procedure, the mortality outcome is attributed to the first hospital performing the index CABG procedure and the 30-day window starts with the date of index CABG procedure. Rationale: A transfer following CABG is most likely due to a complication of the index procedure and that care provided by the hospital performing the CABG procedure likely dominates mortality risk even among transferred patients. 2) If a patient is admitted to a first hospital but does not receive a CABG procedure there and is then transferred to a second hospital where a CABG is performed, the mortality outcome is attributed to the second hospital performing the index CABG procedure and the 30-day window starts with the date of index CABG procedure. Rationale: Care provided by the hospital performing the CABG procedure likely dominates mortality risk. 3) If a patient undergoes a CABG procedure in the first hospital and is transferred to a second hospital where another CABG procedure is performed, the mortality outcome is attributed to the first hospital performing the index (first) CABG procedure and the 30-day window starts with the date of index CABG procedure. Rationale: A transfer following CABG is most likely due to a complication of the index procedure, and care provided by the hospital performing the index CABG procedure likely dominates mortality risk even among transferred patients.	days (Mt30Stat), Mortality Date (MtDate), Mortality Discharge Status (MtDCStat)
Denominator Statement	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 tested the measure in both age groups. The cohort includes admissions for patients who receive a qualifying isolated CABG procedure (see the attached Data Dictionary) and with a complete claims history for the 12 months prior to admission. CMS publicly reports this measure for those patients 65	All patients undergoing isolated CABG

	2558 Hospital 30-Day, All-Cause, Risk-Standardized Mortality Rate (RSMR) Following Coronary Artery Bypass Graft (CABG) Surgery	0119 Risk Adjusted Operative Mortality for CABG
	years or older who are Medicare FFS beneficiaries admitted to non-federal hospitals. If a patient has more than one qualifying isolated CABG admission in a year, the first CABG admission is selected for inclusion in the measure and the subsequent CABG admission(s) are excluded from the cohort.	
Denominator Details	The measure included index admissions for patients: 1. Having a qualifying isolated CABG surgery during the index admission; 2. Enrolled in Medicare fee-for-service (FFS) Part A and Part B for the 12 months prior to the date of the index admission, and enrolled in Part A during the index admission; and, 3. Aged 65 or over. Isolated CABG surgeries are defined as those CABG procedures performed without the following concomitant valve or other major cardiac, vascular, or thoracic procedures: o Valve procedures; o Atrial and/or ventricular septal defects; o Congenital anomalies; o Other open cardiac procedures; o Heart transplants; o Aorta or other non-cardiac arterial bypass procedures; o Head, neck, intracranial vascular procedures; or, o Other chest and thoracic procedures International Classification of Diseases, 9th Revision, Clinical Modification (ICD-9) codes as well as International Classification of Disease, 10th Revision (ICD-10) codes used to define the cohort are listed in the attached Data Dictionary.	Number of isolated CABG procedures. The SQL code used to create the function to identify cardiac procedures is provided in the appendix.
Exclusions	The CABG surgery mortality measure excludes index admissions for patients: 1. With inconsistent or unknown vital status or other unreliable demographic (age and gender) data; or, 2. Discharged against medical advice (AMA).	N/A

	2558 Hospital 30-Day, All-Cause, Risk-Standardized Mortality Rate (RSMR) Following Coronary Artery Bypass Graft (CABG) Surgery	0119 Risk Adjusted Operative Mortality for CABG
	For patients with more than one qualifying CABG surgery admission in the measurement period, the first CABG admission is selected for inclusion in the measure and the subsequent CABG admission(s) are excluded from the cohort.	
Exclusion Details	The CABG surgery mortality measure excludes index admissions for patients: 1. With inconsistent or unknown vital status or other unreliable demographic (age and gender) data. Rationale: We do not include stays for patients where the age (indicated in the claim) is greater than 115, where the gender (indicated in the claim) is neither male nor female, where the admission date (indicated in the claim) is after the date of death in the Medicare Enrollment Database, or where the date of death (in the Medicare Enrollment Database) occurs before the date of discharge but the patient was discharged alive (indicated in the claim). 2. Discharged against medical advice (AMA). Rationale: Providers did not have the opportunity to deliver full care and prepare the patient for discharge. This information is taken from the discharge disposition in the claim. 3. With more than one qualifying CABG surgery admission in the measurement period. Rationale: CABG procedures are expected to last for several years without the need for revision or repeat revascularization. A repeat CABG procedure during the measurement period likely represents a complication of the original CABG procedure and is a clinically more complex and higher risk surgery. Therefore, we select the first CABG surgery admission for inclusion in the measure and exclude subsequent CABG surgery admissions (additional claims indicating a CABG procedure was performed within 30-days of the index CABG procedure) from the cohort.	N/A
Risk Adjustment	Statistical risk model 118210| 112469| 141592| 135810| 109921| 141015| 146637| 144762	Statistical risk model 111855| 137290| 114638| 141015 111855| 137290| 114638| 141015

	2558 Hospital 30-Day, All-Cause, Risk-Standardized Mortality Rate (RSMR) Following Coronary Artery Bypass Graft (CABG) Surgery	0119 Risk Adjusted Operative Mortality for CABG
	118210| 112469| 141592| 135810| 109921| 141015| 146637| 144762	
Stratification	N/A	N/A
Type Score	Rate/proportion better quality = lower score	Rate/proportion better quality = lower score
Algorithm	The measure estimates hospital-level 30-day all-cause RSMRs for CABG surgery using a 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 mortality within 30 days of the procedure date using age, sex, 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 mortality 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 and Shahian, 2007). If there were no differences among hospitals, then after adjusting for patient risk, the hospital effects should be identical across all hospitals. The RSMR is calculated as the ratio of the number of "predicted" deaths to the number of "expected" deaths at a given hospital, multiplied by the national observed mortality rate. For each hospital, the numerator of the ratio is the number of deaths within 30 days predicted based on the hospital's performance with its observed case mix, and the denominator is the number of deaths 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 a particular hospital's performance, given its case mix, to be compared to an average hospital's performance with the same case mix. Thus, a lower ratio indicates lower-than-expected mortality rates or better quality, while a higher ratio indicates higher-than-expected mortality rates or worse quality.	Please refer to numerator and denominator sections for detailed information. 111855| 137290| 114638| 141015

	2558 Hospital 30-Day, All-Cause, Risk-Standardized Mortality Rate (RSMR) Following Coronary Artery Bypass Graft (CABG) Surgery	0119 Risk Adjusted Operative Mortality for CABG
	The "predicted" number of deaths (the numerator) is calculated by using the coefficients estimated by regressing the risk factors and the hospital-specific effect on the risk of mortality. The estimated hospital-specific effect 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 deaths (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 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 mortality rate. The hierarchical logistic regression models are described fully in the original methodology report (Suter et al. 2012). Reference: 1. Normand S-LT, Shahian DM. 2007. Statistical and Clinical Aspects of Hospital Outcomes Profiling. Stat Sci 22(2): 206-226. 2. Suter L, Wang C, Araas M, et al. Hospital-Level 30-day All-Cause Mortality Following Coronary Artery Bypass Graft Surgery; Updated Measure Methodology Report. 2012 118210| 112469| 141592| 135810| 109921| 141015| 146637| 144762	
Submission items	5.1 Identified measures: 0468 : Hospital 30-day, all-cause, risk-standardized mortality rate (RSMR) following pneumonia hospitalization 0535 : 30-day all-cause risk-standardized mortality rate following percutaneous coronary intervention (PCI) for patients without ST segment elevation myocardial infarction (STEMI) and without cardiogenic shock 0536 : 30-day all-cause risk-standardized mortality rate following Percutaneous Coronary Intervention (PCI) for patients with ST	5.1 Identified measures: 0134 : Use of Internal Mammary Artery (IMA) in Coronary Artery Bypass Graft (CABG) 0123 : Risk-Adjusted Operative Mortality for Aortic Valve Replacement (AVR) + CABG Surgery 0122 : Risk-Adjusted Operative Mortality for Mitral Valve (MV) Replacement + CABG Surgery 0121 : Risk-Adjusted Operative Mortality for Mitral Valve (MV) Replacement

	2558 Hospital 30-Day, All-Cause, Risk-Standardized Mortality Rate (RSMR) Following Coronary Artery Bypass Graft (CABG) Surgery	0119 Risk Adjusted Operative Mortality for CABG
	segment elevation myocardial infarction (STEMI) or cardiogenic shock 0123 : Risk-Adjusted Operative Mortality for Aortic Valve Replacement (AVR) + CABG Surgery 0122 : Risk-Adjusted Operative Mortality for Mitral Valve (MV) Replacement + CABG Surgery 0119 : Risk-Adjusted Operative Mortality for CABG 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) 0229 : Hospital 30-day, all-cause, risk-standardized mortality rate (RSMR) following heart failure (HF) hospitalization 0230 : Hospital 30-day, all-cause, risk-standardized mortality rate (RSMR) following acute myocardial infarction (AMI) hospitalization for patients 18 and older 1502 : Risk-Adjusted Operative Mortality for Mitral Valve (MV) Repair + CABG Surgery 1893 : Hospital 30-Day, all-cause, risk-standardized mortality rate (RSMR) following chronic obstructive pulmonary disease (COPD) hospitalization 2515 : Hospital 30-day, all-cause, unplanned, risk-standardized readmission rate (RSRR) following coronary artery bypass graft (CABG) surgery 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 (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. In addition, the related claims-based CABG readmission measure, which utilizes the same definition of isolated CABG as the mortality	0120 : Risk-Adjusted Operative Mortality for Aortic Valve Replacement (AVR) 0118 : Anti-Lipid Treatment Discharge 0117 : Beta Blockade at 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 1501 : Risk-Adjusted Operative Mortality for Mitral Valve (MV) Repair 1502 : Risk-Adjusted Operative Mortality for Mitral Valve (MV) Repair + CABG Surgery 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

	2558 Hospital 30-Day, All-Cause, Risk-Standardized Mortality Rate (RSMR) Following Coronary Artery Bypass Graft (CABG) Surgery	0119 Risk Adjusted Operative Mortality for CABG
	measure, was validated using STS clinical registry data. 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: The NQF-endorsed STS measure that has the same target population and similar measure focus as the proposed CABG mortality measure is the Risk-adjusted operative mortality for CABG (NQF #0119). The measure steward for the registry-based mortality measure for CABG is STS. In developing the measure, we sought to harmonize with the STS measure to the greatest extent feasible given competing measure design objectives and differences in the data source. The potential sources of discrepancy are target patient population, age, isolated CABG, period of observation, and included hospitals. The STS measure also assesses both deaths occurring during CABG hospitalization (in-hospital death, even if after 30 days) and deaths occurring within 30 days of procedure date. As indicated above, the proposed measure uses a standard follow-up period of 30 days of procedure date in order to measure each patient consistently. The proposed claims-based measure has been tested and is appropriate for use in all-payer data for patients 18 years and over. Finally, the STS cardiac surgery registry currently enrolls most, but not all, patients receiving CABG surgeries in the U.S. The proposed CABG mortality measure will capture all qualifying Medicare FFS patients undergoing CABG regardless of whether their hospital or surgeon participates in the STS registry.	

Appendix E2: Related and Competing Measures (narrative format)

Comparison of NQF 2558 and NQF 0119

2558 Hospital 30-Day, All-Cause, Risk-Standardized Mortality Rate (RSMR) Following Coronary Artery Bypass Graft (CABG) Surgery
0119 Risk Adjusted Operative Mortality for CABG

Steward

2558 Hospital 30-Day, All-Cause, Risk-Standardized Mortality Rate (RSMR) Following Coronary Artery Bypass Graft (CABG) Surgery

Centers for Medicare & Medicaid Services

0119 Risk Adjusted Operative Mortality for CABG

The Society of Thoracic Surgeons

Description

2558 Hospital 30-Day, All-Cause, Risk-Standardized Mortality Rate (RSMR) Following Coronary Artery Bypass Graft (CABG) Surgery

The measure estimates a hospital-level, risk-standardized mortality rate (RSMR) for patients discharged from the hospital following a qualifying isolated CABG procedure. Mortality is defined as death from any cause within 30 days of the procedure date of an index CABG admission. An index CABG admission is the hospitalization for a qualifying isolated CABG procedure considered for the mortality outcome. The measure was developed using Medicare Fee-for-Service (FFS) patients 65 years and older and was tested in all-payer patients 18 years and older.

0119 Risk Adjusted Operative Mortality for CABG

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

Type

2558 Hospital 30-Day, All-Cause, Risk-Standardized Mortality Rate (RSMR) Following Coronary Artery Bypass Graft (CABG) Surgery

Outcome

0119 Risk Adjusted Operative Mortality for CABG

Outcome

Data Source

2558 Hospital 30-Day, All-Cause, Risk-Standardized Mortality Rate (RSMR) Following Coronary Artery Bypass Graft (CABG) Surgery

Claims Data sources for the Medicare FFS measure:

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.

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).

The American Community Survey (2008-2012): The American Community Survey data is collected annually and an aggregated 5-years data was used to calculate the AHRQ socioeconomic status (SES) composite index score.

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-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 older, 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 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_2558_CABG_Mortality_Data_Dictionary_12-30-16_v1.0.xlsx

0119 Risk Adjusted Operative Mortality for CABG

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

Level

2558 Hospital 30-Day, All-Cause, Risk-Standardized Mortality Rate (RSMR) Following Coronary Artery Bypass Graft (CABG) Surgery

Facility

0119 Risk Adjusted Operative Mortality for CABG

Facility, Clinician : Group/Practice

Setting

2558 Hospital 30-Day, All-Cause, Risk-Standardized Mortality Rate (RSMR) Following Coronary Artery Bypass Graft (CABG) Surgery

Inpatient/Hospital

0119 Risk Adjusted Operative Mortality for CABG

Inpatient/Hospital

Numerator Statement

2558 Hospital 30-Day, All-Cause, Risk-Standardized Mortality Rate (RSMR) Following Coronary Artery Bypass Graft (CABG) Surgery

The outcome for this measure is 30-day all-cause mortality. Mortality is defined as death for any reason within 30 days of the procedure date from the index admission for patients 18 and older discharged from the hospital after undergoing isolated CABG surgery.

0119 Risk Adjusted Operative Mortality for CABG

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

Numerator Details

2558 Hospital 30-Day, All-Cause, Risk-Standardized Mortality Rate (RSMR) Following Coronary Artery Bypass Graft (CABG) Surgery

In the current publicly reported measure, we identify deaths for Medicare FFS patients 65 years or older in the Medicare Enrollment Database (EDB).

Outcome Attribution:

Attribution of the outcome in situations where a patient has multiple contiguous admissions, at least one of which involves a qualifying isolated CABG procedure is as follows:

1) If a patient undergoes a CABG procedure in the first hospital and is then transferred to a second hospital where there is no CABG procedure, the mortality outcome is attributed to the first hospital performing the index CABG procedure and the 30-day window starts with the date of index CABG procedure.

Rationale: A transfer following CABG is most likely due to a complication of the index procedure and that care provided by the hospital performing the CABG procedure likely dominates mortality risk even among transferred patients.

2) If a patient is admitted to a first hospital but does not receive a CABG procedure there and is then transferred to a second hospital where a CABG is performed, the mortality outcome is attributed to the second hospital performing the index CABG procedure and the 30-day window starts with the date of index CABG procedure.

Rationale: Care provided by the hospital performing the CABG procedure likely dominates mortality risk.

3) If a patient undergoes a CABG procedure in the first hospital and is transferred to a second hospital where another CABG procedure is performed, the mortality outcome is attributed to the first hospital performing the index (first) CABG procedure and the 30-day window starts with the date of index CABG procedure.

Rationale: A transfer following CABG is most likely due to a complication of the index procedure, and care provided by the hospital performing the index CABG procedure likely dominates mortality risk even among transferred patients.

0119 Risk Adjusted Operative Mortality for CABG

Number of isolated CABG procedures with an operative mortality;

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

Denominator Statement

2558 Hospital 30-Day, All-Cause, Risk-Standardized Mortality Rate (RSMR) Following Coronary Artery Bypass Graft (CABG) Surgery

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 tested the measure in both age groups.

The cohort includes admissions for patients who receive a qualifying isolated CABG procedure (see the attached Data Dictionary) and with a complete claims history for the 12 months prior to admission. CMS publicly reports this measure for those patients 65 years or older who are Medicare FFS beneficiaries admitted to non-federal hospitals.

If a patient has more than one qualifying isolated CABG admission in a year, the first CABG admission is selected for inclusion in the measure and the subsequent CABG admission(s) are excluded from the cohort.

0119 Risk Adjusted Operative Mortality for CABG

All patients undergoing isolated CABG

Denominator Details

2558 Hospital 30-Day, All-Cause, Risk-Standardized Mortality Rate (RSMR) Following Coronary Artery Bypass Graft (CABG) Surgery

The measure included index admissions for patients:

1. Having a qualifying isolated CABG surgery during the index admission;

2. Enrolled in Medicare fee-for-service (FFS) Part A and Part B for the 12 months prior to the date of the index admission, and enrolled in Part A during the index admission; and,

3. Aged 65 or over.

Isolated CABG surgeries are defined as those CABG procedures performed without the following concomitant valve or other major cardiac, vascular, or thoracic procedures:

o Valve procedures;

o Atrial and/or ventricular septal defects;

o Congenital anomalies;

o Other open cardiac procedures;

o Heart transplants;

o Aorta or other non-cardiac arterial bypass procedures;

o Head, neck, intracranial vascular procedures; or,

o Other chest and thoracic procedures

International Classification of Diseases, 9th Revision, Clinical Modification (ICD-9) codes as well as International Classification of Disease, 10th Revision (ICD-10) codes used to define the cohort are listed in the attached Data Dictionary.

0119 Risk Adjusted Operative Mortality for CABG

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

Exclusions

2558 Hospital 30-Day, All-Cause, Risk-Standardized Mortality Rate (RSMR) Following Coronary Artery Bypass Graft (CABG) Surgery

The CABG surgery mortality measure excludes index admissions for patients:

1. With inconsistent or unknown vital status or other unreliable demographic (age and gender) data; or,

2. Discharged against medical advice (AMA).

For patients with more than one qualifying CABG surgery admission in the measurement period, the first CABG admission is selected for inclusion in the measure and the subsequent CABG admission(s) are excluded from the cohort.

0119 Risk Adjusted Operative Mortality for CABG

N/A

Exclusion Details

2558 Hospital 30-Day, All-Cause, Risk-Standardized Mortality Rate (RSMR) Following Coronary Artery Bypass Graft (CABG) Surgery

The CABG surgery mortality measure excludes index admissions for patients:

1. With inconsistent or unknown vital status or other unreliable demographic (age and gender) data.

Rationale: We do not include stays for patients where the age (indicated in the claim) is greater than 115, where the gender (indicated in the claim) is neither male nor female, where the admission date (indicated in the claim) is after the date of death in the Medicare Enrollment Database, or where the date of death (in the Medicare Enrollment Database) occurs before the date of discharge but the patient was discharged alive (indicated in the claim).

2. Discharged against medical advice (AMA).

Rationale: Providers did not have the opportunity to deliver full care and prepare the patient for discharge. This information is taken from the discharge disposition in the claim.

3. With more than one qualifying CABG surgery admission in the measurement period.

Rationale: CABG procedures are expected to last for several years without the need for revision or repeat revascularization. A repeat CABG procedure during the measurement period likely represents a complication of the original CABG procedure and is a clinically more complex and higher risk surgery. Therefore, we select the first CABG surgery admission for inclusion in the measure and exclude subsequent CABG surgery admissions (additional claims indicating a CABG procedure was performed within 30-days of the index CABG procedure) from the cohort.

0119 Risk Adjusted Operative Mortality for CABG

N/A

Risk Adjustment

2558 Hospital 30-Day, All-Cause, Risk-Standardized Mortality Rate (RSMR) Following Coronary Artery Bypass Graft (CABG) Surgery

Statistical risk model

118210| 112469| 141592| 135810| 109921| 141015| 146637| 144762

118210| 112469| 141592| 135810| 109921| 141015| 146637| 144762

0119 Risk Adjusted Operative Mortality for CABG

Statistical risk model

111855| 137290| 114638| 141015

111855| 137290| 114638| 141015

Stratification

2558 Hospital 30-Day, All-Cause, Risk-Standardized Mortality Rate (RSMR) Following Coronary Artery Bypass Graft (CABG) Surgery

N/A

0119 Risk Adjusted Operative Mortality for CABG

N/A

Type Score

2558 Hospital 30-Day, All-Cause, Risk-Standardized Mortality Rate (RSMR) Following Coronary Artery Bypass Graft (CABG) Surgery

Rate/proportion better quality = lower score

0119 Risk Adjusted Operative Mortality for CABG

Rate/proportion better quality = lower score

Algorithm

2558 Hospital 30-Day, All-Cause, Risk-Standardized Mortality Rate (RSMR) Following Coronary Artery Bypass Graft (CABG) Surgery

The measure estimates hospital-level 30-day all-cause RSMRs for CABG surgery using a 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 mortality within 30 days of the procedure date using age, sex, 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 mortality 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 and Shahian, 2007). If there were no differences among hospitals, then after adjusting for patient risk, the hospital effects should be identical across all hospitals.

The RSMR is calculated as the ratio of the number of "predicted" deaths to the number of "expected" deaths at a given hospital, multiplied by the national observed mortality rate. For each hospital, the numerator of the ratio is the number of deaths within 30 days predicted based on the hospital's performance with its observed case mix, and the denominator is the number of deaths 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 a particular hospital's performance, given its case mix, to be compared to an average hospital's performance with the same case mix. Thus, a lower ratio indicates lower-than-expected mortality rates or better quality, while a higher ratio indicates higher-than-expected mortality rates or worse quality.

The "predicted" number of deaths (the numerator) is calculated by using the coefficients estimated by regressing the risk factors and the hospital-specific effect on the risk of mortality. The estimated hospital-specific effect 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 deaths (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 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 mortality rate. The hierarchical logistic regression models are described fully in the original methodology report (Suter et al. 2012).

Reference:

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

2. Suter L, Wang C, Araas M, et al. Hospital-Level 30-day All-Cause Mortality Following Coronary

Artery Bypass Graft Surgery; Updated Measure Methodology Report. 2012 118210| 112469| 141592| 135810| 109921| 141015| 146637| 144762

0119 Risk Adjusted Operative Mortality for CABG

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

Submission items

2558 Hospital 30-Day, All-Cause, Risk-Standardized Mortality Rate (RSMR) Following Coronary Artery Bypass Graft (CABG) Surgery

5.1 Identified measures: 0468 : Hospital 30-day, all-cause, risk-standardized mortality rate (RSMR) following pneumonia hospitalization

0535 : 30-day all-cause risk-standardized mortality rate following percutaneous coronary intervention (PCI) for patients without ST segment elevation myocardial infarction (STEMI) and without cardiogenic shock

0536 : 30-day all-cause risk-standardized mortality rate following Percutaneous Coronary Intervention (PCI) for patients with ST segment elevation myocardial infarction (STEMI) or cardiogenic shock

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

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

0119 : Risk-Adjusted Operative Mortality for CABG

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)

0229 : Hospital 30-day, all-cause, risk-standardized mortality rate (RSMR) following heart failure (HF) hospitalization

0230 : Hospital 30-day, all-cause, risk-standardized mortality rate (RSMR) following acute myocardial infarction (AMI) hospitalization for patients 18 and older

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

1893 : Hospital 30-Day, all-cause, risk-standardized mortality rate (RSMR) following chronic obstructive pulmonary disease (COPD) hospitalization

2515 : Hospital 30-day, all-cause, unplanned, risk-standardized readmission rate (RSRR) following coronary artery bypass graft (CABG) surgery

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 (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. In addition, the related claims-based CABG readmission measure, which utilizes the same definition of isolated CABG as the mortality measure, was validated using STS clinical registry data. 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: The NQF-endorsed STS measure that has the same target population and similar measure focus as the proposed CABG mortality measure is the Risk-adjusted operative mortality for CABG (NQF #0119). The measure steward for the registry-based mortality measure for CABG is STS. In developing the measure, we sought to harmonize with the STS measure to the greatest extent feasible given competing measure design objectives and differences in the data source. The potential sources of discrepancy are target patient population, age, isolated CABG, period of observation, and included hospitals. The STS measure also assesses both deaths occurring during CABG hospitalization (in-hospital death, even if after 30 days) and deaths occurring within 30 days of procedure date. As indicated above, the proposed

measure uses a standard follow-up period of 30 days of procedure date in order to measure each patient consistently. The proposed claims-based measure has been tested and is appropriate for use in all-payer data for patients 18 years and over. Finally, the STS cardiac surgery registry currently enrolls most, but not all, patients receiving CABG surgeries in the U.S. The proposed CABG mortality measure will capture all qualifying Medicare FFS patients undergoing CABG regardless of whether their hospital or surgeon participates in the STS registry.

0119 Risk Adjusted Operative Mortality for CABG

5.1 Identified measures: 0134 : Use of Internal Mammary Artery (IMA) in Coronary Artery Bypass Graft (CABG)

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

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

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

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

0118 : Anti-Lipid Treatment Discharge

0117 : Beta Blockade at 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

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

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

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

Appendix F: Pre-Evaluation Comments

Comments received as of June 19, 2018.

2558 Hospital 30-Day, All-Cause, Risk-Standardized Mortality Rate (RSMR) Following Coronary Artery Bypass Graft (CABG) Surgery

Karen Shehade, Medtronic

Medtronic appreciates the opportunity to submit comments to the National Quality Forum's Surgery Portfolio Committee on the Spring 2018 Cycle Measures. Medtronic supports efforts to "alleviate pain, restore health, and extend life" and Medtronic's Minimally Invasive Therapies Group is actively engaged in developing innovative solutions for monitoring and patient safety to assist in the early detection of preventable, adverse events. We commend the committee for their thorough review and support continued endorsement of these measures.

2558 Hospital 30-Day, All-Cause, Risk-Standardized Mortality Rate (RSMR) Following Coronary Artery Bypass Graft (CABG) Surgery

Claudia Salzberg, Federation of American Hospitals

The Federation of American Hospitals (FAH) appreciates the opportunity to comment on Measure #2558: Hospital 30-Day, All-Cause, Risk-Standardized Mortality Rate (RSMR) Following Coronary Artery Bypass Graft (CABG) Surgery. The FAH identified several questions and concerns that we note for the Standing Committee's consideration including:

1A. Evidence to Support the Measure Focus:

The FAH does not disagree with the importance of assessing the mortality rates of those patients who had a hospital admission. However, the FAH does not believe that the Center for Medicare and Medicaid Services (CMS) has provided sufficient evidence for this measure and other mortality measures included in CMS programs that a death in the 30 days following an inpatient admission is a predictor of the quality of care provided by a hospital and may well be due to other factors outside of a hospital's control. The FAH does not believe that adequate justification has been provided for selection of a 30-day window. On review of the evidence provided for this measure, most, if not all, of the studies cited focus on surgical technique and intra-operative interventions and we did not identify any evidence to support measuring mortality using a 30-day time period.

2B. Validity:

- The FAH questions whether the measure meets the requirements for validity testing for measures undergoing maintenance given the lack of empirical validity testing. Only testing for face validity and the validity of the risk adjustment model were provided.
- The FAH would like to again reiterate our disappointment in the minimal set of variables used to test whether social risk factors should be included in the risk adjustment model. As experience is gained and additional factors are available related to the community in which

the patient resides such as access to transportation or pharmacies, we hope to see further analysis and testing be completed in the near future.

- The FAH would also note that testing of social risk factors in the risk adjustment model demonstrated a statistically significant association for each of the two variables; yet, the developer determined that their inclusion was not needed given the lack of improvement of model performance and hospital profiling. Given the minimal variation in performance scores for this measure, which in 2016 ranged from 1.3% to 7.4%, FAH is concerned that what may appear as small changes in performance scores when either of the two variables are included could shift a hospital's risk-standardized mortality rate (RSMR) (e.g., from worse than the national rate to no different than the national rate). Regrettably, this analysis was not provided and would provide useful information in determining whether inclusion of these risk factors is warranted.
- In addition, the FAH is concerned that there is insufficient variation in performance across hospitals to support this measure's use in accountability programs. Specifically, the performance scores reported in 2b4. Identification of Statistically Significant and Meaningful Difference in Performance are generally low with only 17 hospitals identified as better than the national rate, 1,004 as no different than the national rate, and 18 as worse than the national rate.

National Quality Forum
1030 15th St NW, Suite 800
Washington, DC 20005
http://www.qualityforum.org

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