NATIONAL QUALITY FORUM
Driving measurable health improvements together

Patient Safety, Spring 2019 Final CDP Report

TECHNICAL REPORT
FEBRUARY 6, 2020

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

http://www.qualityforum.org

Contents

Executive Summary

Patient safety-related events occur across healthcare settings and include a variety of preventable and potentially preventable incidents such as pressure ulcers, falls, and healthcare associated infections. Medical errors are a major cause of patient safety events, and they are estimated to cause hundreds of thousands of preventable deaths each year in the United States,[1] making them the third leading cause of death.[2] Quality measurement and improvement efforts have helped to drive substantial reductions in patient safety-related events, particularly in hospitals, such as reductions in central line related blood stream infections and catheter-associated urinary tract infections. Yet, despite these improvements in safety, opportunities still exist to reduce harm and promote more affordable, effective, and equitable care across settings.

The Patient Safety Standing Committee oversees the NQF Patient Safety portfolio and assesses both novel and existing performance measures for endorsement using NQF's measure evaluation criteria. This review cycle included measures related to the following key safety topics: electronic clinical quality measures (eCQMs) that measure harmful events within hospitals, hospital-acquired infections, mortality following hospitalization, nurses' staffing and skill mix, and antibiotic use. Additionally, the Standing Committee provides feedback on gaps and priorities related to patient safety and contributes to the advancement of measurement in this area.

The Committee identified several overarching themes in this review cycle, including unintended consequences from measure use, ensuring maintenance measures are in use, the movement toward eCQMs, and the meaning of public reporting.

For this project, the Standing Committee evaluated five newly submitted measures and six measures undergoing maintenance review against NQF's standard evaluation criteria. The Committee endorsed nine measures, did not endorse one measure, and one measure was withdrawn by the developer.

The endorsed measures are:

- 0138 National Healthcare Safety Network (NHSN) Catheter-associated Urinary Tract Infection (CAUTI) Outcome Measure
- 0139 National Healthcare Safety Network (NHSN) Central line-associated Bloodstream Infection (CLABSI) Outcome Measure
- 0204 Skill mix (Registered Nurse [RN], Licensed Vocational/Practical Nurse [LVN/LPN], unlicensed assistive personnel [UAP], and contract)
- 0205 Nursing Hours per Patient Day
- 2720 National Healthcare Safety Network (NHSN) Antimicrobial Use Measure
- 2726 Prevention of Central Venous Catheter (CVC)-Related Bloodstream Infections
- 3502 Hybrid Hospital-Wide (All-Condition, All-Procedure) Risk-Standardized Mortality Measure (CMS/Yale-CORE)
- 3503e Hospital Harm – Severe Hypoglycemia
- 3504 Claims-Only Hospital-Wide (All-Condition, All-Procedure) Risk-Standardized Mortality Measure

The Committee did not endorse the following measure:

- 3501e Hospital Harm – Opioid-Related Adverse Events

The developer withdrew the following measure from consideration:

- 3498e Hospital Harm – Pressure Injury

Brief summaries of the measures 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

Addressing patient safety is central to advancing healthcare quality and improving healthcare delivery. For almost 20 years, the National Quality Forum (NQF) has led initiatives to measure patient safety performance, promote safe practices, and identify and reduce serious reportable events (SREs) and hospital-acquired conditions (HACs). These efforts have also involved expanding the number and use of high-quality patient safety measures across settings as well as promoting alignment of existing measures.

Measures in the Patient Safety portfolio target various patient safety events and practices across healthcare settings. In this review cycle, measures span several types of healthcare settings and are connected to important areas in patient safety, including electronic clinical quality measures (eCQMs) that assess harmful events within hospitals, hospital-acquired infections, mortality following hospitalization, nurses' practice environment, and antibiotic use.

Patient safety measurement and quality improvement efforts represent one of the most successful applications of quality measurement and have had a significant impact on patient-safety events in U.S. hospitals. For example, results from the Agency for Healthcare Research and Quality (AHRQ) National Scorecard on Hospital-Acquired Conditions (HACs) Updated Baseline Rates and Preliminary Results indicate that from 2014 to 2017 HACs fell by approximately 13 percent. From 2015 through 2017 national efforts targeting these conditions helped prevent 20,500 deaths and saved $7.7 billion.[3] This cycle involved a reassessment of HACs as an outcome measure as well as the prevention of HACs, specifically central line associated blood stream infections and catheter-associated urinary tract infections. In addition, other measures addressed measuring the overuse of antibiotics within hospitals, as well as in-hospital mortality.

Additionally, with the increasing ubiquity of electronic health records (EHRs), there has been increased interest in electronic clinical quality measures (eCQMs) that can be automatically extracted from EHRs. In this cycle, the Patient Safety Standing Committee reviewed three eCQMs related to hypoglycemia, pressure injuries, and naloxone use for opioid overdose. Many see eCQMs as the future of quality measurement and a key advancement in measurement science. Over the coming years, eCQMs will become increasingly important as they reduce the burden of abstraction and can rely on more detailed clinical data.

Finally, a key element of this cycle was a maintenance endorsement evaluation of performance measures addressing nursing staffing. The nursing staffing measures were developed more than a decade ago. Staffing measures are vital because ensuring a healthy workplace environment is a fundamental factor in promoting safe and high-quality care. A recent study found that between 2005 and 2016, 21 percent of hospitals made substantial gains in improving nurses' working environment. By comparison, 7 percent of hospital working environments worsened. Among hospitals where the care environment improved for nurses, improvements in performance on patient- and nurse-reported patient safety indicators followed. Improvements include an 11 percent increase in the percent of patients rating their hospital favorably and a 15 percent increase in nurses reporting excellent quality of care and giving the hospital a favorable patient safety grade.[4] Another study found that most new

nurses work 12-hour shifts and approximately half work overtime, trends that have been fairly stable.[5] This occurs despite an established link between overtime and poor patient outcomes (e.g., medical errors, healthcare-associated infections [HAIs], and nurses' well-being), making measurement of the nursing working environment an area in need of continued measurement and improvement. [6–8]

NQF Portfolio of Performance Measures for Patient Safety Conditions

The Patient Safety Standing Committee (Appendix C) oversees NQF's portfolio of Patient Safety measures (Appendix B). This portfolio contains 62 measures: 17 process measures, 37 outcome measures, two intermediate outcome measures, three structure measures, and three composite measures (see table below).

Table 1. NQF Patient Safety Portfolio of Measures

	Process	Outcome	Intermediate Outcome	Structure	Composite	Total
Medication Safety	8	1	–	–	–	9
Healthcare-Associated Infections	2	7	–	–	–	9
Perioperative Safety	–	7	–	–	–	7
Falls	1	5	–	–	–	6
Mortality	–	7	–	–	1	8
Venous Thromboembolism	–	1	–	–	–	1
Pressure Ulcers	–	3	–	–	–	3
Workforce	–	–	–	3	–	3
Radiation Safety	1	–	1	–	–	2
Other	5	6	1	–	2	14
Total	17	37	2	3	3	62

Additional measures related to patient safety are assigned to other projects. These include various diabetes assessment and screening measures (Prevention and Population Health/Behavioral Health and Substance Use projects), primary care and chronic illness measures (Primary Care and Chronic Illness project), ACEI/ARB medication measures (Cardiovascular project), complications measures (Prevention and Population Health/Surgery projects), and cost and efficiency measures (Cost and Efficiency project).

Patient Safety Measure Evaluation

At the in-person meeting on June 17, 2019 at the NQF offices in Washington, DC and at two additional web meetings on June 24, 2019 and July 2, 2019, the Patient Safety Standing Committee evaluated five new measures and six measures undergoing maintenance review against NQF's standard measure evaluation criteria.

Table 2. Patient Safety Measure Evaluation Summary

	Maintenance	New	Total
Measures under consideration	6	5	11
Measures endorsed	6	3	9
Measures not endorsed	0	1	1
Measures withdrawn from consideration	0	1	1
Reasons for not recommending	Importance –N/A Scientific Acceptability – N/A Use – N/A Overall Suitability – N/A Competing Measure – N/A	Importance – 1 Scientific Acceptability – 0 Overall Suitability – 0 Competing Measure – 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 April 24, 2019 and closed on August 26, 2019. As of June 5, 34 comments had been submitted and were shared with the Committee prior to the measure evaluation meetings (Appendix F). Thirty-one comments on measure 0138 requested that the Standing Committee carefully examine the risks and benefits of the measure, particularly for persons with spinal cord injury. Two commenters for measure 3498e had concerns related to the 24-hour timeframe from admission to declare a hospital-acquired pressure injury, the reliability and validity, and a lack of clear guidance as to where in the electronic medical record the pressure injury documentation will be extracted. One commenter was supportive of measure 3498e over the existing PSI 03 measure.

All submitted comments were provided to the Committee prior to their initial deliberations during the June 17 in-person meeting and post-measure evaluation meetings on June 26 and July 2, 2019.

Comments Received After Committee Evaluation

The continuous 16-week public commenting period with NQF member support closed on August 26, 2019. Following the Committee's evaluation of the measures under consideration, NQF received 19 comments from four organizations (all member organizations) and individuals pertaining to the draft report and to the measures under consideration. All comments for each measure under consideration have been summarized in Appendix A.

Throughout the 16-week continuous public commenting period, NQF members had the opportunity to express their support ("support" or "do not support") for each measure submitted for endorsement consideration to inform the Committee's recommendations. Three NQF members provided their expressions of support/nonsupport. One of the eleven measures under consideration (0138) received

support, while eight measures (0138, 0139, 2720, 3498e, 3501e, 3502, 3503e, and 3504) received an expression of "do not support."

Overarching Issues

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

The Importance of Unintended Consequences

During the Committee meeting, there was considerable discussion about the potential for unintended consequences of the CAUTI measure in a specific population: spinal cord injury patients. While there was agreement that the CAUTI measure is a well-designed measure in general, and in broad use, the measure has the potential to cause harm in this particular subpopulation as it may cause providers to pull catheters and rely on intermittent catheterization in the hospital. Pulling the catheter in this population was described by advocates of spinal cord injury patients to cause autonomic dysreflexia, which can potentially cause serious complications. Given these concerns, the measure was initially consensus not reached on the validity criterion. After subsequent discussion at the post-comment meeting, the Committee recommended the measure for endorsement.

Ensuring Maintenance Measures Are in Use

As the quality measurement enterprise has matured, scrutiny of maintenance measures has increased to ensure that they are in use and/or planned to be implemented in public programs.

Focus on Feasibility of Novel eCQMs

There were several new eCQMs that were reviewed during the in-person meeting. This was the first time this Committee had seen eCQMs, and Committee members focused heavily on the testing component. Several of the measures had issues, not with how they were structured but whether the data were being consistently documented in structured fields within all the EHRs tested. During the process of testing, many of these issues were remedied, but it does illustrate potential feasibility issues with eCQMs that require examination by future committees.

Transparency of Measure Results

The Committee discussed the meaning of "public reporting." Members emphasized that, ideally, more measure results would be available to the public so individuals can better understand the quality of care being provided and use this information to inform decisions. However, the Committee recognized that developers often do not have control over how measures are used and to whom the results are available.

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.

3501e Hospital Harm – Opioid-Related Adverse Events (CMS/IMPAQ International): Not Endorsed

Description: This electronic clinical quality measure (eCQM) assesses the proportion of inpatient admissions for patients age 18 years and older who suffer the harm of receiving an excess of hospital-administered opioids, defined as receiving a narcotic antagonist (naloxone). In the first 24 hours of the hospitalization, a hospital-administered opioid must be documented prior to receiving naloxone to be considered part of the numerator. **Measure Type**: Outcome; **Level of Analysis**: Facility; **Setting of Care**: Inpatient/Hospital; **Data Source**: Electronic Health Records

This measure did not pass the Performance Gap criterion—a must-pass criterion. The Committee raised several concerns with this measure. First was whether naloxone use is a good indicator of quality. There was concern that naloxone can be used as empiric therapy in patients with changed sensorium, so its use does not necessarily indicate that there was an opioid overdose. In addition, there were concerns that sometimes naloxone may be used to reverse opioids as part of a plan of care and that the measure may cause providers to be more reluctant to give naloxone when it is needed. There were also concerns about how the measure was specified—as a proportion of hospitalized patients versus hospitalized patients who received narcotics—and how the propensity to use narcotics by a hospital might change performance rates. There were also issues in the measure testing because there are various places in the EHR where narcotics may be documented (e.g., in the medication administration record (MAR) or within procedure notes). In addition, there were concerns that the actual rate of occurrence was relatively low in measure testing and that the measure as specified did not suggest a large enough gap to justify measurement. For these reasons, this measure did not pass performance gap.

0138 National Healthcare Safety Network (NHSN) Catheter-associated Urinary Tract Infection (CAUTI) Outcome Measure (Centers for Disease Control and Prevention): Endorsed

Description: Standardized Infection Ratio (SIR) of healthcare-associated, catheter-associated urinary tract infections (UTI) will be calculated among patients in bedded inpatient care locations, except level II or level III neonatal intensive care units (NICU). This includes acute care general hospitals, long-term acute care hospitals, rehabilitation hospitals, oncology hospitals, and behavior health hospitals. **Measure Type**: Outcome; **Level of Analysis**: Facility, Other, Population : Regional and State; **Setting of Care**: Inpatient/Hospital, Other, Post-Acute Care; **Data Source**: Electronic Health Data, Electronic Health Records, Other, Paper Medical Records

The Standing Committee initially did not vote on the overall suitability for endorsement at the June measure evaluation in-person meeting because the Committee did not reach consensus on validity—a must-pass criterion. The Committee agreed that there are preventive activities that can reduce the incidence of CAUTI and that there is a performance gap warranting measurement. Committee members suggested that for future endorsement reviews, the developer should analyze and provide data related to performance across different types of institutions (e.g., rehabilitation, acute care, long-term care, etc.). Data element validity testing was conducted, which NQF also accepts as a demonstration of data element reliability. The Scientific Methods Panel evaluated this measure for scientific acceptability and found it to meet NQF's standards for reliability and validity. The Patient Safety Standing Committee discussed the definition of UTIs and the timeframe for determining whether or not a CAUTI is present

but focused its discussion largely on the issue of appropriate exclusions, particularly for spinal cord injury (SCI) patients.

Representatives of the SCI physician community submitted comments and/or attended the Committee meeting in person to voice their concerns about the measure. These commenters suggested that the measure could be causing unintended adverse consequences by encouraging bladder management practices that are inconsistent with appropriate SCI care and have led to harm for SCI patients.

Representatives of the developer organization (CDC) maintained that there was not enough rigorous evidence supporting exclusion of SCI patients, adding that SCI patients are at high risk for CAUTI and should not be removed from the measure. Committee members expressed their desire to find a resolution to this issue, noting their general support for the measure and their appreciation of the need for evidence to support exclusions, while also acknowledging that the SCI community had brought forth compelling information suggesting that harm to SCI patients could be an unintended consequence of this measure. The Committee voted to pass the measure on the Reliability criterion, but initially consensus was not reached on the Validity criterion. The Committee continued on to approve the measure with respect to Feasibility and Use and Usability but did not initially vote on overall suitability for endorsement. During the September 18 post-comment meeting, the Committee discussed and re-voted on the validity criterion. The Committee passed the measure on the validity criterion and recommended it for continued NQF endorsement.

0139 National Healthcare Safety Network (NHSN) Central line-associated Bloodstream Infection (CLABSI) Outcome Measure (Centers for Disease Control and Prevention): Endorsed

Description: Standardized Infection Ratio (SIR) and Adjusted Ranking Metric (ARM) of healthcare-associated, central line-associated bloodstream infections (CLABSI) will be calculated among patients in bedded inpatient care locations. This includes acute care general hospitals, long-term acute care hospitals, rehabilitation hospitals, oncology hospitals, and behavioral health hospitals. **Measure Type**: Outcome; **Level of Analysis**: Facility, Population : Regional and State; **Setting of Care**: Inpatient/Hospital, Other, Post-Acute Care; **Data Source**: Electronic Health Data, Electronic Health Records, Other, Paper Medical Records

The Standing Committee recommended this measure for endorsement. The Committee agreed that there are preventive activities that can reduce the incidence of CLABSI and that there is a performance gap warranting measurement. The Committee discussed performance gaps on this measure with respect to variation across ethnic groups, rural vs. urban areas, hospital size, and other factors. Committee members discussed the relationship between “catheter days” and infections, noting that CLABSI risk likely increases the longer a line is left in. The developer noted that the CDC is exploring ways of incorporating this and other factors into measurement calculations. This measure was reviewed against the Scientific Acceptability criteria by NQF’s Scientific Methods Panel (SMP); the SMP judged it to have met NQF’s standards for reliability and validity. The Patient Safety Standing Committee accepted the SMP’s ratings. Committee members agreed that this measure meets the Feasibility and Use and Usability criteria, noting that it is used in federal payment and public reporting programs. Committee members did raise caution about potential gaming of the measure, suggesting that the developer should be watchful for these issues and find ways of addressing them.

0204 Skill mix (Registered Nurse [RN], Licensed Vocational/Practical Nurse [LVN/LPN], unlicensed assistive personnel [UAP], and contract) (American Nurses Association): Endorsed

Description: NSC-12.1 - Percentage of total productive nursing hours worked by RN (employee and contract) with direct patient care responsibilities by hospital unit. NSC-12.2 - Percentage of total productive nursing hours worked by LPN/LVN (employee and contract) with direct patient care responsibilities by hospital unit. NSC-12.3 - Percentage of total productive nursing hours worked by UAP (employee and contract) with direct patient care responsibilities by hospital unit. NSC-12.4 - Percentage of total productive nursing hours worked by contract or agency staff (RN, LPN/LVN, and UAP) with direct patient care responsibilities by hospital unit. Note that the skill mix of the nursing staff (NSC-12.1, NSC-12.2, and NSC-12.3) represent the proportions of total productive nursing hours by each type of nursing staff (RN, LPN/LVN, and UAP); NSC-12.4 is a separate rate. Measure focus is structure of care quality in acute care hospital units. **Measure Type**: Structure; **Level of Analysis**: Facility, Other; **Setting of Care**: Inpatient/Hospital; **Data Source**: Management Data, Other

The Standing Committee recommended the measure for continued endorsement. The Committee agreed that this structure measure is important as it assesses the percentage of total productive nursing hours (employee and contract) with direct patient care responsibilities by hospital unit. The Committee agreed that the evidence remains strong and did not have further discussion. Initially, the Committee had some concern regarding the data presented for performance gap for the various skill mixes in various hospital settings; however, the developer was able to provide tables with differences at the unit level type as well as differences in hospital types. The developer also provided an evidence table linking skill mix to outcomes. The developer noted literature which indicated that even an increase of 1 hour of RN time impacted patient outcomes in hospitals.

The Committee had no concerns on the reliability and validity testing of the measure. Regarding feasibility, Committee members noted significant education done to promote appropriate data collection of nursing care hours in the National Database of Nursing Quality Indicators (NDNQI) database and that nursing as whole is highly invested in the NDNQI database.

Related to use and usability, a few Committee members noted it would be helpful to have a consumer-based report for hospitals below the mean to share skill-mix information with consumers. One Committee member would like to see more than four states using the measure and also more adoption by rural hospitals. The developer noted that this measure is being considered for CMS reporting at the national level, and the conversation has been ongoing. The Committee did lose quorum for voting on the use, usability, and overall endorsement criteria and submitted their vote via SurveyMonkey following the June 24 post-meeting call.

0205 Nursing Hours per Patient Day (American Nurses Association): Endorsed

Description: NSC-13.1 (RN hours per patient day) – The number of productive hours worked by RNs with direct patient care responsibilities per patient day for each in-patient unit in a calendar month. NSC-13.2 (Total nursing care hours per patient day) – The number of productive hours worked by nursing staff (RN, LPN/LVN, and UAP) with direct patient care responsibilities per patient day for each in-patient unit in a calendar month. Measure focus is structure of care quality in acute care hospital units. **Measure**

Type: Structure; **Level of Analysis**: Facility, Other; **Setting of Care**: Inpatient/Hospital; **Data Source**: Management Data, Other

The Standing Committee recommended the measure for continued endorsement. The Committee agreed that this structure measure is important as it assesses the number of productive hours worked by RNs with direct patient care responsibilities for each inpatient unit in a calendar month in acute care hospital units. The Committee agreed that a performance gap continues to exist across and within units.

This measure (0205) is linked to 0204 in that 0205 is the denominator for measure 0204. The Committee discussed whether both measures 0204 and 0205 were needed and brought up the potential of creating one measure. The developer noted that the measure elements are completely harmonized. The developer noted that both measures help inform nurse staffing, and there is no additional data collection burden by having both measures.

The Committee had no concerns on the reliability of the measure. For validity testing, the developer did convergent validity testing and compared nursing care hours in the NDNQI database with staffing levels reported by RNs in each unit from the RN survey. At the hospital level, there were lower correlation coefficients. However, the Committee was comfortable with the high correlation coefficients at the unit level and believed that the unit level was more pertinent to the validity of the measure.

Regarding feasibility, the developer noted that most hospitals have an electronic staffing system or payroll to pull the data, and very few are working off a paper record. For use and usability, the developer noted that this measure is being considered for CMS' inpatient quality reporting program at the national level. The Committee did not have a quorum for voting on the measure and submitted their votes via SurveyMonkey following the July 2 post-meeting call.

2720 National Healthcare Safety Network (NHSN) Antimicrobial Use Measure (Centers for Disease Control and Prevention): Endorsed

Description: This measure assesses antimicrobial use in hospitals based on medication administration data that hospitals collect electronically at the point of care and report via electronic file submissions to CDC's National Healthcare Safety Network (NHSN). The antimicrobial use data that are in scope for this measure are antibacterial agents administered to adult and pediatric patients in a specified set of ward and intensive care unit locations: medical ICU, medical-surgical ICU, surgical ICU (adult only), medical ward, medical-surgical ward, surgical ward, general hematology-oncology ward (adult only), and step-down unit (adult only). The measure compares antimicrobial use that the hospitals report with antimicrobial use that is predicted on the basis of nationally aggregated data. The measure is comprised of a discrete set of ratios, Standardized Antimicrobial Administration Ratios (SAARs), each of which summarizes observed-to-predicted antimicrobial use for one of 40 antimicrobial agent-patient care location combinations. The SAARs are designed to serve as high value targets or high level indicators for antimicrobial stewardship programs (ASPs). SAAR values that are outliers are intended to prompt analysis of possible overuse, underuse, or inappropriate use of antimicrobials, subsequent actions aimed at improving the quality of antimicrobial prescribing, and impact evaluations of ASP interventions.
Measure Type: Process; **Level of Analysis**: Facility; **Setting of Care**: Inpatient/Hospital; **Data Source**: Paper Medical Records, Registry Data

The Standing Committee recommended the measure for continued endorsement. The Committee agreed that the measure is important to measure based on the national priority to fight antibiotic overuse and the overabundance of antimicrobial prescribing, which leads to antibiotic resistance and fewer options for treating several infections. The measure looks at different units within a facility for both adult and pediatric populations. The Committee discussed that SAAR values that are outliers prompt analysis of possible overuse, underuse, or inappropriate use, but there is no perfect way to determine the "right" amount of antibiotic use. The Committee agreed that the evidence presented demonstrates a strong link between antimicrobial stewardship and better patient outcomes, including a decrease in C. difficile rates. There was some question as to the link between the measure and improved antibiotic and resistance rates. The developer added that more than 1,200 hospitals are now reporting data (approximately a five-fold increase since first endorsed) and able to use results for stewardship purposes. The Committee accepted the reliability and validity testing presented. There was discussion that data used to build the model will always be behind the current state of antimicrobial prescribing. Regarding use, the measure is not proposed for public reporting or payment at this time, but is being used to gauge stewardship intervention. Overall, the Committee believed that although this measure is not ready for accountability, the measure is important as it serves as a marker of potential inappropriate use to drive stewardship. The Committee agreed that broad use provides data needed to refine predictive models so that future versions of the measured can accurately distinguish quality differences across facilities.

2726 Prevention of Central Venous Catheter (CVC)-Related Bloodstream Infections (American Society of Anesthesiologists): Endorsed

Description: Percentage of patients, regardless of age, who undergo central venous catheter (CVC) insertion for whom CVC was inserted with all elements of maximal sterile barrier technique, hand hygiene, skin preparation and, if ultrasound is used, sterile ultrasound techniques followed; **Measure Type**: Process; **Level of Analysis**: Clinician : Group/Practice, Clinician : Individual; **Setting of Care**: Inpatient/Hospital; **Data Source**: Registry Data

The Standing Committee recommended the measure for continued endorsement. The evidence was unchanged from the past review and included various CDC recommendation statements as well as studies showing the link between maximal sterile barrier technique and catheter-related bloodstream infections. The Committee discussed if the measure had potentially topped out and if there is still a performance gap; however, they acknowledged that although mean performance rates have increased, the standard deviation indicates there is still performance variability. The Committee accepted the previous score-level reliability testing, which showed reliability scores >0.9, and updated validity testing that compared average reporting rates to CLABSI SIRs over the same time period. In the future, the Committee would like to see more specificity in the analysis of the measure and the outcome of infections, as well as data regarding opt-outs and percentage of lines placed in the U.S. versus those being captured in the registry. Regarding feasibility, the Committee agreed the data are captured through chart review/registry reporting. The measure is used in Merit-based Incentive Payment System (MIPS) and for external benchmarking in the National Anesthesia Clinical Outcomes Registry. The Committee discussed the meaning of public reporting and suggested that the developer should aim to increase transparency of performance to the public.

3498e Hospital Harm – Pressure Injury (CMS/IMPAQ International): Withdrawn from consideration

Description: This electronic clinical quality measure (eCQM) assesses the proportion of inpatient admissions for patients ages 18 years and older who develop a new stage 2, stage 3, stage 4 pressure injury, deep tissue pressure injury, or unstageable pressure injury during hospitalization. **Measure Type**: Outcome; **Level of Analysis**: Facility; **Setting of Care**: Inpatient/Hospital; **Data Source**: Electronic Health Records

The Standing Committee recommended the measure for NQF endorsement at the measure evaluation in-person meeting. However, following the September 18 Committee Post-Comment call, the developer for new measure #3498e Hospital Harm – Pressure Injury notified NQF that they are withdrawing the measure for consideration due to substantive anticipated changes. The measure will not move forward in the endorsement process at this time. Below is a summary of discussion on the measure by the Committee for future reference.

Despite concerns with the feasibility across multiple EHRs, the Committee believed overall that this is a good outcome measure for quality of care, and that it is reliable and valid as specified by the developer. During the Standing Committee meeting, there was discussion that while there were several pressure ulcer measures in the NQF portfolio, this was the first submitted as an eCQM. This measure applies to new stage 2, 3, and 4 pressure ulcers that develop during a hospitalization. The Committee agreed that there was one or more healthcare activities that can be performed to reduce the incidence of pressure ulcers. This measure was evaluated by the NQF Scientific Methods Panel; however, the Committee chose to vote on the individual elements of reliability and validity, and there were no major concerns, but there was some discussion about the ability to extract this information within structured fields as well as discussion on testing across multiple EHR vendors. Notably, the developer stated that this had been tested in three separate EHR vendors at beta sites.

The Committee discussed some challenges in the feasibility testing of the eMeasure, particularly the variability in where the measure information was documented in structured fields in one of the EHRs. As a result of this discussion, the Committee had some concerns about feasibility, particularly integrating this measure across multiple EHRs that may not have structured fields to capture pressure ulcer data in a standardized way. Regarding usability, the developer stated that the MAP had recommended inclusion in an accountability program pending feedback from the Committee. Therefore, there were no concerns about usability.

3502 Hybrid Hospital-Wide (All-Condition, All-Procedure) Risk-Standardized Mortality Measure (CMS/Yale-CORE): Endorsed

Description: The measure estimates a hospital-level 30-day risk-standardized mortality rate (RSMR), defined as death from any cause within 30 days after the index admission date for patients who are between the ages of 50 and 94. Please note that in parallel with the hybrid hospital-wide mortality (HWM) measure, we are submitting a claims-only HWM measure. Note that ultimately the claims and hybrid measures will be harmonized and use the same exact cohort specifications. The intent is that prior to implementation, the two measures will be exactly the same, with the exception of the additional risk adjustment added by the CCDE in the hybrid measure. This is analogous to the currently

endorsed and implemented hybrid hospital-wide readmissions measure (NQF 1789 and NQF 2879e). Because of the homology between the claims and hybrid HWM measures, there is no reason to suspect that the results of analyses done for the claims-only measure would differ in any significant way from results of analyses for a nationally representative hybrid measure.

Below we highlight the differences between the two measures, including specifications, data used, and testing which reflect limitations of data availability, as well as actual intended differences in the measure (risk adjustment).

Differences in the measure, data, and testing that reflect limitations in data availability

1. Dataset used for development, some testing (see below for differences), and measure results:
    a. The claims-only measure uses nation-wide Medicare FFS claims and the enrollment database.
    b. The hybrid measure uses an electronic health record (EHR) database from 21 hospitals in the Kaiser Permanente network which includes inpatient claims data information.
2. Age of patients in cohort:
    a. The claims-only measure includes Medicare FFS patients, age 65-94.
    b. The hybrid measure includes all patients age 50-94 (see later discussion for justification)
3. External empiric validity testing
    a. Not possible for the hybrid measure, due to limited data availability. We provide results from the claims-only measure within the hybrid testing form.
4. Socioeconomic risk factor analyses
    a. Not possible for the hybrid measure, due to limited data availability. We provide results from the claims-only measure within the hybrid testing form.
5. Exclusion analyses
    a. To be representative of what we expect the impact would be of the measures' exclusions in a nation-wide sample, we provide the results from the claims-only measure.
6. Meaningful differences
    a. To be representative of what we expect the range of performance would be in a nation-wide sample, we provide the distribution results from the claims-only measure.

Difference between the two measures when fully harmonized, prior to implementation:

1. Risk adjustment:
    a. The claims-only measure uses administrative claims data only for risk adjustment
    b. The hybrid measure adds 10 clinical risk variables, derived from a set of core clinical data elements (CCDE) extracted from the EHR.

Measure Type: Outcome; **Level of Analysis**: Facility; **Setting of Care**: Inpatient/Hospital, Other; **Data Source**: Claims, Electronic Health Records, Other

The Standing Committee recommended the measure for NQF endorsement. This is a new measure developed in sequence with measure 3504 (starting with measure 3504). Many of the submission sections are identical to those submitted for measure 3504; therefore, the Committee focused their conversation on key differences between the two measures. This measure is aligned with measure 3504 but includes 10 additional risk adjusters captured from EHR data. This measure expands the target age

to 50 to 94 years from the 65 to 94 years range used in 3504. The measure was tested in a smaller set of 21 hospitals in one integrated delivery system. The developer noted that it performed face validity for the hybrid measure specifically and tested the data element validity of the EHR elements. The developer stated that they tested the claims-based measure extensively and has no reason to believe this measure would be less valid. The developer performed reliability testing for the hybrid measure (ICC=0.78). There was conversation about missing lab values and how they are handled. The Committee suggested that the developer further examine the completeness of lab data when the measure is used more broadly. The Committee generally agreed that the 21 data points from claims and 10 clinical data elements are available in standardized fields and feasible. The Committee acknowledges the plan for the new measure to be considered in the future for the Inpatient Quality Reporting Program.

3503e Hospital Harm – Severe Hypoglycemia (CMS/IMPAQ International): Endorsed

Description: This electronic clinical quality measure (eCQM) assesses the proportion of inpatient admissions for patients aged 18 years and older who received at least one antihyperglycemic medication during their hospitalization, and who suffered a severe hypoglycemic event (blood glucose less than 40 mg/dL) within 24 hours of the administration of an antihyperglycemic agent.; **Measure Type**: Outcome; **Level of Analysis**: Facility; **Setting of Care**: Inpatient/Hospital; **Data Source**: Electronic Health Records

The Standing Committee recommended the measure for NQF endorsement. During the Committee's discussion, there was support that this measure represents a good assessment of quality of care, as it was seen as a preventable patient safety event.However, some were concerned that the measure does not apply to pediatric populations and applies only to adults 18 and older. The Committee was comfortable that there was a sufficient performance gap across hospitals. The Committee voted to accept the NQF Scientific Methods Panel decision on Scientific Acceptability, which was to pass the measure. The Committee also discussed this eCQM's feasibility, which was testing in two separate EHRs, and had few concerns. There were Measure Applications Partnership (MAP) recommendations to include this measure in public accountability programs through CMS; therefore, the Committee passed the measure on usability.

3504 Claims-Only Hospital-Wide (All-Condition, All-Procedure) Risk-Standardized Mortality Measure (CMS/Yale-CORE): Endorsed

Description: The measure estimates a hospital-level 30-day hospital-wide risk-standardized mortality rate (RSMR), defined as death from any cause within 30 days after the index admission date, for Medicare fee-for-service (FFS) patients who are between the ages of 65 and 94.
Please note that in parallel with the claims-only HWM measure, we are submitting a hybrid HWM measure. Note that ultimately the claims and hybrid measures will be harmonized and use the same exact cohort specifications. The intent is that prior to implementation, the two measures will be exactly the same, with the exception of the additional risk adjustment added by the CCDE in the hybrid measure. This is analogous to the currently endorsed and implemented hybrid hospital-wide readmissions measure (NQF 1789 and NQF 2879e).
Because of the homology between the claims and hybrid HWM measures, there is no reason to suspect that the results of analyses done for the claims-only measure would differ in any significant way from results of analyses for a nationally representative hybrid measure.

Below we highlight the differences between the two measures, including specifications, data used, and testing which reflect limitations of data availability, as well as actual intended differences in the measure (risk adjustment).
Differences in the measure, data, and testing that reflect limitations in data availability

1. Dataset used for development, some testing (see below for differences), and measure results:
    a. The claims-only measure uses nation-wide Medicare FFS claims and the enrollment database.
    b. The hybrid measure uses an electronic health record (EHR) database from 21 hospitals in the Kaiser Permanente network which includes inpatient claims data information.
2. Age of patients in cohort:
    a. The claims-only measure includes Medicare FFS patients, age 65-94.
    b. The hybrid measure includes all patients age 50-94 (see later discussion for justification)
3. External empiric validity testing
    a. Not possible for the hybrid measure, due to limited data availability. We provide results from the claims-only measure within the hybrid testing form.
4. Socioeconomic risk factor analyses
    a. Not possible for the hybrid measure, due to limited data availability. We provide results from the claims-only measure within the hybrid testing form.
5. Exclusion analyses
    a. To be representative of what we expect the impact would be of the measures' exclusions in a nation-wide sample, we provide the results from the claims-only measure.
6. Meaningful differences
    a. To be representative of what we expect the range of performance would be in a nation-wide sample, we provide the distribution results from the claims-only measure.

Difference between the two measures when fully harmonized, prior to implementation:

1. Risk adjustment:
    a. The claims-only measure uses administrative claims data only for risk adjustment
    b. The hybrid measure adds 10 clinical risk variables, derived from a set of core clinical data elements (CCDE) extracted from the EHR.

Measure Type: Outcome; **Level of Analysis**: Facility; **Setting of Care**: Inpatient/Hospital; **Data Source**: Claims, Enrollment Data, Other

The Standing Committee recommended the measure for NQF endorsement. This is a new measure developed in sequence with measure 3502.The measure divides patients into specialty divisions as well as by the presence or absence of significant surgical procedures in order to develop risk-adjustment models for each of the 15 subdivisions of the overall cohort. The model calculates the standardized mortality (risk) ratio for each of those divisions and rolls that into the overall risk standardized hospital-wide mortality rate. The developer explained that 3504 and 3502 are aligned besides the addition of validated EHR risk variables to the hybrid measure to enhance claims-only risk adjustment. The Committee agreed that there are evidence-based strategies to decrease risk of hospital mortality and that there is a gap in mortality scores based on the range of mortality scores presented: 3.95 percent to 8.70 percent. The Committee agreed with the SMP's passing ratings of reliability and validity. At least

one member had some concern about this attribution approach and quality signal (e.g., if the measure is able to appropriately attribute the impact of hospital quality care versus patient-related factors). The developer responded that the hospital-level effect is evident in the distribution rates across hospitals, and they also performed analysis to understand the influence of hospital versus patient factors. The Committee agreed that the measure is feasible based on the use of claims data. There is a plan for the measure to be used in the Hospital Inpatient Quality Reporting Program.

Measures Withdrawn from Consideration

One measure previously endorsed by NQF has not been re-submitted for maintenance of endorsement. Endorsement for this measure has been removed. Note a new measure 3498e was withdrawn during the evaluation process and is summarized elsewhere in this report.

Table 3. Measure Withdrawn from Consideration

Measure	Reason for withdrawal
0678 Percent of Residents or Patients with Pressure Ulcers That Are New or Worsened (Short-Stay)	Developer has retired this measure and plans to adopt a new measure. Endorsement has been removed.

References

1 James JT. A new, evidence-based estimate of patient harms associated with hospital care. *J Patient Saf*. 2013;9(3):122-128.

2 Makary MA, Daniel M. Medical error—the third leading cause of death in the US. *BMJ*. 2016;353:i2139.

3 AHRQ National Scorecard on Hospital-Acquired Conditions: Updated Baseline Rates and Preliminary Results 2014-2017. :27.

4 Aiken LH, Sloane DM, Barnes H, et al. Nurses' and patients' appraisals show patient safety in hospitals remains a concern. *Health Aff*. 2018;37(11):1744-1751.

5 Stimpfel AW, Fletcher J, Kovner CT. A comparison of scheduling, work hours, overtime, and work preferences across four cohorts of newly licensed Registered Nurses. *Journal of Advanced Nursing*. 0(0). https://onlinelibrary.wiley.com/doi/abs/10.1111/jan.13972. Last accessed July 2019.

6 Rogers AE, Hwang W-T, Scott LD, et al. The working hours of hospital staff nurses and patient safety. *Health Aff*. 2004;23(4):202-212.

7 Stone PW, Mooney-Kane C, Larson EL, et al. Nurse working conditions and patient safety outcomes. *Med Care*. 2007;45(6):571-578.

8 Stimpfel AW, Sloane DM, Aiken LH. The longer the shifts for hospital nurses, the higher the levels of burnout and patient dissatisfaction. *Health Aff*. 2012;31(11):2501-2509.

Appendix A: Details of Measure Evaluation

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

Measures Endorsed

0138 National Healthcare Safety Network (NHSN) Catheter-associated Urinary Tract Infection (CAUTI) Outcome Measure

Submission | Specifications

Description: Standardized Infection Ratio (SIR) of healthcare-associated, catheter-associated urinary tract infections (UTI) will be calculated among patients in bedded inpatient care locations, except level II or level III neonatal intensive care units (NICU).

This includes acute care general hospitals, long-term acute care hospitals, rehabilitation hospitals, oncology hospitals, and behavior health hospitals.

Numerator Statement: Total number of observed healthcare-associated CAUTI among patients in bedded inpatient care locations (excluding patients in Level II or III neonatal ICUs).

Denominator Statement: Total number of predicted healthcare-associated CAUTI among inpatient care locations under surveillance for CAUTI during the data period, based on the national CAUTI baseline Data is calculated using the facility's number of catheter days and the following significant risk factors:

- Acute Care Hospitals: CDC Location, Facility bed size, Medical school affiliation, and Facility type
- Critical Access Hospitals: Medical school affiliation
- Long-Term Acute Hospitals: Average length of stay, Setting type, and Location type
- Inpatient Rehabilitation Facilities: Setting type, Proportion of admissions with traumatic and non-traumatic spinal cord dysfunction, Proportion of admissions with stroke

Exclusions: The following are not considered indwelling catheters by NHSN definitions:

1. 1.Suprapubic catheters
2. 2.Condom catheters
3. 3."In and out" catheterizations
4. Nephrostomy tubes

Note, that if a patient has either a nephrostomy tube or a suprapubic catheter and also has an indwelling urinary catheter, the indwelling urinary catheter will be included in the CAUTI surveillance.

Adjustment/Stratification:

Level of Analysis: Facility, Other, Population : Regional and State

Setting of Care: Inpatient/Hospital, Other, Post-Acute Care

Type of Measure: Outcome

Data Source: Electronic Health Data, Electronic Health Records, Other, Paper Medical Records

Measure Steward: Centers for Disease Control and Prevention

STANDING COMMITTEE MEETING 06/17/2019

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

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

1a. Evidence: **Pass-20**; **No Pass-0**; 1b. Performance Gap: **H-1**; **M-19**; **L-0**; **I-0**

Rationale:

- The Committee agreed that there are preventive activities that can reduce the incidence of CAUTI. These include:
  - Appropriate catheter use
  - Proper techniques for urinary catheter insertion
  - Proper techniques for urinary catheter maintenance
- To support these practices, the developer cites a guideline from the Healthcare Infection Control Practices Advisory Committee (HICPAC): Guideline for Prevention of Catheter-Associated Urinary Tract Infections (2009) revised February 15, 2017.
- The developer provided national Standardized Infection Ratios (SIRs) for CAUTI in 2015, 2016, and 2017:
  - National Catheter-associated UTI SIR in 2015 is 0.993 = 28,712 observed / 28,910.634 predicted
  - National Catheter-associated UTI SIR in 2016 is 0.930 = 26,983 observed / 29,002.430 predicted
  - National catheter-associated UTI SIR in 2017 is 0.880 = 24,865 observed / 28,241.960 predicted
- The developer also reports that there was a 6% decrease in CAUTI between 2015 and 2016, and a 5% decrease between 2016 and 2017.
- The Committee agreed that there is a performance gap warranting measurement in this area; Committee members suggested that the developer analyze and provide data related to performance across different types of institutions (e.g., rehabilitation, acute care, long-term care, etc.).
- The Committee also discussed performance gaps on this measure with respect to variation across ethnic groups, rural vs. urban areas, hospital size, and other factors.

---

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

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

2a. Reliability: **M-14**; **L-4**; **I-0**; 2b. Validity: **M-10**; **L-8**; **I-2 |** Validity: (Revote on post-comment call 9/18/19)**: M-13; L-4; I-2**

- This measure is deemed as complex and was evaluated by the NQF Scientific Methods Panel.

The Standing Committee chose to vote on this measure for, both, reliability and validity.

Rationale:

- This measure was reviewed for Scientific Acceptability by NQF's Scientific Methods Panel (SMP).
- Data element validity testing was conducted, which NQF accepts as a demonstration of data element reliability.
- There was some question from SMP reviewers about the appropriateness of using data element validity testing to stand in for reliability testing. NQF reminded the group that NQF allows this substitution.
- The developer notes that the critical data elements of this measure have been validated by several state health departments that require mandatory reporting of CAUTI through the NHSN.

- Data validation is conducted by trained auditors, who review medical records and determine whether facilities' identification of patients meeting CAUTI criteria were accurate.
- Sensitivity, specificity, positive predicted value, and negative predicted value are calculated.
- Validation results from 10 states are provided—the developer reports that these validations indicated a pooled mean sensitivity of 88.1% (range: 50%-95.6%), specificity of 99.1% (range: 91.4% - 100%), positive predictive value of 94.4% (range: 84.6% - 100%) and negative predictive value of 97.9% (range: 91.4% - 99.8%).
- Some SMP reviewers expressed concern about the lack of measure score testing, given that this is a maintenance measure. NQF clarified that either empirical data element or score-level testing are acceptable validity testing methods for maintenance measures.
- The measure uses a statistical risk model with risk factors relevant to the facility type. No social risk factors are applied in the modeling.
- There was some concern that no statistical results (e.g., c-statistic) of model power were reported.
- The Patient Safety Standing Committee discussed the definition of UTIs and the timeframe for determining whether or not a CAUTI is present but focused its discussion largely on the issue of appropriate exclusions, particularly for spinal cord injury (SCI) patients.
- A number of representatives of the SCI physician community submitted comments and/or attended the Committee meeting in person to voice their concerns about the measure. These commenters suggested that the measure could be causing unintended adverse consequences by encouraging bladder management practices that are inconsistent with appropriate SCI care and have led to harm for SCI patients.
- Representatives of the developer organization (CDC) maintained that there was not enough rigorous evidence supporting exclusion of SCI patients, adding that SCI patients are at high risk for CAUTI and should not be removed from the measure.
- Committee members expressed their desire to find a resolution to this issue, noting their general support for the measure and their appreciation of the need for evidence to support exclusions, while also acknowledging that the SCI community had brought forth compelling information suggesting that harm to SCI patients could be an unintended consequence of this measure.
- The Committee voted to pass the measure on the Reliability criterion, but consensus was not reached on the Validity criterion.
- After the public comment period, the Committee revisited their evaluation of this measure. The Committee reviewed submitted comments, and heard from both the developer and representatives of the SCI physician community, who reiterated their positions on the measure.
- The Committee acknowledged the potential unintended consequences of this measure for SCI patients, but noted that it is an outcome measure, and does not prescribe specific behavior, such as removal of Foley catheters.
- Committee members observed that measuring this outcome may create incentives for certain behaviors, but added that health care providers must treat each patient individually and use their best judgment as to how care should be approached.
- The Committee suggested that the benefits of this measure are strong enough to warrant its continued endorsement, and passed the measure on the Validity criterion.

3. Feasibility: H-2; M-18; L-0; I-0

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

Rationale:

- Data for the measure are collected through the National Healthcare Safety Network (NHSN) using a set of standardized forms.
- The developer reports that CAUTI and catheter days (the numerator and denominator) must be collected by trained hospital staff from information available in clinical data sources.
- The developer notes that some of the data used in the measure can be mined from electronic sources, adding that NHSN is moving towards an electronically captured CAUTI measure for future use. However, development and testing is not complete at this time; barriers include a lack of consistency in the use of electronic records across different platforms and facility types.
- The Committee noted that this measure does require manual abstraction of clinical information, but agreed that measuring CAUTI rates is worth the effort.

4. Use and Usability

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

4a. Use: **Pass-20; No Pass-0** 4b. Usability*:* **H-0; M-18; L-0; I-0**

Rationale:

- The measure is used in several accountability programs, including:
  - Hospital Inpatient Quality Reporting Program (HIQR)
  - Hospital Value-Based Purchasing
  - Hospital-Acquired Condition Reduction Program (HACRP)
- The developer notes that SIR results are available to NHSN users at any time, based on their current data entry. Data provided within the analysis report includes numerator, denominator, SIR, p-value, and 95% confidence interval. Educational materials are available on the NHSN website that explain each data element.
- Based on results from a polling survey, hospitals have indicated that they are running SIR analysis reports within NHSN on a monthly basis, and that they use SIRs for prevention activities in their hospital. State health departments are using the SIR for public reporting purposes and to help target facilities for additional prevention. Feedback was received via email regarding the extent of risk adjustment and the limitations.

5. Related and Competing Measures

- No related or competing measures noted.

6. Standing Committee Recommendation for Endorsement: **Yes-13**; **No-5**

7. Public and Member Comment

- Eight comments were received regarding this measure from three commenters. One commenter was not supportive of the measure as currently specified, explaining in detail the measure's unintended adverse consequences for patients with spinal cord injury (with references included for various points) and suggesting specific key topics that should be re-examined and resolved. Another commenter shared that individual clinicians may attempt to reduce urinary catheter use in patients who require continuous bladder drainage, but noted that this represents a small patient subpopulation and should not warrant removal of endorsement. Another comment expressed concern that the validity testing is aggregated at the state level rather than for each facility and that results are not presented for each data element.
    - Developer Response: NHSN's surveillance protocol and reporting guidance for the system's users and NHSN's clinical quality measures do not recommend or call for preferential use of specific clinical practices or procedures. The protocol, guidance, and measures are designed for purposes of tracking, summarizing, and responding to adverse events that are associated with use of specific practices or procedures or exposures to other healthcare risks. Because spinal cord injured patients are at high risk for catheter-associated urinary tract infections (CAUTIs), these patients are included in NHSN's CAUTI surveillance protocol, reporting guidance and clinical quality measure. To exclude this patient population without compelling evidence of unintended adverse consequences attributable to including them would preclude the availability of surveillance and measure data for prevention and quality improvement purposes. NHSN readily acknowledges that clinical quality measures can have unintended consequences and is prepared to respond accordingly, including excluding affected patient populations, if there are compelling reasons to do so. Anecdotal reports of unintended consequences of the CAUTI measure on bladder management of spinal cord injured patients fall short of actionable data. A systematic study confirming the purported unintended adverse consequence of the CAUTI measure has yet to be reported—perhaps not yet initiated despite NHSN's recommendations to design and complete such a study. NHSN remains committed to surveillance and measurement of adverse events in healthcare and providing comprehensive, high caliber data for measurement purposes and to guide prevention and quality improvement.

      Reliability testing of critical data elements is performed by many of the state health departments that have implemented mandatory reporting of CAUTI data to the state using NHSN as the data entry system and the source of case definitions and surveillance methodology. NHSN provides a guidance toolkit that suggests the selection methodology of a sample of facilities and medical charts to determine the accuracy of data elements. The recommended sample sizes are developed with a priori assumptions of expected accuracy and prevalence of CAUTI events. The state health departments using the NHSN guidance methodology conduct external validations. Data validations are conducted at each facility and facility specific data accuracy estimates are provided to each facility by the respective state health departments. These data are shared with NHSN on an aggregate level for estimation of state specific accuracy of reporting.

      NHSN has confidence that the sampling methodology as described is adequate for purposes of rendering estimates of accuracy and meets the NQF criteria for data

element validity. Testing for this measure has satisfactorily been through the rigor of NQF Methods Panel and was passed. If the commenter continues to have concerns about validity testing for this measure, we would be willing to talk further with the commenter about this concern.

---

8. Consensus Standards Approval Committee (CSAC) Vote: Yes-13; No-0 (10/21/2019)

Decision: Approved for continued endorsement

---

9. Appeals

No appeals were received.

0139 National Healthcare Safety Network (NHSN) Central line-associated Bloodstream Infection (CLABSI) Outcome Measure

Submission | Specifications

Description: Standardized Infection Ratio (SIR) and Adjusted Ranking Metric (ARM) of healthcare-associated, central line-associated bloodstream infections (CLABSI) will be calculated among patients in bedded inpatient care locations.

This includes acute care general hospitals, long-term acute care hospitals, rehabilitation hospitals, oncology hospitals, and behavioral health hospitals.

Numerator Statement: Total number of observed healthcare-associated CLABSI among patients in bedded inpatient care locations.

Denominator Statement: Total number of predicted healthcare-associated CLABSI among patients in bedded inpatient care locations, calculated using the facility's number of central line days and the following significant risk factors:

- Acute Care Hospitals: CDC location, facility bed size, medical school affiliation, facility type, birthweight category (NICU locations only)
- Critical Access Hospitals: no significant risk factors, calculation based intercept only model
- Inpatient Rehabilitation Facilities: Proportion of admissions with stroke, proportion of admissions in other non-specific diagnostic categories
- Long Term Acute Care Hospitals: CDC location type , facility bed size, average length of stay, proportion of admissions on a ventilator, proportion of admissions on hemodialysis

Exclusions: Data from patients who are not assigned to an inpatient bed are excluded from the denominator counts, including outpatient clinics, 24-hour observation units, and emergency department visits. Inpatient rehab locations and inpatient psychiatric locations that have their own Centers for Medicare and Medicaid Services (CMS) Certification Number (CCN) are excluded.

Adjustment/Stratification: Statistical risk model

Level of Analysis: Facility, Population : Regional and State

Setting of Care: Inpatient/Hospital, Other, Post-Acute Care

Type of Measure: Outcome

Data Source: Electronic Health Data, Electronic Health Records, Other, Paper Medical Records

Measure Steward: Centers for Disease Control and Prevention

STANDING COMMITTEE MEETING 06/17/2019

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

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

1a. Evidence: **Pass-20**; **No Pass-0**; 1b. Performance Gap: **H-5**; **M-15**; **L-0**; **I-0**

Rationale:

- The Committee agreed that there are preventive activities that can reduce the incidence of CLABSI; these include:
    - Appropriate central line use: promptly removing non-essential intravascular catheters,
    - Hand hygiene and aseptic technique
    - The use of maximal barrier equipment including a large patient drape, inserter mask, sterile gloves, cap, and sterile gown during aseptic insertion of the central line
    - Appropriate insertion site decontamination before central line insertion
    - Chlorhexidine-impregnated dressings (in patients ≥ 18 years), and (vi) implementing surveillance strategies
- To support these practices, the developer cites a guideline:
    - O'Grady NP, Alexander M, Burns LA, Dellinger PE, Garland J, et al. Guidelines for the prevention of intravascular catheter-related infections. Available at http://www.cdc.gov/hicpac/pdf/guidelines/bsi-guidelines-2011.pdf.
- The developer provided national Standardized Infection Ratios (SIRs) for CAUTI in 2015, 2016, and 2017:
    - National CLABSI SIR in 2015 is 0.994 = 26,029 observed / 26,183.537 predicted
    - National CLABSI SIR in 2016 is 0.891 = 23,591 observed / 26,472.710 predicted
    - National CLABSI SIR in 2017 is 0.814 = 21,173 observed / 25,993.180 predicted
- The developer also reports that there was a 10% decrease in CLABSI between 2015 and 2016, and a 9% decrease between 2016 and 2017.
- The Committee discussed performance gaps on this measure with respect to variation across ethnic groups, rural vs. urban areas, hospital size, and other factors.

---

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

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

- *This measure is deemed as complex and was evaluated by the NQF Scientific*

2a. NQF Scientific Methods Panel Ratings for Reliability: **H-0**; **M-4**; **L-0**; **I-0**

2b. NQF Scientific Methods Panel Ratings for Validity: **H-0**; **M-3 L-1**; **I-0**

(The Committee accepted the NQF Scientific Methods Panel's Moderate rating, unanimously.)

Rationale:

- Data element validity testing was conducted, which NQF allows to serve as a demonstration of data element reliability.
- The developer notes that the critical data elements of this measure have been validated by a number of state health departments that require mandatory reporting of CLABSI through the NHSN.

- Data validation is conducted by trained auditors, who review medical records and determine whether facilities' identification of patients meeting or not meeting CLABSI criteria was accurate.
- Sensitivity, specificity, positive predicted value, and negative predicted value were calculated.
- Validation results from 5 states are provided—the developer reports that these validations indicated a pooled mean sensitivity of 87.5% (range: 80.3%-100%), specificity of 99.3% (range: 98.7% - 100%), positive predictive value of 96.9% (range: 94.2% - 100%) and negative predictive value of 96.9% (range: 93.7% - 100%).
- Committee members discussed the relationship between 'catheter days' and infections, noting that CLABSI risk likely increases the longer a line is left in.
    - The developer noted that CDC is exploring ways of incorporating this and other factors into measurement calculations.
- This measure was reviewed against the Scientific Acceptability criteria by NQF's Scientific Methods Panel (SMP); the SMP judged it to have met NQF's standards for reliability and validity.
- The Patient Safety Standing Committee accepted the SMP's ratings.

---

3. Feasibility: H-1; M-19; L-0; I-0

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

Rationale:

- Data for the measure are collected through the National Healthcare Safety Network (NHSN) using a set of standardized forms.
- The developer reports that CLABSI and central line days (the numerator and denominator) must be collected by trained hospital staff from information available in clinical data sources.
- The developer noted that some of the data used in the measure can be mined from electronic sources, adding that NHSN is moving towards an electronically captured CAUTI measure for future use. However, development and testing are not complete at this time.

---

4. Use and Usability

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

4a. Use: **Pass-20; No Pass-0** 4b. Usability*:* **H-7; M-13; L-0; I-0**

Rationale:

- The measure is used in several accountability programs, including:
    - Hospital Inpatient Quality Reporting Program (HIQR)
    - Hospital Value-Based Purchasing
    - Hospital-Acquired Condition Reduction Program (HACRP)
- The Committee agreed that this measure meets the Use & Usability criteria, noting that it is used in federal payment and public reporting programs.
- Committee members did raise caution about potential 'gaming' of the measure, suggesting that the developer should be watchful for these issues and find ways of addressing them.

5. Related and Competing Measures

- No related or competing measures noted.

6. Standing Committee Recommendation for Endorsement: **Yes-20**; **No-0**

7. Public and Member Comment

- One commenter expressed the same concern about the validity testing for this measure as for measure 0138. The commenter is concerned that the validity testing is aggregated at the state level rather than for each facility and that results are not presented for each data element. Accordingly, the developer's response is essentially the same.
    - Developer Response: Reliability testing of critical data elements is performed by many of the state health departments that have implemented mandatory reporting of CLABSI data to the state using NHSN as the data entry system and the source of case definitions and surveillance methodology. NHSN provides a guidance toolkit that suggests the selection methodology of a sample of facilities and medical charts to determine the accuracy of data elements. The recommended sample sizes are developed with a priori assumptions of expected accuracy and prevalence of CLABSI events. The state health departments using the NHSN guidance methodology conduct external validations. Data validations are conducted at each facility and facility specific data accuracy estimates are provided to each facility by the respective state health departments. These data are shared with NHSN on an aggregate level for estimation of state specific accuracy of reporting.

      NHSN has confidence that the sampling methodology as described is adequate for purposes of rendering estimates of accuracy and meets the NQF criteria for data element validity. Testing for this measure has satisfactorily gone through the rigor of NQF Methods Panel and was passed. If the commenter continues to have concerns about validity testing for this measure, we would be willing to talk further with the commenter about this concern.

8. Consensus Standards Approval Committee (CSAC) Vote: Yes-14; No-0 (10/21/2019)

Decision: Approved for continued endorsement

9. Appeals

No appeals were received.

0204 Skill mix (Registered Nurse [RN], Licensed Vocational/Practical Nurse [LVN/LPN], unlicensed assistive personnel [UAP], and contract)

Submission | Specifications

Description: NSC-12.1 - Percentage of total productive nursing hours worked by RN (employee and contract) with direct patient care responsibilities by hospital unit.

NSC-12.2 - Percentage of total productive nursing hours worked by LPN/LVN (employee and contract) with direct patient care responsibilities by hospital unit.

NSC-12.3 - Percentage of total productive nursing hours worked by UAP (employee and contract) with direct patient care responsibilities by hospital unit.

NSC-12.4 - Percentage of total productive nursing hours worked by contract or agency staff (RN, LPN/LVN, and UAP) with direct patient care responsibilities by hospital unit.

Note that the skill mix of the nursing staff (NSC-12.1, NSC-12.2, and NSC-12.3) represent the proportions of total productive nursing hours by each type of nursing staff (RN, LPN/LVN, and UAP); NSC-12.4 is a separate rate.

Measure focus is structure of care quality in acute care hospital units.

Numerator Statement: Four separate numerators are as follows:

RN hours – Productive nursing care hours worked by RNs with direct patient care responsibilities for each hospital in-patient unit during the calendar month.

LPN/LVN hours – Productive nursing care hours worked by LPNs/LVNs with direct patient care responsibilities for each hospital in-patient unit during the calendar month.

UAP hours – Productive nursing care hours worked by UAP with direct patient care responsibilities for each hospital in-patient unit during the calendar month.

Contract or agency hours – Productive nursing care hours worked by nursing staff (contract or agency staff) with direct patient care responsibilities for each hospital in-patient unit during the calendar month.

Denominator Statement: Denominator is the total number of productive hours worked by employee or contract nursing staff with direct patient care responsibilities (RN, LPN/LVN, and UAP) for each hospital in-patient unit during the calendar month.

Exclusions: Same as numerator; nursing staff with no direct patient care responsibilities are excluded.

Adjustment/Stratification: Other Each unit is stratified by unit type (e.g., critical care, step down, medical), which is not identical to risk, but may be related.

Level of Analysis: Facility, Other

Setting of Care: Inpatient/Hospital

Type of Measure: Structure

Data Source: Management Data, Other

Measure Steward: American Nurses Association

STANDING COMMITTEE MEETING 06/24/2019

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

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

1a. Evidence: **H-5**; **M-11**; **L-1**; **I-0**; 1b. Performance Gap: **H-1**; **M-12**; **L-3**; **I-1**

Rationale:

- The Committee agreed this structure measure is important as it assesses the percentage of total productive nursing hours (employee and contract) with direct patient care responsibilities by hospital unit.
- The developer provided data of differences in skill mix by unit type across all National Database of Nursing Quality Indicators (NDNQI) participating hospitals that provided nurse staffing data for 2017. In addition, the developer provided difference in skill mix in hospital types (i.e. bed size, teaching status, magnet status, rural/metropolitan).
- The developer also cited literature linking skill mix to patient outcomes.

---

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-6**; **M-9**; **L-1**; **I-0**; 2b. Validity: **H-3**; **M-11**; **L-2**; **I-0**

Rationale:

- Reliability testing was done at the performance score level and tested the stability of measures across time for nursing care hours data collected from the National Database of Quality Indicators from January 1, 2016-April 30, 2017. Reliability at the Unit-Level and Hospital-Level were reported for Skill Mix and the intraclass correlation coefficient (ICC) results ranged from 0.86-0.92. (>0.8 is high reliability).
- The developer performed convergent validity testing with correlation coefficients and compared Skill Mix (%RN) in the NDNQI® database with the staffing levels reported by RNs in each unit from the RN survey. The correlation coefficients were “strong” at the unit level, however weaker at the hospital level. The developer attributed the lower results at the hospital level to unit-level variation in nurse staffing in hospital. The Committee was satisfied with this rationale.
- The Committee had no concerns on the reliability and validity testing of the measure.

---

3. Feasibility: H-0; M-14; L-2; I-0

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

Rationale:

- The measure is generated from electronic payroll/accounting report or electronic staffing system.
- Committee members noted significant education done to promote appropriate data collection of nursing care hours in the NDNQI database and that nursing as whole is highly invested in the NDNQI database.

---

4. Use and Usability

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

4a. Use: **Pass-19; No Pass-1** *4b.* Usability*:* **H-1; M-18; L-1; I-0**

Rationale:

- The measure is currently publicly reported in four states and also by the American Nurses Credentialing Center (ANCC) as part of their Magnet Recognition Program and Pathways to Excellence Recognition Program.
- One Committee member would like to see more states than the current four states using the measure and more adoption by rural hospitals. The developer noted this measure is being considered for CMS inpatient quality reporting program at the national level and the conversation has been ongoing.
- A few Committee members noted it would be helpful to have a consumer-based report for hospitals below the mean to share skill-mix information with consumers.

---

5. Related and Competing Measures

- This measure 0204 is related with NQF 0205 Nursing Hours per Patient Day.
- Measure 0204 is a ratio of the RN hours and Total Nursing Hours elements that are the numerator for the rates tested in measure 0205.
- The Committee discussed whether both measures 0204 and 0205 were needed and brought up the potential of the creation of a single measure.
- The developer noted that the measure elements are completely harmonized. The developer noted that both measures help inform nurse staffing, and there is no additional data collection burden by having both measures.

---

6. Standing Committee Recommendation for Endorsement: **Yes-19**; **No-1**

Rationale

- The Standing Committee recommended the measure for continued endorsement.
- The Committee agreed this structure measure is important as it assesses the percentage of total productive hours worked by RNs (employee and contract) with direct patient care responsibilities by hospital units.

---

7. Public and Member Comment

- NQF did not receive comments following the Committee's evaluation of the measure.

---

8. Consensus Standards Approval Committee (CSAC) Vote: Yes-14; No-0 (10/21/2019)

Decision: Approved for continued endorsement

---

9. Appeals

No appeals were received.

0205 Nursing Hours per Patient Day

Submission | Specifications

Description: NSC-13.1 (RN hours per patient day) – The number of productive hours worked by RNs with direct patient care responsibilities per patient day for each in-patient unit in a calendar month.

NSC-13.2 (Total nursing care hours per patient day) – The number of productive hours worked by nursing staff (RN, LPN/LVN, and UAP) with direct patient care responsibilities per patient day for each in-patient unit in a calendar month.

Measure focus is structure of care quality in acute care hospital units.

Numerator Statement: Total number of productive hours worked by nursing staff with direct patient care responsibilities for each hospital in-patient unit during the calendar month.

Denominator Statement: Denominator is the total number of patient days for each in-patient unit during the calendar month. Patient days must be from the same unit in which nursing care hours are reported.

Exclusions: Patient days from some non-reporting unit types, such as Emergency Department, peri-operative unit, and obstetrics, are excluded.

Adjustment/Stratification: Other Each unit is stratified by unit type (e.g., critical care, step down, medical), which is not identical to risk, but may be related.

Level of Analysis: Facility, Other

Setting of Care: Inpatient/Hospital

Type of Measure: Structure

Data Source: Management Data, Other

Measure Steward: American Nurses Association

STANDING COMMITTEE MEETING 07/02/2019

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

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

1a. Evidence: **H-0**; **M-18**; **L-1**; **I-0**; 1b. Performance Gap: **H-4**; **M-14**; **L-1**; **I-0**

Rationale:

- The Committee agreed this structure measure is important as it assesses the number of productive hours worked by RNs with direct patient care responsibilities per patient day for each in-patient unit in a calendar month.
- The developer provided data of differences in nursing care hours by unit type across all National Database of Nursing Quality Indicators (NDNQI) participating hospitals that provided nurse staffing data for 2017. In addition, the developer provided difference in nursing care hours in hospital types (i.e. bed size, teaching status, magnet status, rural/metropolitan).
- The developer also cited literature linking nursing hours per patient day to patient outcomes.

---

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-3**; **M-15**; **L-1**; **I-0**; 2b. Validity: **H-2**; **M-16**; **L-1**; **I-0**

Rationale:

- Reliability testing was done at the performance score level and tested the stability of measures across time for nursing care hours data collected from the National Database of Quality Indicators from January 1, 2016-April 30, 2017. Reliability at the Unit-Level and Hospital-Level were reported for patient day adjusted nursing hours and the intraclass correlation coefficient (ICC) results ranged from 0.70-0.85. (>0.8 is high reliability).
- The developer performed convergent validity testing with correlation coefficients and compared nursing care hours (both RN and total hours) in the NDNQI® database with the staffing levels reported by RNs in each unit from the RN survey. The correlation coefficients were "strong" at the unit level, however weaker at the hospital level. The developer attributed the lower results at the hospital level to unit-level variation in nurse staffing in hospital. The Committee was comfortable with the high correlation coefficients at the unit level and believed the unit level was more pertinent to the validity of the measure.
- The Committee had no concerns on the reliability and validity testing of the measure.

---

3. Feasibility: H-4; M-15; L-0; I-0

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

Rationale:

- The measure is generated from electronic payroll/accounting report or electronic staffing system.
- The developer noted that the majority of hospitals have an electronic staffing system or payroll to pull the data and very few are working off a paper record.

---

4. Use and Usability

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

4a. Use: **Pass-18; No Pass-1** 4b. Usability: **H-7; M-11; L-1; I-0**

Rationale:

- The measure is currently publicly reported in 7 states and also by the American Nurses Credentialing Center (ANCC) as part of their Magnet Recognition Program and Pathways to Excellence Recognition Program.
- The developer noted this measure is being considered for CMS inpatient quality reporting program at the national level and the conversation has been ongoing.
- A few Committee members noted it would be helpful to have a consumer-based report for hospitals below the mean to share skill-mix information with consumers.

---

5. Related and Competing Measures

- This measure 0205 is related with NQF 0204 Skill mix (Registered Nurse [RN], Licensed Vocational/Practical Nurse [LVN/LPN], unlicensed assistive personnel [UAP], and contract).

- Measure 0204 is actually a ratio of the RN hours and Total Nursing Hours elements that are the numerator for the rates tested in measure 0205.
- The Committee discussed whether both measures 0204 and 0205 were needed and brought up the potential of the creation of a single measure.
- The developer noted that the measure elements are completely harmonized. The developer noted that both measures help inform nurse staffing, and there is no additional data collection burden by having both measures.

---

6. Standing Committee Recommendation for Endorsement: **Yes-18**; **No-1**

Rationale

- The Standing Committee recommended the measure for continued endorsement.
- The Committee agreed this structure measure is important as it assesses the number of productive hours worked by RNs with direct patient care responsibilities per patient day for each in-patient unit in a calendar month.

---

7. Public and Member Comment

- NQF did not receive comments following the Committee's evaluation of the measure.

---

8. Consensus Standards Approval Committee (CSAC) Vote: Yes-14; No-0 (10/21/2019)

Decision: Approved for continued endorsement

---

9. Appeals

No appeals were received.

2720 National Healthcare Safety Network (NHSN) Antimicrobial Use Measure

Submission | Specifications

Description: This measure assesses antimicrobial use in hospitals based on medication administration data that hospitals collect electronically at the point of care and report via electronic file submissions to CDC's National Healthcare Safety Network (NHSN). The antimicrobial use data that are in scope for this measure are antibacterial agents administered to adult and pediatric patients in a specified set of ward and intensive care unit locations: medical ICU, medical-surgical ICU, surgical ICU (adult only), medical ward, medical-surgical ward, surgical ward, general hematology-oncology ward (adult only), and step-down unit (adult only). The measure compares antimicrobial use that the hospitals report with antimicrobial use that is predicted on the basis of nationally aggregated data. The measure is comprised of a discrete set of ratios, Standardized Antimicrobial Administration Ratios (SAARs), each of which summarizes observed-to-predicted antimicrobial use for one of 40 antimicrobial agent-patient care location combinations. The SAARs are designed to serve as high vaue targets or high level indicators for antimicrobial stewardship programs (ASPs). SAAR values that are outliers are intended to prompt

analysis of possible overuse, underuse, or inappropriate use of antimicrobials, subsequent actions aimed at improving the quality of antimicrobial prescribing, and impact evaluations of ASP interventions.

Numerator Statement: Days of antimicrobial therapy for antimicrobial agents administered to adult and pediatric patients in medical ICU, medical-surgical ICU, surgical ICU (adult only), medical ward, medical-surgical ward, surgical ward, general hematology-oncology ward (adult only), and step-down unit (adult only).

Denominator Statement: Days present for each patient care location—adult and pediatric medical ICU, medical-surgical ICU, surgical ICU (adult only), medical ward, medical-surgical ward, surgical ward, general hematology-oncology ward (adult only), and step-down unit (adult only) is defined as the number of patients who were present for any portion of each day of a calendar month for each location. The day of admission, discharge, and transfer to and from locations are included in days present. All days present are summed for each location and month, and the aggregate sums for each location-month combination comprise the denominator data for the measure.

Exclusions: Hospital patient care locations other than adult and pediatric medical ICU, medical-surgical ICU, surgical ICU (adult only), medical ward, medical-surgical ward, surgical ward, general hematology-oncology ward (adult only), and step-down unit (adult only) are excluded from this measure.

Adjustment/Stratification: Statistical risk model

Level of Analysis: Facility

Setting of Care: Inpatient/Hospital

Type of Measure: Process

Data Source: Paper Medical Records, Registry Data

Measure Steward: Centers for Disease Control and Prevention

STANDING COMMITTEE MEETING 06/24/2019

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

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

1a. Evidence: **H-2**; **M-13**; **L-3**; **I-0**; 1b. Performance Gap: **H-4**; **M-13**; **L-1**; **I-0**

Rationale:

- Data from the ISDA/SHEA guidelines for developing an institutional program to enhance antimicrobial stewardship (2007) was presented along with four other systematic reviews. The evidence provided supports the link between ASPs/effective antimicrobial prescribing and positive outcomes including a reduction in CDI and colonization/infection with certain bacteria, a decrease in antibiotic use in critical care patients, a reduction in the prevalence of resistant gram-negative bacteria and C. diff infection, a reduction in mortality for patients with pneumonia.
- The Committee agreed that the evidence presented demonstrates a strong link between antimicrobial stewardship and better patient outcomes, including a decrease in C. difficile rates. There was some question as to the link between the measure and improved antibiotic and resistance rates.
- Regarding performance gap, for all agents and units for the adult population, 44% of SAARs are lower than 1, while 45% of SAARs are greater than 1. For all agents and units for the pediatric population, 43% of SAARs are lower than 1, while 40% are greater than 1.

- The Committee discussed that SAAR values that are outliers, prompt analysis of possible overuse, underuse, or inappropriate use, but there is not a perfect way to determine the "right" amount of antibiotic use. Other members agreed conceptually but recognized the lack of data and information available in this area.
- The developer also acknowledged they are collecting data on antimicrobial resistance and C. difficile rates and plan to examine these relationships further in the future.

---

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

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

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

<u>Rationale</u>:

- The developer conducted validity testing of the numerator and denominator data elements.
    - Antimicrobial days numerator: percent agreement 60-80% (at the outset of validation) and Days present denominator: percent agreement 70-80% (at the outset of validation). By design the process led to >99% agreement for all required data elements prior to data submission to CDC.
- Face validity was also tested by an expert panel of infectious disease physicians and clinical pharmacists.
- The measure is risk adjusted, and each group of SAAR antimicrobial agents is modeled separately
- The Committee accepted the testing presented.
- One Committee member asked if the developer is considering an analysis by infection type, but the developer noted that infection data are not captured in the current version of the measure.
- There was discussion that data used to build the model will always be behind the current state of antimicrobial prescribing. The CDC advised that the developer use the most recently reported data (CY 2017 for the updated measure) to build their predictive models.

---

3. Feasibility: H-3; M-14; L-0; I-1

(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 measure uses electronic health data, electronic format Admission Discharge Transfer that is in defined fields in electronic sources and routinely generated.
- One Committee member questioned whether using a proxy (i.e., claims data) to capture information would be an alternative way to gather useful data about antimicrobial use.

---

4. Use and Usability

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

4a. Use: **Pass-16; No Pass-2** 4b. Usability: **H-3; M-11; L-2; I-1**

<u>Rationale</u>:

- Regarding use, the measure is not proposed for public reporting or payment at this time but is being used to gauge stewardship intervention. One Committee member wanted to see the data showing that measure use has driven change in prescribing practices. Overall, the Committee believed that although this measure is not ready for accountability, the measure is important as it serves as a marker of potential inappropriate use to drive stewardship.
- One Committee member wanted to see the data showing that measure use has driven change in prescribing practices.
- The Committee agreed that broad use provides data needed to refine predictive models so that measured performance accurately distinguishes quality care and differences across facilities.
- In almost all states, at least some hospitals are reporting data to the NHSN and gaining access to benchmark data.
- The developer added that more than 1,200 hospitals are now reporting data (approximately a five-fold increase since first endorsed) and can use results for stewardship purposes.

---

5. Related and Competing Measures

- No related or competing measures noted.

---

6. Standing Committee Recommendation for Endorsement: **Yes-15**; **No-2**

---

7. Public and Member Comment

- Two commenters highlight areas of concern regarding the measure. One commenter suggested that risk adjustment or stratification of institutions by additional attributes may help improve measure utility and noted persistent low levels of reporting and the complexity of reporting to the NHSN AU module. The commenter also highlighted that it is problematic that small hospitals, least likely to have an antibiotic stewardship program, are inadequately represented in the measure as they lack infrastructure to report. Another commenter stated that since the measure is not appropriate for accountability purposes at this time, they do not believe the measure should maintain endorsement.
    - Developer Response: The standardized antimicrobial administration ratio (SAAR) is the statistical centerpiece of the NHSN Antimicrobial Use measure that was endorsed by NQF in December 2015 and that is under review for re-endorsement. In the time period since the measure was initially endorsed, the number of hospitals participating in NHSN's antimicrobial use (AU) surveillance has increased seven-fold, to over 1400 hospitals. These hospitals submit AU data to NHSN and use NHSN's analytic features to benchmark their AU performance. The SAAR is the statistical measure by which hospitals can benchmark their performance to all hospitals participating in NHSN's AU surveillance. While the commenter reports that there is "still controversy about how to conduct inter-institutional comparisons" with the SAAR metric, CDC is pleased to report that hundreds of hospitals are using SAAR data to make valid comparisons, enabling those hospitals to identify opportunities to improve antimicrobial prescribing. Further, NHSN has worked to improve the SAAR predictive models in the AU measure proposal submitted for re-endorsement consideration, and these improvements include taking additional predictive factors into account such as average length of stay and percentage

of beds that are in an ICU. The commenter expresses concerns about "persistent low levels of reporting" of AU data to NHSN, a concern that is corrected and mitigated by substantial and steady increases in hospital participation in NHSN's AU surveillance. To address the commenter's concern about poor representation in the NHSN AU data for hospitals less than 200 beds, the median (and interquartile range) among hospitals reporting AU data from adult patient care locations in 2017 was 176 (86, 307). The commenter also expresses concerns about the complexity and costs of that participation, which again overlooks the fact that participation is rapidly increasing and is all voluntary. No state or federal mandates have required hospitals to submit AU data to NHSN. If complexity and costs are prohibitive, why do hospitals continue to join? The commenter observes that "automated platforms" may eventually augment AU reporting to NHSN, an observation that overlooks the fact that all AU reporting to NHSN is automated. There is no manual data entry. Despite the commenter's concerns, we are pleased that the commenter supports the NHSN AU module "as written." NHSN also agrees that the AU measure submitted to NQF for re-endorsement consideration should not be used for public reporting and reimbursement purposes. That said, NHSN supports use of the measure for non-publicly reported comparisons of antibiotic use between facilities, and NHSN looks forward to further work with hospitals throughout the U.S. that are using the measure for precisely that purpose.

NHSN serves as a national data aggregating system for AU and engages with multiple antimicrobial stewardship programs that use of AU data for stewardship purposes on a voluntary basis. The continuing growth in AU reporting to NHSN —a greater than five-fold increase in hospital participation since NQF initially endorsed the NHSN AU measure —is indicative of the measure's value even without an external accountability application. As a result of this increased participation in AU reporting, much more AU data was available for NHSN to develop AU predictive models used in this measure proposal than were used in the initial proposal. Additional data, e.g., extent of infectious disease burden and indications for antimicrobial prophylaxis, are candidates for additions to NHSN's AU predictive models. NHSN is working to identify or develop sources for these additional data, and will apply this work and work products in the next iteration of its AU predictive models.

---

8. Consensus Standards Approval Committee (CSAC) Vote: Yes-14; No-0 (10/21/2019)

Decision: Approved for continued endorsement

---

9. Appeals

No appeals were received.

2726 Prevention of Central Venous Catheter (CVC)-Related Bloodstream Infections

Submission | Specifications

Description: Percentage of patients, regardless of age, who undergo central venous catheter (CVC) insertion for whom CVC was inserted with all elements of maximal sterile barrier technique, hand hygiene, skin preparation and, if ultrasound is used, sterile ultrasound techniques followed

Numerator Statement: Patients for whom central venous catheter (CVC) was inserted with all elements of maximal sterile barrier technique*, hand hygiene, skin preparation and, if ultrasound is used, sterile ultrasound techniques** followed

Definitions:

*Maximal sterile barrier technique includes ALL of the following elements:

- cap
- mask
- sterile gown
- sterile gloves
- sterile full body drape

** Sterile ultrasound techniques require sterile gel and sterile probe covers

Denominator Statement: All patients, regardless of age, who undergo CVC insertion

Exclusions: None

The measure includes a denominator exception as indicated by reporting 6030F-1P for the numerator: Documentation of medical reason(s) for not following all elements of maximal sterile barrier technique, hand hygiene, skin preparation and, if ultrasound is used, sterile ultrasound techniques during CVC insertion (including increased risk of harm to patient if adherence to aseptic technique would cause delay in CVC insertion)

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: Registry Data

Measure Steward: American Society of Anesthesiologists

STANDING COMMITTEE MEETING 06/17/2019

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

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

1a. Evidence: **H-4**; **M-16**; **L-0**; **I-0**; 1b. Performance Gap: **H-1**; **M-12**; **L-7**; **I-0**

Rationale:

- The evidence was unchanged from the past review and included various recommendation statements from the CDC's Guidelines for the Prevention of Intravascular Catheter-Related Infections as well as studies showing the link between maximal sterile barrier technique and catheter-related bloodstream infections.

- Average performance rates from MIPS data were 93.9% in 2016, 94.2% in 2017, and 97.08% in 2018, with standard deviations around 15.7% each year.
- The Committee discussed whether the measure had potentially topped out and if there is still a performance gap; however, they acknowledged that although mean performance rates have increased, the standard deviation indicates there is still performance variability.
- The Committee also acknowledged that it is possible to achieve 100 percent performance, and MIPS data may overestimate actual performance nationwide.

---

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

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

2a. Reliability: **H-2**; **M-14**; **L-4**; **I-0**; 2b. Validity: **H-1**; **M-17**; **L-2**; **I-0**

<u>Rationale</u>:

- The Committee accepted the previous score-level reliability testing, which showed reliability scores >0.9, and updated validity testing that compared average reporting rates to CLABSI SIRs over the same time period.
- Face validity was also performed previously; 17 of 19 TEP members agreed that the scores from the measure as specified would provide an accurate reflection of quality and two disagreed.
- There was also some concern that self-reported rates versus observed rates of appropriate catheter insertion technique may be different.
- In future submissions, the Committee requested more specificity in the analysis of the measure and the outcome of infections, as well as data regarding opt outs and percentage of lines placed in the U.S. versus those being captured in the registry.

---

3. Feasibility: H-2; M-18; 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 measure uses registry data and limited propriety coding is included in the specifications.
- In response to a member's questions, the developer provided information that all elements of maximal sterile barrier technique must be completed in order to meet numerator requirements.

---

4. Use and Usability

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

4a. Use: **Pass-19; No Pass-1** 4b. Usability*:* **H-1; M-17; L-2; I-0**

<u>Rationale</u>:

- The measure is used in MIPS and for external benchmarking in the Anesthesia Quality Institute (AQI) National Anesthesia Clinical Outcomes Registry (NACOR).

5. Related and Competing Measures

- This measure is related to but not directly competing with measure 0139: National Healthcare Safety Network (NHSN) Central line-associated Bloodstream Infection (CLABSI) Outcome Measure
    - Differences include measure type (process versus outcome) and different levels of analysis (2726 is specified at the clinician level, while 0139 is specified at the facility level).
- The Committee previously discussed that both process and outcome measures exist around this issue, and the developer explained that the measures are complimentary and serve different purposes.

6. Standing Committee Recommendation for Endorsement: **Yes-18**; **No-2**

7. Public and Member Comment

- NQF did not receive comments following the Committee's evaluation of the measure.

8. Consensus Standards Approval Committee (CSAC) Vote: Yes-14; No-0 (10/21/2019)

Decision: Approved for continued endorsement

9. Appeals

No appeals were received.

3502 Hybrid Hospital-Wide (All-Condition, All-Procedure) Risk-Standardized Mortality Measure

Submission | Specifications

Description: The measure estimates a hospital-level 30-day risk-standardized mortality rate (RSMR), defined as death from any cause within 30 days after the index admission date for patients who are between the ages of 50 and 94.

Please note that in parallel with the hybrid HWM measure, we are submitting a claims-only HWM measure. Note that ultimately the claims and hybrid measures will be harmonized and use the same exact cohort specifications. The intent is that prior to implementation, the two measures will be exactly the same, with the exception of the additional risk adjustment added by the CCDE in the hybrid measure. This is analogous to the currently endorsed and implemented hybrid hospital-wide readmissions measure (NQF 1789 and NQF 2879e).

Because of the homology between the claims and hybrid HWM measures, there is no reason to suspect that the results of analyses done for the claims-only measure would differ in any significant way from results of analyses for a nationally representative hybrid measure.

Below we highlight the differences between the two measures, including specifications, data used, and testing which reflect limitations of data availability, as well as actual intended differences in the measure (risk adjustment).

Differences in the measure, data, and testing that reflect limitations in data availability

1. Dataset used for development, some testing (see below for differences), and measure results:
    a. The claims-only measure uses nation-wide Medicare FFS claims and the enrollment database.
    b. The hybrid measure uses an electronic health record (EHR) database from 21 hospitals in the Kaiser Permanente network which includes inpatient claims data information.
2. Age of patients in cohort:
    a. The claims-only measure includes Medicare FFS patients, age 65-94.
    b. The hybrid measure includes all patients age 50-94 (see later discussion for justification)
3. External empiric validity testing
    a. Not possible for the hybrid measure, due to limited data availability. We provide results from the claims-only measure within the hybrid testing form.
4. Socioeconomic risk factor analyses
    a. Not possible for the hybrid measure, due to limited data availability. We provide results from the claims-only measure within the hybrid testing form.
5. Exclusion analyses
    a. To be representative of what we expect the impact would be of the measures' exclusions in a nation-wide sample, we provide the results from the claims-only measure.
6. Meaningful differences
    a. To be representative of what we expect the range of performance would be in a nation-wide sample, we provide the distribution results from the claims-only measure.

Difference between the two measures when fully harmonized, prior to implementation:

1. Risk adjustment:
    a. The claims-only measure uses administrative claims data only for risk adjustment
    b. The hybrid measure adds 10 clinical risk variables, derived from a set of core clinical data elements (CCDE) extracted from the EHR.

Numerator Statement: The outcome for this measure is 30-day, all-cause mortality. Mortality is defined as death from any cause, either during or after admission, within 30 days of the index admission date.

Denominator Statement: The cohort includes inpatient admissions for a wide variety of conditions for patients aged between 50 and 94 years old who were discharged from short-term acute care hospitals. If a patient has more than one admission during the measurement year, one admission is randomly selected for inclusion in the measure. Additional details are provided in S.7 Denominator Details. The age range for this measure differs from that of the claims-only measure due to the limited size of the dataset used for testing. The intent is to harmonize the age range of the hybrid measure with the age range of the claims-only measure, so that both will include admissions for patients age 65-94.

Exclusions: The measure excludes index admissions for patients:

1. With inconsistent or unknown vital status (from claims data) or other unreliable claims data;
2. Discharged against medical advice (AMA);

3. With an admission for spinal cord injury (CCS 227), skull and face fractures (CCS 228), Intracranial Injury (CCS 233), Crushing injury or internal injury (CCS 234), Open wounds of head/neck/trunk (CCS 235), and burns (CCS 240); and
4. With a principal discharge diagnosis within a CCS with fewer than 100 admissions in that division within the measurement year.

Adjustment/Stratification: Statistical risk model

Level of Analysis: Facility

Setting of Care: Inpatient/Hospital, Other

Type of Measure: Outcome

Data Source: Claims, Electronic Health Records, Other

Measure Steward: Centers for Medicare & Medicaid Services (CMS)

STANDING COMMITTEE MEETING 06/17/2019

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

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

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

Rationale:

- This is a new measure developed in sequence with measure 3504 (starting with measure 3504).
- This measure is aligned with measure 3504 but includes 10 additional risk adjusters captured from EHR data.
- This measure expands the target age to 50 to 94 years (from the 65 to 94 years range used in 3504.
- The developer provided several evidence-based strategies to reduce hospital mortality and shared that in the study cohort (4692 acute-care hospitals), the mean hospital-level risk standardized mortality rate (RSMR) was 6.85 and range was 3.95%-8.70%.
- Evidence and performance gap information for this measure is the same as measure 3504, therefore the Committee did not engage in further discussion related to “Importance”.

---

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-1**; **M-15**; **L-1**; **I-0**; 2b. Validity: **H-0**; **M-12**; **L-3**; **I-2**

- This measure is deemed as complex and was evaluated by the NQF Scientific Methods Panel.
- The Standing Committee chose to vote on this measure for, both, reliability and validity.

Rationale:

- This measure is deemed as complex and was evaluated and passed by the NQF Scientific Methods Panel, but the Committee engaged in some discussion regarding the scientific properties.
- The developer performed score-level reliability testing for the hybrid measure (ICC=0.78).
- The developer noted that they performed face validity for the hybrid measure (5 of 6 respondents indicated that they somewhat, moderately, or strongly agreed, and 1 moderately disagreed that the hybrid measure can be used to distinguish between better and worse quality

facilities) and tested the data element validity of the EHR elements. The measure was tested in a smaller set of 21 hospitals in one integrated delivery system.
- The developer stated that they tested the claims-based measure extensively and have no reason to believe this measure would be less valid. Empirical validity testing –correlation with nurse-to-bed ratio, hospital star rating mortality group score and overall hospital star rating – showed a trend toward better performance on the measure with better performance on the comparators.
- There was a suggestion by a Committee member that the developer could look at the performance of the claims-only measure in the integrated delivery system (rather than only Medicare patients).
- The developer responded that they did look at the integrated delivery system data compared to the national data in terms of representativeness; the population was more similar to the U.S. Medicare population in rates of comorbidities than might be expected.
- There was conversation about missing lab values and how they are handled. The Committee suggested that the developer further examine the completeness of lab data when the measure is used more broadly.
- The developer was not able to test the hybrid measure for the impact of social factors due to the small testing sample but explained they do not have a reason to expect that testing would reveal different results than the claims-only measure related to disparities. The Committee accepted the rationale.
- The Standing Committee chose to vote on this measure for the reliability and validity criteria.

---

3. Feasibility: H-3; M-14; L-0; I-0

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

Rationale:

- The Committee generally agreed that the 21 data points from claims and 10 clinical data elements are available in standardized fields and feasible.

---

4. Use and Usability

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

4a. Use: **Pass-17; No Pass-0** *4b. Usability:* **H-0; M-15; L-0; I-2**

Rationale:

- The Committee acknowledged the plan for the new measure to considered in the future in the Inpatient Quality Reporting Program.
- There was some discussion regarding the need for two measures – the claims-based measure and the hybrid. The developer shared that depending on the program or the setting one measure may be preferred over the other for adoption.

---

5. Related and Competing Measures

- The following measures are related but not competing:
    - Hospital-Wide All-Cause Risk-Standardized Readmission Measure (NQF #1789)

- Hospital-level risk-standardized complication rate (RSCR) following elective primary total hip arthroplasty (THA) and/or total knee arthroplasty (TKA) (NQF #1550)
- Hospital 30-day, all-cause, risk-standardized mortality rate (RSMR) following pneumonia hospitalization (NQF #0468)
- Hospital 30-Day, all-cause, risk-standardized mortality rate (RSMR) following chronic obstructive pulmonary disease (COPD) hospitalization (NQF #1893)
- Hospital 30-Day, all-cause, risk-standardized mortality rate (RSMR) following coronary artery bypass graft (CABG) Surgery (NQF #2558)
- Hospital 30-day, all-cause, risk-standardized mortality rate (RSMR) following acute myocardial infarction (AMI) hospitalization (NQF #0230)
- Hospital 30-day, all-cause, risk-standardized mortality rate (RSMR) following heart failure (HF) hospitalization (NQF #0229)
- Hospital 30-day, all-cause, risk-standardized mortality rate (RSMR) following acute ischemic stroke hospitalization
- Death Rate in Low Mortality Diagnosis Related Groups (PSI-02) (NQF #0347)
- AHRQ's Mortality for Select Conditions (IQI-90) (NQF #0530)

- The developer notes the measures are harmonized to the extent possible and complimentary to one another.

---

6. Standing Committee Recommendation for Endorsement: **Yes-16**; **No-1**

---

7. Public and Member Comment

- Two similar comments pertaining to both measure 3502 and measure 3504 were received from one commenter. The commenter expressed detailed concerns regarding various aspects of these measures. The commenter stated there is a lack of evidence to support the measure's focus, a lack of convincing validity testing, inadequate support for the risk-adjustment approach, and limited usefulness of results for quality improvement and accountability purposes.

  Developer Response: We appreciate your comments and have addressed each of your concerns below, separately.

  Death within 30 days as a hospital quality measure

  The claims-only and hybrid Hospital-Wide Mortality (HWM) measures include deaths that occur within 30-days of hospital admission. This is consistent with CMS's condition- and procedure-specific mortality measures currently reported on Hospital Compare. The 30-day time frame is also supported by the input we have received from clinical experts, empirical analyses performed during the development of this measure, and the published literature.

  From a clinical perspective, adverse events that occur within the immediate post-discharge timeframe are often attributable to the hospital stay. For example, a patient released from the hospital may experience dizziness while driving, from medication or anesthesia administered during the hospital stay, and experience a fatal car accident. Also, adverse events that occur 30

days post-discharge can be attributed to the hospital. For example, a patient given a diuretic at discharge may become dehydrated, leading to kidney failure and death. However, input we received from clinical experts suggested deaths beyond 30 days are seldom attributed to care received during the hospitalization and are more commonly attributed to underlying health or care received in other settings.

From an empirical data analysis perspective, during measure development we reviewed survival curves (for Medicare beneficiaries 65 years and older) up to 90 days following admission to evaluate the appropriateness of the 30-day time frame across the HWM cohort. We found that 30 days post-admission included the largest declines in mortality and therefore, was the most appropriate time frame to capture most post-hospitalization deaths.

The published literature indicates that existing condition- specific, 30-day mortality measures support targeted quality improvement work, and may have contributed to national declines in hospital mortality rates for measures conditions and/or procedures. Studies have shown that, for selected conditions and diagnoses, mortality within 30 days of hospital admission is related to quality of care and variable mortality rates across hospitals indicate opportunities for improvement.

Finally, we examined the published literature and found that older adults are more vulnerable to adverse health outcomes within 30 days of a hospital admission and that mortality can be influenced by hospital care and the early transition to the outpatient setting during this time. Based on the evidence discussed above, a 30-day measurement period is the most appropriate period to measure mortality in a hospital setting.

Validity testing

The measures' NQF submissions meet NQF's criteria for validity testing. In terms of face validity, five of six Technical Expert Panel (TEP) member respondents somewhat, moderately, or strongly agreed with the statement that the HWM measures as specified can be used to distinguish good from poor quality. NQF does not specify the number of experts that are required to assess the measures' validity.

New measures are only required to submit evidence for face validity, however we also provided empiric validity with this initial endorsement submission. We chose three quality measures (nurse to bed ratio, Overall Hospital Quality Star Ratings mortality measure group score, and Overall Hospital Quality Star Ratings), as comparator measures, and demonstrated a relationship with the HWM measure scores in the expected direction for each comparator measure. We did not evaluate CMS's Hospital-Wide Readmission (HWR) measure score as a comparator because such testing is not a requirement of NQF's consensus development process. We agree that once implemented, it is important to examine trends in complementary measures and expect to do so as part of endorsement maintenance, should this measure be endorsed. Examination of correlation in measures scores after implementation are an important feature of surveillance for unintended consequences and should be part of rigorous measure maintenance.

Identification and testing of social risk factors as supplementary to clinical risk factors

We agree that, in the risk-adjusted outcome measures, CMS first considers adjustment for clinical conditions and then examines additional risk imparted by social risk factors after the potential for greater disease burden is included in the risk model. We believe that this is consistent with NQF current guidance and is appropriate given the evidence cited in our submission that people who experience greater social risk are more likely to have more disease burden compared with those who do not; and that this is clearly not a signal of hospital quality. In addition, according to NQF guidance, developers should assess social risk factors for their contribution of unique variation in the outcome – that they are not redundant. Therefore, if clinical risk factors explain all or most of the patient variation in the outcome, then NQF guidance does not support adding social risk factors that do not account for variation.

An extensive set of analyses of the impact of including social risk variables in the risk adjustment model was included as part of the NQF application submitted for these measures' endorsements. For example, one analysis examined the strength and significance of the SES variables in the context of a bivariate model compared with a multivariable model. When these variables were included in a multivariate model that includes all the claims-based clinical variables, the odds ratios for both the dual eligible and AHRQ SES variables in the multivariate model are almost always lower than the odds ratio for the bivariate association. This indicates that the comorbid risk variables that are already in the model (in the multivariate view) are capturing the risk associated with the outcome seen in the bivariate analysis (with the social risk factor alone), and the dual eligible variable in a multivariate model would not play a significant role in the model (the coefficients/odds ratios are not different from 1). Additional analyses provided in the application also showed that correlation coefficients of measure scores comparing models with and without the social risk variables are near 1.0 and that C-statistics with the social risk variables in vs. out of the model, are unchanged.

Usefulness of the measures; variation in the measure score

Mortality is an important health outcome that is meaningful to patients and providers, and updated estimates suggest that more than 400,000 patients die each year from preventable harm in hospitals. The existing condition- and procedure-specific mortality measures have a narrow focus, only capturing specific patient populations, while the HWM measures capture most Medicare FFS beneficiaries.

The hospital-level variation in performance on the measure score for the claims-only HWM measure between the lowest-performing hospitals (risk-standardized mortality rate or RSMR of 3.95%) and the highest performing hospitals (RSMR of 8.7%) shows there is a clear quality gap. In terms of performance compared to the median (6.93%), some hospitals can achieve substantially lower overall risk-standardized mortality rates than the average-performing hospital, while other hospitals are performing substantially worse than an average performer. Specifically, the best performing hospital (RSMR of 3.95%) is performing 43% better than an average performer, while the worst performing hospital (RSMR of 8.70%) is performing 25% worse than an average performer. (Note that the average performer refers to hospital with the same case and service-line mix, performing at the average [median]).

In terms of outliers, in the updated ICD-10 version of the measure (which was submitted to NQF), using 95% confidence interval (uncertainty) estimates to categorize hospital outliers, there were 14 hospitals with performance that was statically significantly worse than the

national average, and 103 hospitals with performance that was statistically significantly better than the national average. In total, this measure identified 2.6% of hospitals as outliers, which is consistent with other CMS condition- and procedure-specific measures that display a range of 2.5% - 11.2% of hospitals as outliers. However, using 95% confidence interval (uncertainty) estimates to categorize hospital outliers is conservative by design. The distribution and mortality rates themselves (cited in the paragraph above), however, do convey meaningful variation. This variation provides a quality signal and we believe reporting hospital mortality scores will improve transparency and promote quality improvement.

The HWM measures were also designed to support quality improvement efforts. By providing a hospital-wide quality score, as well as division-level results, the measures give hospitals an overall evaluation of a hospital's performance on an important outcome and provides actionable information for quality improvement. Should CMS include the HWM measures in public reporting, consistent with other measures, hospitals would receive confidential, patient-level data for quality improvement, allowing for thorough investigation of patient scenarios that resulted in mortality. In addition, similar to CMS's HWR measure, confidential data and mortality results may be provided to all hospitals for each of the service-line divisions, allowing hospitals to identify service lines with greater mortality and target them for improvement.

Hospital-wide measures provide patients and consumers with an overall outcome score (in this case, mortality) for most acute care hospitals in the nation, including smaller, low volume hospitals without enough cases to publicly report scores for the condition- and procedure-specific measures.

---

8. Consensus Standards Approval Committee (CSAC) Vote: Yes-14; No-0 (10/21/2019)

Decision: Approved for endorsement

---

9. Appeals

No appeals were received.

3503e Hospital Harm – Severe Hypoglycemia

Submission | Specifications

Description: This electronic clinical quality measure (eCQM) assesses the proportion of inpatient admissions for patients aged 18 years and older who received at least one antihyperglycemic medication during their hospitalization, and who suffered a severe hypoglycemic event (blood glucose less than 40 mg/dL) within 24 hours of the administration of an antihyperglycemic agent.

Numerator Statement: The number of inpatient admissions during which a test for blood glucose with a result less than 40 mg/dL (severe hypoglycemia) where the event follows the administration of an antihyperglycemic medication within 24 hours.

Denominator Statement: All patients 18 years or older at the start of the encounter with a discharged inpatient hospital admission during the measurement period who were given at least one

antihyperglycemic medication during their hospital stay. The measure includes inpatient admissions which began in the Emergency Department or in observation status.

Exclusions: N/A, there are no denominator exclusions.

Adjustment/Stratification: There is no risk adjustment

Level of Analysis: Facility

Setting of Care: Inpatient/Hospital

Type of Measure: Outcome

Data Source: Electronic Health Records

Measure Steward: Centers for Medicare & Medicaid Services (CMS)

STANDING COMMITTEE MEETING 06/17/2019

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

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

1a. Evidence: **Pass-18; No Pass-0**; 1b. Performance Gap: **H-0**; **M-17**; **L-1**; **I-1**

Rationale:

- The goal of the Severe Hypoglycemia Electronic Clinical Quality Measure (eCQM) is to improve patient
  safety and prevent severe hypoglycemia in patients who are at risk.
- The focus of this outcome measure is inpatient hypoglycemia. The purpose of measuring hypoglycemic events is to reduce the frequency of these adverse patient outcomes and to improve hospitals' practices for appropriate dosing of medication and adequate monitoring of patients receiving glycemic control agents.
- The Committee agreed that rates of inpatient hypoglycemic events can be reduced with high quality of care provided by a hospital and that severe hypoglycemic events are largely avoidable by careful use of antihyperglycemic medication, monitoring of patient blood glucose levels, enhanced use of technology, and implementation of evidence-based best practices.
- This eCQM was tested with 2 test sites (6 hospitals) in 2 states (located in Midwest, South).
- Performance rates on this measure were ~2.5%. The committee agreed there was variation in performance across the hospitals tested.

---

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

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

- *This measure is deemed as complex and was evaluated by the NQF Scientific Methods Panel*

2a. NQF Scientific Methods Panel Ratings for Reliability: **H-2**; **M-2**; **L-0**; **I-0**

2b. NQF Scientific Methods Panel Ratings for Validity: **H-1**; **M-3 L-1**; **I-0**

(The Committee accepted the NQF Scientific Methods Panel's Moderate rating, unanimously.)

Rationale:

- This measure was deemed as complex and was evaluated by the NQF Scientific Methods Panel, who passed the measure.
- The committee accepted the NQF Scientific Methods Panel decision, unanimously.

3. Feasibility: H-11; M-8; L-0; I-0

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

Rationale:

- The committee voted to accept the NQF Scientific Methods Panel's decision, which was to pass this measure. The Committee also discussed this measure's feasibility which was also tested as an eMeasure in two separate EHRs and had few concerns.

4. Use and Usability

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

4a. Use: **Pass-19; No Pass-0** 4b. Usability: **H-7; M-12; L-0; I-0**

Rationale:

- There are also recommendations by the MAP to include this in public accountability programs through CMS, therefore the committee passed the measure on usability.

5. Related and Competing Measures

- No related or competing measures noted.

6. Standing Committee Recommendation for Endorsement: **Yes-19**; **No-0**

7. Public and Member Comment

- Two comments were received for this measure. One commenter did not support the measure because it provides no clear guidance on the medications to be monitored or the types of glucose tests that would apply. Another commenter supported the measure's intent, but suggested additional work is needed before endorsement. The commenter highlighted MAP conversations around the need for a balancing measure to account for unintended consequences, expressed that additional feasibility and validity testing is needed, and stated that differences in scores may be minimal.

    - Developer Response**:** Thank you for your comment. This measure assesses the use of specific antihyperglycemic medications documented in the National Library of Medicine (NLM) Value Set Authority Center (VSAC) that can cause severe hypoglycemia. This measure considers both point-of-care test results and laboratory test results, which are also documented in the NLM VSAC.

      Thank you for your comment. We recognize the importance of measuring hyperglycemia as a balancing measure in conjunction with hypoglycemia. We have submitted a balancing hyperglycemia measure to the NQF Patient Safety Standing Committee for the fall 2019 cycle, as well as the 2019-2020 Measures Under

Consideration (MUC) list. We agree with the importance of continually monitoring for unintended consequences, and we intend to consider these comments when implementing these measures in the future.

We understand the value of sample size in measure testing and note that measure testing was done in compliance with NQF requirements for eCQM development. This measure was tested in two EHR systems that had good representation of hospitals across the country. This aligns with NQF's recommendation to conduct eCQM testing in more than one EHR system. The empirical results demonstrated that the measure exhibited high reliability and data element validity.

We also note that testing results demonstrated statistically significant variation in performance rates across the hospitals tested. This wide variation indicates that there exists ample room for improvement on this harm event.

8. Consensus Standards Approval Committee (CSAC) Vote: Yes-13; No-0 (10/21/2019)
Decision: Approved for endorsement

9. Appeals

No appeals were received.

3504 Claims-Only Hospital-Wide (All-Condition, All-Procedure) Risk-Standardized Mortality Measure

Submission | Specifications

Description: The measure estimates a hospital-level 30-day hospital-wide risk-standardized mortality rate (RSMR), defined as death from any cause within 30 days after the index admission date, for Medicare fee-for-service (FFS) patients who are between the ages of 65 and 94.

Please note that in parallel with the claims-only HWM measure, we are submitting a hybrid HWM measure. Note that ultimately the claims and hybrid measures will be harmonized and use the same exact cohort specifications. The intent is that prior to implementation, the two measures will be exactly the same, with the exception of the additional risk adjustment added by the CCDE in the hybrid measure. This is analogous to the currently endorsed and implemented hybrid hospital-wide readmissions measure (NQF 1789 and NQF 2879e).

Because of the homology between the claims and hybrid HWM measures, there is no reason to suspect that the results of analyses done for the claims-only measure would differ in any significant way from results of analyses for a nationally representative hybrid measure.

Below we highlight the differences between the two measures, including specifications, data used, and testing which reflect limitations of data availability, as well as actual intended differences in the measure (risk adjustment).

Differences in the measure, data, and testing that reflect limitations in data availability

1. Dataset used for development, some testing (see below for differences), and measure results:

   a. The claims-only measure uses nation-wide Medicare FFS claims and the enrollment database.
   b. The hybrid measure uses an electronic health record (EHR) database from 21 hospitals in the Kaiser Permanente network which includes inpatient claims data information.
2. Age of patients in cohort:
   a. The claims-only measure includes Medicare FFS patients, age 65-94.
   b. The hybrid measure includes all patients age 50-94 (see later discussion for justification)
3. External empiric validity testing
   a. Not possible for the hybrid measure, due to limited data availability. We provide results from the claims-only measure within the hybrid testing form.
4. Socioeconomic risk factor analyses
   a. Not possible for the hybrid measure, due to limited data availability. We provide results from the claims-only measure within the hybrid testing form.
5. Exclusion analyses
   a. To be representative of what we expect the impact would be of the measures' exclusions in a nation-wide sample, we provide the results from the claims-only measure.
6. Meaningful differences
   a. To be representative of what we expect the range of performance would be in a nation-wide sample, we provide the distribution results from the claims-only measure.

Difference between the two measures when fully harmonized, prior to implementation:

1. Risk adjustment:
   a. The claims-only measure uses administrative claims data only for risk adjustment
   b. The hybrid measure adds 10 clinical risk variables, derived from a set of core clinical data elements (CCDE) extracted from the EHR.

Numerator Statement: The outcome for this measure is 30-day, all-cause mortality. Mortality is defined as death from any cause, either during or after admission, within 30 days of the index admission date.

Denominator Statement: The cohort includes inpatient admissions for a wide variety of conditions for Medicare FFS patients aged between 65 and 94 years old who were admitted to short-term acute care hospitals. If a patient has more than one admission during the measurement year, one admission is randomly selected for inclusion in the measure. Additional details are provided in S.7 Denominator Details.

Exclusions: The measure excludes index admissions for patients:

1. With inconsistent or unknown vital status (from claims data) or other unreliable claims data;
2. Discharged against medical advice (AMA);
3. With an admission for spinal cord injury (CCS 227), skull and face fractures (CCS 228), Intracranial Injury (CCS 233), Crushing injury or internal injury (CCS 234), Open wounds of head/neck/trunk (CCS 235), and burns (CCS 240); and
4. With a principal discharge diagnosis within a CCS with fewer than 100 admissions within the measurement year.

Adjustment/Stratification: Statistical risk model

Level of Analysis: Facility

Setting of Care: Inpatient/Hospital

Type of Measure: Outcome

Data Source: Claims, Enrollment Data, Other

Measure Steward: Centers for Medicare & Medicaid Services (CMS)

STANDING COMMITTEE MEETING 06/17/2019

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

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

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

Rationale:

- This is a new measure developed in sequence with measure 3502 (starting with this measure).
- The Committee agreed that there are evidence-based strategies to decrease risk of hospital mortality and that there is a gap in mortality scores based on the range of mortality scores presented: 3.95 percent to 8.70 percent.
- The Committee asked about the upper age limit of 95 years, and the developer responded that mortality rate generally levels off after 95 years and they also used input from a TEP and a patient and caregiver group.

---

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

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

- *This measure is deemed as complex and was evaluated by the NQF Scientific Methods Panel*

2a. NQF Scientific Methods Panel Ratings for Reliability: **H-3**; **M-2**; **L-0**; **I-0**

2b. NQF Scientific Methods Panel Ratings for Validity: **H-3**; **M-2 L-0**; **I-0**

(The Committee accepted the NQF Scientific Methods Panel's Moderate/High ratings, unanimously.)

Rationale:

- The Committee accepted the SMP's passing ratings of reliability and validity.
- Testing included score-level reliability (ICC=0.84).
- Face validity results were that 5 out of 6 respondents indicated that they somewhat, moderately, or strongly agreed, and 1 moderately disagreed that the claims-based measure can be used to distinguish between better and worse quality facilities.
- Empirical validity testing –correlation with nurse-to-bed ratio, hospital star rating mortality group score and overall hospital star rating – showed a trend toward better performance on the measure with better performance on the comparators.
- There was discussion about patients that come into the hospital in a fragile state, at the end of life, or with a complication from lack of quality care outside of the hospital and how complications prior to the visit but not associated with a present-on-admission code impact the measure. The Committee generally agreed with the developer's response that they use a validated algorithm, representing the risk adjustment model, that captures inpatient claims data from the prior 12 months and that they wanted to recognize the opportunity for hospitals that do rescue.

- The developer uses a risk-adjustment model with 21 variables, not including dual eligibility or AHRQ SES Index based on testing results showing very limited impact of these factors on the adjustment model.

---

3. Feasibility: H-4; M-14; L-0; I-0

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

Rationale:

- The Committee agreed the measure is feasible based on the use of claims data.

---

4. Use and Usability

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

4a. Use: **Pass-18; No Pass-0** 4b. Usability: **H-1; M-16; L-0; I-1**

Rationale:

- The Committee acknowledge the plan for the new measure to considered in the future in the Inpatient Quality Reporting Program.
- The developer explained that 3504 and 3502 are aligned besides the addition of validated EHR risk variables to the hybrid measure to enhance claims-only risk adjustment. The developer explained that one or the other could be adopted depending on the program and setting.
- Regarding use and usability, there was some concern that hospitals not chosen for the measure that served patients who had multiple hospitalizations are not able to see or understand results of the quality of care they provided. The developer stated that patients being admitted repeatedly represent only a small portion of the total measured population and that the measure is complementary to the readmissions measure; admissions not selected as part of the mortality measure may be captured in the readmissions measure, if a readmission occurred.

---

5. Related and Competing Measures

- This measure is related to the following measures:
    - NQF 1789: Hospital-Wide All-Cause Risk-Standardized Readmission Measure
    - NQF 1550: Hospital-level risk-standardized complication rate (RSCR) following elective primary total hip arthroplasty (THA) and/or total knee arthroplasty (TKA
    - NQF 0468: Hospital 30-day, all-cause, risk-standardized mortality rate (RSMR) following pneumonia hospitalization
    - NQF 1893: Hospital 30-Day, all-cause, risk-standardized mortality rate (RSMR) following chronic obstructive pulmonary disease (COPD) hospitalization
    - NQF 2558: Hospital 30-Day, all-cause, risk-standardized mortality rate (RSMR) following coronary artery bypass graft (CABG) Surgery
    - NQF 0230: Hospital 30-day, all-cause, risk-standardized mortality rate (RSMR) following acute myocardial infarction (AMI) hospitalization
    - NQF 0229: Hospital 30-day, all-cause, risk-standardized mortality rate (RSMR) following heart failure (HF) hospitalization

- NQF 0347: Hospital 30-day, all-cause, risk-standardized mortality rate (RSMR) following acute ischemic stroke hospitalization. Death Rate in Low Mortality Diagnosis Related Groups (PSI-02)
- NQF 0530: AHRQ's Mortality for Select Conditions

- The developer states specification differences are justified.

---

6. Standing Committee Recommendation for Endorsement: **Yes-17**; **No-1**

---

7. Public and Member Comment

- Two similar comments pertaining to both measure 3502 and measure 3504 were received from one commenter. The commenter expressed detailed concerns regarding various aspects of these measures. The commenter stated there is a lack of evidence to support the measure's focus, a lack of convincing validity testing, inadequate support for the risk-adjustment approach, and limited usefulness of results for quality improvement and accountability purposes.

  - Developer Response: We appreciate your comments and have addressed each of your concerns below, separately.

    Death within 30 days as a hospital quality measure

    The claims-only and hybrid Hospital-Wide Mortality (HWM) measures include deaths that occur within 30-days of hospital admission. This is consistent with CMS's condition- and procedure-specific mortality measures currently reported on Hospital Compare. The 30-day time frame is also supported by the input we have received from clinical experts, empirical analyses performed during the development of this measure, and the published literature.

    From a clinical perspective, adverse events that occur within the immediate post-discharge timeframe are often attributable to the hospital stay. For example, a patient released from the hospital may experience dizziness while driving, from medication or anesthesia administered during the hospital stay, and experience a fatal car accident. Also, adverse events that occur 30 days post-discharge can be attributed to the hospital. For example, a patient given a diuretic at discharge may become dehydrated, leading to kidney failure and death. However, input we received from clinical experts suggested deaths beyond 30 days are seldom attributed to care received during the hospitalization and are more commonly attributed to underlying health or care received in other settings.

    From an empirical data analysis perspective, during measure development we reviewed survival curves (for Medicare beneficiaries 65 years and older) up to 90 days following admission to evaluate the appropriateness of the 30-day time frame across the HWM cohort. We found that 30 days post-admission included the largest declines in mortality and therefore, was the most appropriate time frame to capture most post-hospitalization deaths.

The published literature indicates that existing condition- specific, 30-day mortality measures support targeted quality improvement work, and may have contributed to national declines in hospital mortality rates for measures conditions and/or procedures. Studies have shown that, for selected conditions and diagnoses, mortality within 30 days of hospital admission is related to quality of care and variable mortality rates across hospitals indicate opportunities for improvement.

Finally, we examined the published literature and found that older adults are more vulnerable to adverse health outcomes within 30 days of a hospital admission and that mortality can be influenced by hospital care and the early transition to the outpatient setting during this time. Based on the evidence discussed above, a 30-day measurement period is the most appropriate period to measure mortality in a hospital setting.

Validity testing

The measures' NQF submissions meet NQF's criteria for validity testing. In terms of face validity, five of six Technical Expert Panel (TEP) member respondents somewhat, moderately, or strongly agreed with the statement that the HWM measures as specified can be used to distinguish good from poor quality. NQF does not specify the number of experts that are required to assess the measures' validity.

New measures are only required to submit evidence for face validity, however we also provided empiric validity with this initial endorsement submission. We chose three quality measures (nurse to bed ratio, Overall Hospital Quality Star Ratings mortality measure group score, and Overall Hospital Quality Star Ratings), as comparator measures, and demonstrated a relationship with the HWM measure scores in the expected direction for each comparator measure. We did not evaluate CMS's Hospital-Wide Readmission (HWR) measure score as a comparator because such testing is not a requirement of NQF's consensus development process. We agree that once implemented, it is important to examine trends in complementary measures and expect to do so as part of endorsement maintenance, should this measure be endorsed. Examination of correlation in measures scores after implementation are an important feature of surveillance for unintended consequences and should be part of rigorous measure maintenance.

Identification and testing of social risk factors as supplementary to clinical risk factors

We agree that, in the risk-adjusted outcome measures, CMS first considers adjustment for clinical conditions and then examines additional risk imparted by social risk factors after the potential for greater disease burden is included in the risk model. We believe that this is consistent with NQF current guidance and is appropriate given the evidence cited in our submission that people who experience greater social risk are more likely to have more disease burden compared with those who do not; and that this is clearly not a signal of hospital quality. In addition, according to NQF guidance, developers should assess social risk factors for their contribution of unique variation in the outcome – that they are not redundant. Therefore, if clinical risk factors explain all or most of the

patient variation in the outcome, then NQF guidance does not support adding social risk factors that do not account for variation.

An extensive set of analyses of the impact of including social risk variables in the risk adjustment model was included as part of the NQF application submitted for these measures' endorsements. For example, one analysis examined the strength and significance of the SES variables in the context of a bivariate model compared with a multivariable model. When these variables were included in a multivariate model that includes all the claims-based clinical variables, the odds ratios for both the dual eligible and AHRQ SES variables in the multivariate model are almost always lower than the odds ratio for the bivariate association. This indicates that the comorbid risk variables that are already in the model (in the multivariate view) are capturing the risk associated with the outcome seen in the bivariate analysis (with the social risk factor alone), and the dual eligible variable in a multivariate model would not play a significant role in the model (the coefficients/odds ratios are not different from 1). Additional analyses provided in the application also showed that correlation coefficients of measure scores comparing models with and without the social risk variables are near 1.0 and that C-statistics with the social risk variables in vs. out of the model, are unchanged.

Usefulness of the measures; variation in the measure score

Mortality is an important health outcome that is meaningful to patients and providers, and updated estimates suggest that more than 400,000 patients die each year from preventable harm in hospitals. The existing condition- and procedure-specific mortality measures have a narrow focus, only capturing specific patient populations, while the HWM measures capture most Medicare FFS beneficiaries.

The hospital-level variation in performance on the measure score for the claims-only HWM measure between the lowest-performing hospitals (risk-standardized mortality rate or RSMR of 3.95%) and the highest performing hospitals (RSMR of 8.7%) shows there is a clear quality gap. In terms of performance compared to the median (6.93%), some hospitals can achieve substantially lower overall risk-standardized mortality rates than the average-performing hospital, while other hospitals are performing substantially worse than an average performer. Specifically, the best performing hospital (RSMR of 3.95%) is performing 43% better than an average performer, while the worst performing hospital (RSMR of 8.70%) is performing 25% worse than an average performer. (Note that the average performer refers to hospital with the same case and service-line mix, performing at the average [median]).

In terms of outliers, in the updated ICD-10 version of the measure (which was submitted to NQF), using 95% confidence interval (uncertainty) estimates to categorize hospital outliers, there were 14 hospitals with performance that was statically significantly worse than the national average, and 103 hospitals with performance that was statistically significantly better than the national average. In total, this measure identified 2.6% of hospitals as outliers, which is consistent with other CMS condition- and procedure-specific measures that display a range of 2.5% - 11.2% of hospitals as outliers. However, using 95% confidence interval (uncertainty) estimates to categorize hospital outliers is conservative by design. The distribution and mortality rates themselves (cited in the

paragraph above), however, do convey meaningful variation. This variation provides a quality signal and we believe reporting hospital mortality scores will improve transparency and promote quality improvement.

The HWM measures were also designed to support quality improvement efforts. By providing a hospital-wide quality score, as well as division-level results, the measures give hospitals an overall evaluation of a hospital's performance on an important outcome and provides actionable information for quality improvement. Should CMS include the HWM measures in public reporting, consistent with other measures, hospitals would receive confidential, patient-level data for quality improvement, allowing for thorough investigation of patient scenarios that resulted in mortality. In addition, similar to CMS's HWR measure, confidential data and mortality results may be provided to all hospitals for each of the service-line divisions, allowing hospitals to identify service lines with greater mortality and target them for improvement.

Hospital-wide measures provide patients and consumers with an overall outcome score (in this case, mortality) for most acute care hospitals in the nation, including smaller, low volume hospitals without enough cases to publicly report scores for the condition- and procedure-specific measures.

---

8. Consensus Standards Approval Committee (CSAC) Vote: Yes-14; No-0 (10/21/2019)

Decision: Approved for endorsement

---

9. Appeals

No appeals were received.

Measure Not Endorsed

3501e Hospital Harm – Opioid-Related Adverse Events

Submission

Description: This electronic clinical quality measure (eCQM) assesses the proportion of inpatient admissions for patients age 18 years and older who suffer the harm of receiving an excess of hospital-administered opioids, defined as receiving a narcotic antagonist (naloxone). In the first 24 hours of the hospitalization, a hospital-administered opioid must be documented prior to receiving naloxone to be considered part of the numerator.

Numerator Statement: The number of inpatient admissions during which naloxone is administered as a proxy for administration of excessive amounts of opioid medications, not including naloxone given while in the operating room. In the first 24 hours of the hospitalization, an opioid must have been administered prior to receiving naloxone to be considered part of the outcome.

Denominator Statement: All patients 18 years or older at the start of the encounter with a discharged inpatient hospital admission during the measurement period. The measure includes inpatient admissions which began in the Emergency Department or in observational status.

Exclusions: N/A; there are no denominator exclusions

Adjustment/Stratification: There is no risk stratification.

Level of Analysis: Facility

Setting of Care: Inpatient/Hospital

Type of Measure: Outcome

Data Source: Electronic Health Records

Measure Steward: Centers for Medicare & Medicaid Services

STANDING COMMITTEE MEETING 06/17/2019

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

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

1a. Evidence: **Pass-18; No Pass-1;** 1b. Performance Gap: **H-1**; **M-5**; **L-4**; **I-9**

Rationale:

- The Committee did think that there were one or more healthcare actions that could lower the risk of naloxone being necessary, particularly actions that would lower the use of opioids in the hospital.
- However, the measure did not pass the Performance Gap criterion—a must-pass criterion.
- There were several concerns that were raised with this measure by the Committee. First was whether naloxone use is a good quality measure.
- There was concern that naloxone can be used empirically in patients with changed sensorium, so it does not necessarily indicate that there was an opioid overdose. In addition, there were concerns that sometimes naloxone may be used to reverse opioids as part of a plan of care and that the measure may cause providers to be more reluctant to give naloxone when it's needed.

- There were also concerns about how the measure was specified – as a proportion of all adult patients dischared from the hospital as opposed to those who received opioids– and how the propensity to use narcotics by a hospital might change performance rates.
- There were also issues in the measure testing because there are variable places in the EHR where narcotics are documented: in the Medication Administration Record (MAR) or within procedure notes.
- In addition, there were concerns that the actual rate of occurrence was relatively low in measure testing and did not have a large enough measure gap to justify measurement. For these reasons, this measure did not pass performance gap and discussion and voting on the remaining criteria stopped.

---

2. Scientific Acceptability of Measure Properties:

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

2a. Reliability: **N/A**

Rationale:

---

3. Feasibility: N/A

(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:

---

4. Use and Usability

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

4a. Use: **N/A** *4b. Usability:* ***N/A***

Rationale:

---

5. Related and Competing Measures

- N/A

---

6. Standing Committee Recommendation for Endorsement: **N/A**

Rationale

- The Committee did not vote on this measure because it did not pass Performance Gap, which is a Must Pass criterion.

---

7. Public and Member Comment

- Two comments were received for this measure. One commenter agreed with the Committee's decision not to recommend this measure for endorsement citing the lack of score variation to support a performance gap and the potential for the measure to misrepresent hospital performance. Another commenter offered recommendations: clarify the measure rate is not

expected to be zero, exclude patients with cancer or palliative care, and also exclude patients for which naloxone is administered for suspected overdose but later found to be unrelated to opioid harm.

- Developer Comments: Thank you for your comment. The measure steward will consider what changes, if any, should be incorporated into this important measure for future use. We, however, note that testing results showed statistically significant variation in performance rates across the hospitals tested. The wide variation suggests there exists ample room for improvement on this harm event.

  Thank you for your comment. The intent of this measure is not to reduce clinically appropriate use of naloxone nor to bring the measure rate to zero, but to identify if hospitals have particularly high rates of naloxone use as an indicator of high rates of over-administration of opioids in the inpatient setting, thereby incentivizing improved clinical practices. Proper dosing of opioids and monitoring of patients on opioids can reduce the need for naloxone use in patient care. We thank the commenter's suggestion for the potential refinement specific to the exclusion criteria. We will take this suggestion under consideration as we review consider what changes, if any, should be incorporated into this important measure for future use.

---

8. Consensus Standards Approval Committee (CSAC) Vote: Yes-0; No-13 (10/21/2019)

Decision: Not approved for endorsement

---

9. Appeals

This measure did not move forward to appeals period.

Measure Withdrawn From Consideration

3498e Hospital Harm - Pressure Injury

Submission | Specifications

Description: This electronic clinical quality measure (eCQM) assesses the proportion of inpatient admissions for patients ages 18 years and older who develop a new stage 2, stage 3, stage 4 pressure injury, deep tissue pressure injury, or unstageable pressure injury during hospitalization.

Numerator Statement: The number of hospital inpatient admissions during which a patient developed a new stage 2, stage 3, stage 4 pressure injury, deep tissue pressure injury, or unstageable pressure injury that was not documented as present in the first 24 hours of hospital arrival.

Denominator Statement: All patients 18 years or older at the start of the encounter and discharged inpatient hospital admission during the measurement period. The measure includes inpatient admissions which began in the Emergency Department or in observational status.

Exclusions: There are no denominator exclusions.

Adjustment/Stratification: No risk adjustment or stratification

Level of Analysis: Facility

Setting of Care: Inpatient/Hospital

Type of Measure: Outcome

Data Source: Electronic Health Records

Measure Steward: Centers for Medicare and Medicaid Services (CMS)

STANDING COMMITTEE MEETING 06/17/2019

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

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

1a. Evidence: **Pass-19; No Pass-0**. Performance Gap: **H-1**; **M-17**; **L-0**; **I-1**

Rationale:

- The goal of the Pressure Injury Electronic Clinical Quality Measure (eCQM) is to improve patient safety
  and prevent patients from acquiring a new pressure injury during their hospitalization. Pressure injuries, also called pressure ulcers, bed sores, or decubitus ulcers, are serious events and one of the most common patient harms.
- The committee agreed that pressure ulcers can be reduced using best practices including frequent repositioning, proper skin care, and specialized cushions or beds.
- The measure was tested in three sites (24 hospitals) across 3 separate EHR systems. Performance rates were all <1% for hospitals and there was variation in performance across sites.

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-2**; **M-16**; **L-0**; **I-1**; 2b. Validity: **H-0**; **M-17**; **L-2**; **I-0**

- This measure is deemed as complex and was evaluated by the NQF Scientific Methods Panel.
- The Standing Committee chose to vote on this measure for, both, reliability and validity.

Rationale:

- This measure was assessed by the Scientific Methods Panel.
- There were some concerns raised in the Methods Panel review as below; however, the committee choose to accept the overall assessment of the methods panel to pass the measure on Scientific Acceptability.
- In reliability testing, the PPV was high in two of the four datasets tested (98% and 97%) but lower in two tested (69% and 45%), which were explained as documentation errors.
- There was concern by the Methods Panel because of the lack of risk adjustment.
- There was also concern that inconsistent use of structured fields by hospitals may influence the measure score.

---

3. Feasibility: H-0; M-13; L-5; I-1

(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:

- There were some challenges in the feasibility testing of the eMeasure which were discussed by the committee, particularly the variability in where the information was documented in structured fields in one of the EHRs to document data for the measure.
- As a result of this discussion, there were some concerns by the Committee about feasibility, particularly integrating this measure across multiple EHRs that may not have structured fields to capture pressure ulcer data in a standardized way.

---

4. Use and Usability

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

4a. Use: **Pass-19; No Pass-0** 4b. Usability: **H-3; M-15; L-1; I-0**

Rationale:

- Regarding usability, the developer stated that the MAP had recommended inclusion in an accountability program pending feedback from the Committee. Therefore, there were no concerns about usability.

---

5. Related and Competing Measures

- Hospital-acquired pressure injuries are currently measured and publicly reported in the Hospital-Acquired Condition Reduction Program (HACRP) as a component of the Patient Safety Indicator (PSI) 90 measure, which relies on ICD codes as a data source.
- Related: Additionally, the following NQF endorsed measures are related but measure different patient populations: Percent of High Risk Residents with Pressure Ulcers (Long Stay) (NQF #0679) and Percent of Residents or Patients with Pressure Ulcers that are New or Worsened (Short Stay) (NQF #0678).

6. Standing Committee Recommendation for Endorsement: **Yes-19**; **No-0 (Withdrawn from Consideration)**

Rationale

- The Standing Committee recommended the measure for NQF endorsement. Overall, the Committee believed that despite concerns with the feasibility across multiple EHRs that this was a good outcome measure for quality of care, and that it was a reliable and valid as specified by the developer. The standing committee noted that while there are several pressure ulcer measures in the NQF portfolio, this was the first that was submitted as an eMeasure.
- However, following the September 18 Committee Post-Comment call, the developer for this measure notified NQF that they are withdrawing the measure fromconsideration due to substantive anticipated changes. This is measure is withdrawn from consideration at this time.

7. Public and Member Comment

- Two commenters supported the measure's intent, but suggested additional work is needed before endorsement. One commenter referenced the Measure Application Partnership's (MAP) discussions around the need to consider additional exclusions. The commenter also expressed concern regarding the ability to capture pressure injury staging in the electronic health record (EHR) and was not convinced there are meaningful differences in performance scores. Another commenter also was concerned about the lack of standardization around pressure injury documentation. Also referenced was the need for consistency around who determines staging and the length of time for considering an injury hospital-acquired.

  Developer Response: Thank you for your comment. We understand that the MAP has expressed broad support for the measure and agreed that the measure can reduce patient harm caused by pressure injury. As the commenter pointed out, the MAP has also suggested that the measure may need to exclude certain types of patients. MAP's suggestion was taken into account during measure testing. Based on the evidence gathered during testing and from expert input, the measure does not exclude patients with certain conditions from the denominator. Evidence suggests most newly acquired pressure injuries can be prevented through best practices that are customized to the patient's risk. The most common causes of pressure injuries (limited mobility during acute illness, friction against skin) put all hospitalized patients at similar risk [1][2]. Overall, this measure aims to be as inclusive as possible to ensure the most impact on the safety of all patients.

  The information required for this eCQM is collected during routine patient assessment in accordance with national clinical guidelines. During measure development and testing, we noted that the eCQM requirement for documentation in discrete fields resulted in a need to adjust clinical workflow in some hospitals, but this was offset by the benefit of capturing accurate information from which to drive quality improvement efforts. Documentation is an important component of the quality signal as hospitals cannot measure what is not documented.

  We note that measure testing was done in compliance with NQF requirements for eCQM development, including NQF's recommendation to conduct eCQM testing in more than one EHR

system. The empirical results demonstrated that the measure exhibited high reliability and data element validity.

Lastly, we understand the commenter's concern about the measure's performance rates. We, however, note that the wide variation of rates across hospitals indicates that there is ample room for improvement with this serious harm event.

[1] Gunningberg, L., Donaldson, N., Aydin, C., Idvall, E. (2011). Exploring variation in pressure ulcer prevalence in Sweden and the USA: Benchmarking in action. 18. 10.1111/j.1365-2753.2011.01702.x. Journal of evaluation in clinical practice, 904-910.

[2] Berlowitz, D., VanDeusen Lukas, C., Parker, V., Niederhauser, A., Silver, J., Logan, C., Ayello, E., Zulkowski, K. (2012). Preventing Pressure Ulcers in Hospitals-A Toolkit for Improving Quality of Care.

Developer Response: Thank you for your comment. We understand that clinician variability in documenting stages of pressure injuries can present challenges. We clarify that the measure numerator includes all new hospital-acquired pressure injuries stage 2-4, unstageable pressure injuries, and deep tissue pressure injuries. The measure, as specified, does not discriminate by stage and does not penalize hospitals based on variability in clinician staging of pressure injuries.

---

8. Consensus Standards Approval Committee (CSAC) Vote: Yes-X; No-X

- Following the September 18 Committee Post-Comment call, the developer for new measure #3498e Hospital Harm – Pressure Injury notified NQF that they are withdrawing the measure for consideration due to anticipated substantive changes. This measure did not move forward to CSAC.

---

9. Appeals

This measure did not move forward to appeals period.

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

NQF #	Title	Federal Programs: Implemented or Finalized
0022	Use of High Risk Medications in the Elderly	Merit-Based Incentive Payment System (MIPS) Program (Finalized 2016)
0097	Medication Reconciliation Post-Discharge	Merit-Based Incentive Payment System (MIPS) Program (Finalized 2016) Physician Compare (Implemented 2007)
0101	Falls: Screening for Future Fall Risk	Merit-Based Incentive Payment System (MIPS) Program (Implemented 2018) Shared Savings Program (Implemented 2012)
0138	National Healthcare Safety Network (NHSN) Catheter-associated Urinary Tract Infection (CAUTI) Outcome Measure	Hospital Acquired Condition Reduction Program (Implemented 2014) Inpatient Rehabilitation Facility Quality Reporting (Implemented 2014) Hospital Inpatient Quality Reporting (Implemented 2013/Scheduled Removal 2021) Long-Term Care Hospital Quality Reporting (Implemented 2013) Prospective Payment System-Exempt Cancer Hospital Quality Reporting (Implemented 2013)
0139	National Healthcare Safety Network (NHSN) Central line-associated Bloodstream Infection (CLABSI) Outcome Measure	Hospital Acquired Condition Reduction Program (Implemented 2014) Hospital Inpatient Quality Reporting (Implemented 2013/Scheduled Removal 2021) Long-Term Care Hospital Quality Reporting (Implemented 2013) Prospective Payment System-Exempt Cancer Hospital Quality Reporting (Implemented 2013)
0468	Hospital 30-Day, All-Cause, Risk-Standardized Mortality Rate (RSMR) Following Pneumonia Hospitalization	Hospital Compare (Implemented 2010) Hospital Inpatient Quality Reporting (Implemented 2010/Scheduled Removal 2020) Hospital Value Base Purchasing (Implemented 2014)
0500	Severe Sepsis and Septic Shock: Management Bundle	Hospital Compare (Implemented 2016) Hospital Inpatient Quality Reporting (Implemented 2016)
0513	Thorax CT—Use of Contrast Material	Hospital Compare (Implemented 2014) Hospital Outpatient Quality Reporting (Implemented 2014/Scheduled Removal 2021)

[a] Per CMS Measures Inventory Tool as of 1/16/2020

NQF #	Title	Federal Programs: Implemented or Finalized
0531	PSI 90: Patient Safety and Adverse Events Composite (Composite Measure)	Hospital Acquired Condition Reduction Program (Implemented 2017) Hospital Compare (Implemented 2014) Hospital Value Base Purchasing (Removed 2018/ new version to be implemented 2023) 2013)
0553	Care for Older Adults (COA) – Medication Review	Medicare Part C Star Rating (Implemented 2017)
0674	Percent of Residents Experiencing One or More Falls with Major Injury (Long Stay)	Nursing Home Quality Initiative (Implemented 2017)
0679	Percent of High Risk Residents with Pressure Ulcers (Long Stay)	Nursing Home Quality Initiative (Implemented 2017)
0684	Percent of Residents with a Urinary Tract Infection (Long-Stay)	Nursing Home Quality Initiative (Implemented 2017)
0686	Percent of Residents Who Have/Had a Catheter Inserted and Left in Their Bladder (long stay)	Nursing Home Quality Initiative (Implemented 2017)
0687	Percent of Residents Who Were Physically Restrained (Long Stay)	Nursing Home Quality Initiative (Implemented 2017)
0689	Percent of Residents Who Lose Too Much Weight (Long-Stay)	Nursing Home Quality Initiative (Implemented 2017)
0733	Operative Mortality Stratified by the Five STS-EACTS Mortality Categories	Merit-Based Incentive Payment System (MIPS) Program (Implemented 2018/Scheduled for removal 2021))
0753	American College of Surgeons – Centers for Disease Control and Prevention (ACS-CDC) Harmonized Procedure Specific Surgical Site Infection (SSI) Outcome Measure	Hospital Compare (Implemented 2016) Hospital Value Base Purchasing (Implemented 2016) Hospital Acquired Condition Reduction Program (Implemented 2015) Hospital Inpatient Quality Reporting (Implemented 2015/Scheduled Removal 2021) Prospective Payment System-Exempt Cancer Hospital Quality Reporting (Implemented 2014)
1365	Child and Adolescent Major Depressive Disorder (MDD): Suicide Risk Assessment	Merit-Based Incentive Payment System (MIPS) Program (Implemented 2018)
1365e	Child and Adolescent Major Depressive Disorder (MDD): Suicide Risk Assessment	Merit-Based Incentive Payment System (MIPS) Program (Implemented 2018)
1463	Standardized Hospitalization Ratio for Admissions	End-Stage Renal Disease Quality Incentive Program (Finalized 2016)
1523	Rate of Open Repair of Small or Moderate Abdominal Aortic Aneurysms (AAA) Where Patients Are Discharged Alive	Merit-Based Incentive Payment System (MIPS) Program (Implemented 2018/Scheduled for removal 2021)

NQF #	Title	Federal Programs: Implemented or Finalized
1716	National Healthcare Safety Network (NHSN) Facility-wide Inpatient Hospital-onset Methicillin-resistant Staphylococcus aureus (MRSA) Bacteremia Outcome Measure	Hospital Acquired Condition Reduction Program (Implemented 2016) Hospital Compare (Implemented 2016) Hospital Inpatient Quality Reporting (Implemented 2014/Scheduled Removal 2021) Hospital Value Base Purchasing (Implemented 2016) Prospective Payment System-Exempt Cancer Hospital Quality Reporting (Implemented 2017)
1717	National Healthcare Safety Network (NHSN) Facility-wide Inpatient Hospital-onset Clostridium difficile Infection (CDI) Outcome Measure	Hospital Acquired Condition Reduction Program (Implemented 2016) Hospital Compare (Implemented 2016) Hospital Inpatient Quality Reporting (Implemented 2014/Scheduled Removal 2021) Hospital Value Base Purchasing (Implemented 2016) Prospective Payment System-Exempt Cancer Hospital Quality Reporting (Implemented 2017) Long-Term Care Hospital Quality Reporting (Implemented 2016) Inpatient Rehabilitation Facility Quality Reporting (Implemented 2016)
1893	Hospital 30-Day, all-cause, risk-standardized mortality rate (RSMR) following chronic obstructive pulmonary disease (COPD)	Hospital Compare (Implemented 2015) Hospital Inpatient Quality Reporting (Implemented 2015/Scheduled Removal 2020) Hospital Value Base Purchasing (Implemented 2015/Scheduled for Implementation 2020)
2726	Prevention of Central Venous Catheter (CVC)-Related Bloodstream Infections	Merit-Based Incentive Payment System (MIPS) Program (Implemented 2018)
2940	Use of Opioids at High Dosage in Persons Without Cancer	Medicaid (Implemented 2016)
2988	Medication Reconciliation for Patients Receiving Care at Dialysis Facilities	End-Stage Renal Disease Quality Incentive Program (Finalized 2018/Scheduled Implementation 2022)

Appendix C: Patient Safety Standing Committee and NQF Staff

STANDING COMMITTEE

Ed Septimus, MD (Co-chair)
Medical Director Infection Prevention and Epidemiology HCA and Professor of Internal Medicine
Texas A&M Health Science Center College of Medicine, Hospital Corporation of America
Houston, TX

Iona Thraen, PhD, ACSW (Co-chair)
Patient Safety Director, Utah Department of Health
Salt Lake City, UT

Jason Adelman, MD, MS
Chief Patient Safety Officer, Associate Chief Quality Officer, and Director of Patient Safety Research at New York-Presbyterian Hospital/Columbia University Medical Center
New York, NY

Charlotte Alexander, MD
Orthopedic Hand Surgeon, Memorial Hermann Medical System
Houston, TX

Laura Ardizzone, BSN, MS, DNP, CRNA
Director of Nurse Anesthesia Services, Memorial Sloan Kettering Cancer Center
New York, NY

Richard Brilli, MD, FAAP, FCCM
John F. Wolfe Endowed Chair in Medical Leadership and Pediatric Quality and Safety Chief Medical Officer - Nationwide Children's Hospital
Professor, Pediatrics - Pediatric Critical Care Medicine - Ohio State University College of Medicine
Columbus, OH

Curtis Collins, PharmD, MS
Specialty Pharmacist, Infectious Diseases, St. Joseph Mercy Health System
Ann Arbor, MI

Christopher Cook, PharmD, PhD
Sr. Director, Strategic Business Development, bioMérieux
Raleigh-Durham, NC

Melissa Danforth, BA
Senior Director of Hospital Ratings, The Leapfrog Group
Washington, DC

Theresa Edelstein, MPH, LNHA
Vice President, New Jersey Hospital Association
Tonawanda, NY

Lillee Gelinas, MSN, RN, CPPS, FAAN
Senior Fellow and Nurse Executive, SaferCare Texas, University of North Texas Health Science Center
Fort Worth, TX

John James, PhD
Founder, Patient Safety America
Houston, TX

Stephen Lawless, MD, MBA, FAAP, FCCM
Senior Vice President Chief Clinical Officer, Nemours Children's Health System
Hockessin, DE

Lisa McGiffert
Project Director, Safe Patient Project, Consumers Union
Austin, TX

Susan Moffatt-Bruce, MD, PhD, MBA, FACS
Executive Director, The Ohio State University's Wexner Medical Center
Washington, DC

Patricia Quigley, PhD, MPH, ARNP, CRRN, FAAN, FAANP
Managing member of Patricia A. Quigley, Nurse Consultant, LLC
St. Petersburg, Florida

Leslie Schultz, PhD, RN, NEA-BC, CPHQ
Director, Premier Safety Institute®, Premier, Inc.
Charlotte, NC

David Stockwell, MD, MBA
Associate Professor of Pediatrics, Johns Hopkins University, SOM, Chief Medical Officer, Pascal Metrics, a Patient Safety Organization
Charlotte, NC

Tracy Wang, MPH
Public Health Program Director, WellPoint, Inc.
Los Angeles, California

Kendall Webb, MD, FACEP
Chief Medical Information Officer, University of Florida Health Systems; Associate Professor of Emergency Medicine (EM) and Pediatric EM (PEM); Assistant Dean of Medical Informatics
University of Florida Health - Jacksonville (UFHJ)
Jacksonville, FL

Albert Wu, MD, MPH, FACP
Professor of Health Policy and Management and Medicine, Johns Hopkins University
Baltimore, MD

Donald Yealy, MD, FACEP
Professor and Chair, University of Pittsburgh-Department of Emergency Medicine
Pittsburgh, PA

Yanling Yu, PhD
Physical Oceanographer and Patient Safety Advocate, Washington Advocate for Patient Safety
Seattle, WA

NQF STAFF

Elisa Munthali, MPH
Senior Vice President, Quality Measurement

Andrew Lyzenga, MPH
Senior Director

Nicolette Mehas, PharmD
Director

Hiral Dudhwala, RN, MSN,MPH
Project Manager

Desmirra Quinnonez
Project Analyst

Jesse Pines, MD, MBA, MSCE
Consultant

Appendix D: Measure Specifications

0138 National Healthcare Safety Network (NHSN) Catheter-associated Urinary Tract Infection (CAUTI) Outcome Measure

STEWARD

Centers for Disease Control and Prevention

DESCRIPTION

Standardized Infection Ratio (SIR) of healthcare-associated, catheter-associated urinary tract infections (UTI) will be calculated among patients in bedded inpatient care locations, except level II or level III neonatal intensive care units (NICU).

This includes acute care general hospitals, long-term acute care hospitals, rehabilitation hospitals, oncology hospitals, and behavior health hospitals.

TYPE

Outcome

DATA SOURCE

Electronic Health Data, Electronic Health Records, Other, Paper Medical Records NHSN Urinary Tract Infection form; NHSN Denominators for Intensive Care Unit (ICU)/Other Locations (not NICU or SCA) form; NHSN Denominators for Specialty Care Areas/Oncology form.

LEVEL

Facility, Other, Population : Regional and State

SETTING

Inpatient/Hospital, Other, Post-Acute Care Oncology hospital

NUMERATOR STATEMENT

Total number of observed healthcare-associated CAUTI among patients in bedded inpatient care locations (excluding patients in Level II or III neonatal ICUs).

NUMERATOR DETAILS

1. Definition of Infection that is Present on Admission (POA): An infection where all of the elements of an infection definition are present during the two calendar days before the day of admission, the first day of admission (day 1) and/or the day after admission (day 2) and are documented in the medical chart. Infections that are POA should not be reported as healthcare-associated infections (HAI) and are not reported as CAUTI. Symptoms must be documented in the chart by a healthcare professional during the POA time frame (e.g., nursing home documents fever prior to arrival to the hospital, patient reports fever >38.0°C). Physician diagnosis alone cannot be accepted as evidence of a urinary tract infection that is POA.

2. Definition of Healthcare-associated Infection (HAI): Any infection reported to NHSN must meet the definition of an NHSN HAI, that is, a localized or systemic condition resulting from an adverse reaction to the presence of an infectious agent(s) or its toxin(s) that was not present on admission to the acute care facility. An infection is considered an HAI if the date of event of the

NHSN site-specific infection criterion occurs on or after the 3rd calendar day of admission to an inpatient location where day of admission is calendar day 1. All elements of the site-specific infection criterion must occur during the infection window period.

3. Definition of Infection Window Period: The NHSN Infection Window Period is defined as the 7-days during which all site-specific infection criteria must be met. It includes the day the first positive diagnostic test that is an element of the site-specific infection criterion, was obtained, the 3 calendar days before and the 3 calendar days after.

4. Definition of CAUTI: A UTI (either a Symptomatic Urinary Tract Infection [SUTI], or an asymptomatic bacteremic urinary tract infection [ABUTI]) where an indwelling urinary catheter was in place for more than 2 consecutive days in an inpatient location on the date of event, with day of device placement being Day 1, AND an indwelling urinary catheter was in place on the date of event or the day before. If an indwelling urinary catheter was in place for more than 2 consecutive days in an inpatient location and then removed, the UTI date of event must be the day of discontinuation or the next calendar day to be catheter-associated.

5. Definition of indwelling catheter: A drainage tube that is inserted into the urinary bladder through the urethra, is left in place, and is connected to a drainage bag (including leg bags). These devices are also called Foley catheters. Condom or straight in-and-out catheters are not included nor are nephrostomy tubes or suprapubic catheters unless a indwelling urinary catheter is also present. Indwelling urethral catheters that are used for intermittent or continuous irrigation are included in CAUTI surveillance.

6. NHSN UTI criteria: Symptomatic Urinary Tract Infection criteria or Asymptomatic Bacteremic Urinary Tract Infection criteria. See below:

A Symptomatic Urinary Tract Infection (SUTI) that is catheter associated must meet A) or B) below:

A) Patient must meet 1, 2, and 3 below:

1. Patient had an indwelling urinary catheter that had been in place for more than 2 consecutive days as an inpatient on the date of event (day of device placement = Day 1) AND was either:

- Present for any portion of the calendar day on the date of event†,

OR

- Removed the day before the date of event‡

2. Patient has at least one of the following signs or symptoms:

• fever (>38.0°C) (To use fever in a patient > 65 years of age, the IUC needs to be in place for more than 2 consecutive days in an inpatient location on date of event and is either still in place OR was removed the day before the DOE.)

• suprapubic tenderness*

• costovertebral angle pain or tenderness*

• urinary urgency ^

• urinary frequency ^

• dysuria ^

3. Patient has a urine culture with no more than two species of organisms identified, at least one of which is a bacterium of =105 CFU/ml (See Comments). All elements of the UTI criterion must occur during the Infection Window Period (See Definition Chapter 2 Identifying HAIs in NHSN).

† When entering event into NHSN choose “INPLACE” for Risk Factor for Urinary Catheter

‡ When entering event into NHSN choose “REMOVE” for Risk Factor for Urinary Catheter

*With no other recognized cause (see Comments)

^ These symptoms cannot be used when catheter is in place. An indwelling urinary catheter in place could cause patient complaints of “frequency” “urgency” or “dysuria”.

B) Patient must meet 1, 2, and 3 below:

1. Patient is =1 year of age

2. Patient has at least one of the following signs or symptoms:

- fever (>38.0°C)
- hypothermia (<36.0°C)
- apnea*
- bradycardia*
- lethargy*
- vomiting*
- suprapubic tenderness*

3. Patient has a urine culture with no more than two species of organisms, at least one of which is a bacterium of =105 CFU/ml. All elements of the SUTI criterion must occur during the Infection Window Period

*With no other recognized cause

‡ If patient had an indwelling urinary catheter in place for more than 2 consecutive days in an inpatient location, and catheter was in place on the date of event or the previous day the CAUTI criterion is met. If no such indwelling urinary catheter was in place, UTI (non-catheter associated) criterion is met.

Note: Fever and hypothermia are non-specific symptoms of infection and cannot be excluded from UTI determination because they are clinically deemed due to another recognized cause.

An Asymptomatic Bacteremic Urinary Tract Infection (ABUTI) that is catheter associated must meet the following:

Patient must meet 1, 2, and 3 below:

1.Patient has no signs or symptoms of SUTI 1 or 2 according to age

2.Patient has a urine culture with no more than two species of organisms, at least one of which is a bacterium of =105 CFU/ml

3.Patient has organism identified** from blood specimen with at least one matching bacterium to the bacterium identified in the urine specimen, or meets LCBI criterion 2 (without fever) and matching common commensal(s) in the urine. All elements of the ABUTI criterion must occur during the Infection Window Period

(See Definition Chapter 2 Identifying HAIs in NHSN).

** Organisms identified by a culture or non-culture based microbiologic testing method which is performed for purposes of clinical diagnosis or treatment (e.g., not Active Surveillance Culture/Testing (ASC/AST).

7. Definition of Location of Attribution: The inpatient location where the patient was assigned on the date of the UTI event.

8. Definition of Date of Event: The date when the first element used to meet the UTI criterion occurred during the infection window period.

9. Definition of Repeat Infection Timeframe (RIT): The RIT is a 14-day timeframe during which no new infections of the same type are reported. The date of event is Day 1 of the 14-day RIT. Additional pathogens recovered during the RIT from the same type of infection are added to the event. The RIT will apply at the level of specific type of infection with the exception of BSI, UTI, and PNEU where the RIT will apply at the major type of infection.

DENOMINATOR STATEMENT

Total number of predicted healthcare-associated CAUTI among inpatient care locations under surveillance for CAUTI during the data period, based on the national CAUTI baseline Data is calculated using the facility's number of catheter days and the following significant risk factors:

- Acute Care Hospitals: CDC Location, Facility bed size, Medical school affiliation, and Facility type
- Critical Access Hospitals: Medical school affiliation
- Long-Term Acute Hospitals: Average length of stay, Setting type, and Location type
- Inpatient Rehabilitation Facilities: Setting type, Proportion of admissions with traumatic and non-traumatic spinal cord dysfunction, Proportion of admissions with stroke

DENOMINATOR DETAILS

Numbers of indwelling urinary catheter days attributed to each location are counted for each data period using the following definitions and guidelines. All indwelling urinary catheter days for each location and data period are summed.

1. Definition of indwelling catheter day: For each patient, a day that an indwelling urinary catheter was present at the time of the indwelling urinary catheter day count.

2. CDC Location (acute care hospitals, long term acute care hospitals): Each patient care area in a facility that is monitored in NHSN is "mapped" to one or more CDC Locations. The specific CDC Location code is determined by the type of patients cared for in that area according to the 80% Rule. That is, if 80% of patients are of a certain type (e.g., pediatric patients with orthopedic problems) then that area is designated as that type of location (in this case, an Inpatient Pediatric Orthopedic Ward).
https://www.cdc.gov/nhsn/pdfs/pscmanual/15locationsdescriptions_current.pdf

3. Medical school affiliation categories:

a. Major – facility has a program for medical students and post-graduate medical training

b. Graduate – facility has a program for post-graduate medical training (i.e., residency and/or fellowships)

c. Undergraduate: facility has a program for medical students only

4. Facility bedsize: Number of beds set up and staffed in the healthcare facility

5. Setting (Freestanding or Within a Hospital): Describes physical placement of LTACH or IRF and does not define financial or administrative relationship with other healthcare facility types.

6. Definition for Facility Physician Education Status: Teaching statuses: major, graduate, undergraduate - Major: Facility has a program for medical students and post-graduate medical training; Graduate: Facility has a program for post-graduate medical training (i.e., residency and/or fellowships); Undergraduate: Facility has a program for medical students only.

7. Proportion of admissions within a diagnostic category: number of admissions during the calendar year where the primary diagnosis of that type (e.g. traumatic spinal cord dysfunction) divided by the total number of admissions during the calendar year

EXCLUSIONS

The following are not considered indwelling catheters by NHSN definitions:

1.Suprapubic catheters

2.Condom catheters

3.“In and out” catheterizations

4. Nephrostomy tubes

Note, that if a patient has either a nephrostomy tube or a suprapubic catheter and also has an indwelling urinary catheter, the indwelling urinary catheter will be included in the CAUTI surveillance.

EXCLUSION DETAILS

See S. 10

RISK ADJUSTMENT

Statistical risk model

STRATIFICATION

CAUTI data is stratified by facility-specific and individual patient location data (i.e., bedsize of location, affiliation and level of affiliation with a medical school [Teaching statuses: major, graduate, undergraduate, not affiliated - See definitions S.7. above.

TYPE SCORE

Ratio better quality = lower score

ALGORITHM

The Standardized Infection Ratio (SIR) for annual and quarterly data aggregation and analysis of CAUTI events is calculated for each healthcare facility for a specified time period. The SIR is an indirect standardization method for summarizing healthcare associated infection (HAI) experience, including CAUTI events, in a single group of data or across any number of stratified groups of data. To produce the SIR:

1. Identify number of observed healthcare-associated CAUTIs for a given time period by adding the total number of observed CAUTIs across the facility.

2. Calculate the number of predicted healthcare-associated CAUTIs for each CDC location using a negative binomial regression model and the risk factors described above.

3. Calculate the number of predicted healthcare-associated CAUTIs for the facility and time period by adding the predicted number of CAUTIs for each location across the facility.

4. Divide the number of observed healthcare-associated CAUTIs (1 above) by the number of predicted healthcare-associated CAUTIs (3 above) to obtain the SIR.

5. Perform a Poisson test to compare the SIR obtained in 4 above to the nominal value of 1. P-value and confidence interval will be calculated, which can be used to assess significance of SIR.

(The NHSN analysis tool will perform the calculations once the patient infection data, denominator information, and related facility-level information are entered into the system.)

The Adjusted Ranking Metric (ARM) for annual data aggregation and analysis of HAI events, including CAUTI events, combines the method of indirect standardization used to calculate the unadjusted SIR described above with a Bayesian random effects hierarchical model to account

for the potentially low precision and/or reliability inherent in the unadjusted SIR. A Bayesian posterior distribution constructed through Monte Carlo Markov Chain sampling is used to produce the adjusted numerator. The ARM enables more meaningful statistical differentiation between hospitals by accounting for differences in patient case-mix, exposure volume (e.g. patient days, indwelling urinary catheter days, central line-days, surgical procedure volume), and unmeasured factors that are not reflected in the unadjusted SIR and that cause variation between healthcare facilities. Accounting for these sources of variability enables better measure discrimination between facilities and leads to more reliable performance rankings. To produce the ARM:

1. Identify the number of CAUTI in each location

2. Obtain the adjusted number of observed CAUTIs by using a Bayesian posterior distribution constructed through Monte Carlo Markov Chain sampling which results from a Bayesian random effects model.

3. Total these numbers for an observed number of CAUTIs

4. Obtain the predicted number of CAUTIs in the same locations by multiplying the observed indwelling urinary catheter days according to the factors significantly associated with predicting CAUTI incidence as identified through a Log-linear Negative Binomial Regression Model.

5. Divide the total number of adjusted CAUTI events (“3” above) by the predicted number of CAUTIs (“4” above).

6. Result = ARM

COPYRIGHT / DISCLAIMER

0139 National Healthcare Safety Network (NHSN) Central line-associated Bloodstream Infection (CLABSI) Outcome Measure

STEWARD

Centers for Disease Control and Prevention

DESCRIPTION

Standardized Infection Ratio (SIR) and Adjusted Ranking Metric (ARM) of healthcare-associated, central line-associated bloodstream infections (CLABSI) will be calculated among patients in bedded inpatient care locations.

This includes acute care general hospitals, long-term acute care hospitals, rehabilitation hospitals, oncology hospitals, and behavioral health hospitals.

TYPE

Outcome

DATA SOURCE

Electronic Health Data, Electronic Health Records, Other, Paper Medical Records NHSN Primary BSI collection form

NHSN Denominator for ICU form

NHSN Denominator for NICU form

NHSN Denominator for Specialty Care Area/Oncology Form

LEVEL

Facility, Population : Regional and State

SETTING

Inpatient/Hospital, Other, Post-Acute Care Oncology Hospital; IRF; LTACH; Inpatient Psych

NUMERATOR STATEMENT

Total number of observed healthcare-associated CLABSI among patients in bedded inpatient care locations.

NUMERATOR DETAILS

Numbers of CLABSIs attributed to each location are counted for each month using the definitions below. CLABSIs attributed to neonatal ICUs are stratified by birth weight category. CLABSIs attributed to Specialty Care Areas or Oncology Locations are stratified by association with temporary vs. permanent central line.

1. Definition of infection that is Present on Admission (POA): An infection is considered Present on Admission (POA) if the date of event of the NHSN site-specific infection criterion occurs during the POA time period, which is defined as the day of admission to an inpatient location (calendar day 1), the 2 days before admission, and the calendar day after admission. For purposes of NHSN surveillance and determination of the Repeat Infection Timeframe (as defined below) if the date of event is determined to be either of the two days prior to inpatient admission, then the date of event will be hospital day 1. POA events are excluded

2. Definition of Healthcare-associated Infection (HAI): An infection is considered a Healthcare-associated Infection (HAI) if the date of event of the NHSN site-specific infection criterion occurs on or after the 3rd calendar day of admission to an inpatient location where day of admission is calendar day 1.

3. Definition of Eligible Central Line: A CL that has been in place for more than two consecutive calendar days (on or after CL day 3), following the first access of the central line, in an inpatient location, during the current admission. Such lines are eligible for CLABSI events and remain eligible for CLABSI events until the day after removal from the body or patient discharge, whichever comes first.

4. Definition of Central line: An intravascular catheter that terminates at or close to the heart or in one of the great vessels that is used for infusion, withdrawal of blood, or hemodynamic monitoring. The following are considered great vessels for the purpose of reporting CLABSI events and counting central-line device days in the NHSN system: Aorta, pulmonary artery, superior vena cava, inferior vena cava, brachiocephalic veins, internal jugular veins, subclavian veins, external iliac veins, common iliac veins, femoral veins, and in neonates, the umbilical artery/vein.

Neither the type of device nor the insertion site are used to determine if a device is considered a central line for NHSN reporting purposes.

The following devices are not considered central lines for NHSN Reporting Purposes:

- Non-lumened Pacemaker wires and other non-lumened devices inserted into central blood vessels or the heart
- Arterial catheters

- Arteriovenous fistula
- Arteriovenous graft
- Atrial catheters (also known as transthoracic intra-cardiac catheters, those catheters inserted directly into the right or left atrium via the heart wall)
- Extracorporeal membrane oxygenation (ECMO)
- Hemodialysis reliable outflow (HERO) dialysis catheters
- Intra-aortic balloon pump (IABP) devices
- Peripheral IV or Midlines
- Ventricular Assist Device (VAD)

5. Definition of CLABSI: A laboratory confirmed bloodstream infection which meets LCBI Criterion 1, 2, or 3, and where an eligible BSI organism is identified and an eligible central line is present on the LCBI DOE or the day before. Access definition: The performance of any of the following activities during the current inpatient admission

6. Definition of Infusion: The administration of any solution through the lumen of a catheter into a blood vessel. Infusions include continuous infusion (for example, nutritional fluids or medications), intermittent infusion (for example, IV flush), IV antimicrobial administration, and blood transfusion or hemodialysis treatment.

7. Definition of Temporary Central Line: A non-tunneled, non-implanted catheter.

8. Definition of Permanent Central Line: Tunneled catheters, (including tunneled dialysis catheters) and implanted catheters (including ports)

9. Definition of Laboratory Confirmed Bloodstream Infection (LCBI):

For all LCBI definitions, the following resources may be referenced:

- Appendix B: Secondary BSI Guide of the CLABSI Surveillance protocol can be found at http://www.cdc.gov/nhsn/PDFs/pscManual/4PSC_CLABScurrent.pdf (p.32)
- NHSN Common Commensals from the NHSN Organism List can be found at https://www.cdc.gov/nhsn/xls/master-organism-com-commensals-lists.xlsx

LCBI must meet one of the following criteria:

LCBI Criterion 1: Patient of any age has a recognized bacterial or fungal pathogen not included on the NHSN common commensal list, identified from one or more blood specimens obtained by a culture or non-culture based microbiologic testing methods

AND

Organism(s) identified in blood is not related to an infection at another site

(See Appendix B [p.32] Secondary BSI Guide)

LCBI Criterion 2: Patient of any age has at least one of the following signs or symptoms: fever (>38 degrees C), chills, or hypotension and positive Organism(s) identified in blood

AND

Organism(s) identified in blood is not related to an infection at another site

AND

The same NHSN common commensal is identified by a culture or non-culture based microbiologic testing method, from two or more blood specimens collected on separate occasions not related to an infection at another site and the same NHSN common commensal is

identified from two or more blood specimens drawn on separate occasions, by a culture or non-culture based microbiologic testing method.

Common Commensal organisms include, but not are not limited to, diphtheroids (Corynebacterium spp. not C. diphtheria), Bacillus spp. (not B. anthracis), Propionibacterium spp., coagulase-negative staphylococci (including S. epidermidis), viridans group streptococci, Aerococcus spp. Micrococcus spp, and Rhodococcus spp.

For a full list of Common Commensals see the Common Commensal tab of the NHSN organisms list. Criterion elements must occur within the Infection Window Period, the seven-day time period which includes the date the positive blood culture was collected, the 3 calendar days before and the 3 calendar days after. Note: The matching common commensals represent a single element; therefore, the collection date of the first common commensal is the date of the element used to determine the Date of Event.

LCBI Criterion 3: Patient 1 year of age or less has at least one of the following signs or symptoms: fever (>38 degrees C), hypothermia (<36 degrees C), apnea, or bradycardia and organism identified in blood not related to an infection at another site (See Appendix B Secondary BSI Guide) and the same NHSN common commensal is identified from two or more blood specimens drawn on separate occasions, by a culture or non-culture based microbiologic testing.

10. Criteria for meeting Mucosal Barrier Injury (MBI) Laboratory Confirmed Bloodstream Infection (LCBI)

For all MBI-LCBI definitions, the following resources may be referenced:

- Appendix B: Secondary BSI Guide of the CLABSI Surveillance protocol can be found at http://www.cdc.gov/nhsn/PDFs/pscManual/4PSC_CLABScurrent.pdf (p.32)
- NHSN Common Commensals from the NHSN Organism List can be found at https://www.cdc.gov/nhsn/xls/master-organism-com-commensals-lists.xlsx
- NHSN MBI Organism List can be found at https://www.cdc.gov/nhsn/xls/analysis/nhsn-data-dictionary.xlsx

MBI-LCBI Criterion1: Patient of any age fully meets criterion 1 for LCBI with at least one blood specimen identified by a culture or non-culture based microbiologic testing method, with ONLY intestinal organisms from the NHSN MBI organism list and patient meets at least one of the following:

a)Is an allogeneic hematopoietic stem cell transplant recipient within the past year with one of the following documented during same hospitalization as positive blood culture:

i.) Grade III or IV gastrointestinal graft versus host disease [GI GVHD]

ii.)1 liter or more diarrhea in a 24-hour period (or 20 or more mL/kg in a 24-hour period for patients <18 years of age) with onset on or within 7 calendar days before the date the positive blood specimen was collected

b)Is neutropenic, defined as at least 2 separate days with values of absolute neutrophil count (ANC) and/or white blood cell (WBC) values <500 cells/mm3 within a seven-day time period which includes the collection date of the positive blood specimen (Day 1), the 3 calendar days before and the 3 calendar days after.

MBI-LCBI Criterion 2: Patient of any age meets criterion 2 for LCBI when the blood specimens identify only viridans group streptococci or Rothia spp and patient meets at least one of the following:

a)Is an allogeneic hematopoietic stem cell transplant recipient within the past year with one of the following documented during same hospitalization as positive blood culture:

i.) Grade III or IV gastrointestinal graft versus host disease [GI GVHD]

ii.)1 liter or more diarrhea in a 24-hour period (or 20 or more mL/kg in a 24-hour period for patients <18 years of age) with onset on or within 7 calendar days before the date the positive blood specimen was collected

b)Is neutropenic, defined as at least 2 separate days with values of absolute neutrophil count (ANC) and/or white blood cell (WBC) values <500 cells/mm3 within a seven-day time period which includes the collection date of the positive blood specimen (Day 1), the 3 calendar days before and the 3 calendar days after

MBI-LCBI Criterion 3: Patient 1 year of age or less meets criterion 3 for LCBI when the blood specimens identify only viridans group streptococci or Rothia spp and patient meets at least one of the following:

a)Is an allogeneic hematopoietic stem cell transplant recipient within the past year with one of the following documented during same hospitalization as positive blood culture:

i.) Grade III or IV gastrointestinal graft versus host disease [GI GVHD]

ii.)1 liter or more diarrhea in a 24-hour period (or 20 or more mL/kg in a 24-hour period for patients <18 years of age) with onset on or within 7 calendar days before the date the positive blood specimen was collected

b)Is neutropenic, defined as at least 2 separate days with values of absolute neutrophil count (ANC) and/or white blood cell (WBC) values <500 cells/mm3 within a seven-day time period which includes the collection date of the positive blood specimen (Day 1), the 3 calendar days before and the 3 calendar days after

11. Definition of CDC Location: The patient care area to which a patient is assigned while receiving care in the healthcare facility. NOTE: Only locations where patients are housed overnight (i.e., inpatient locations) and where denominator data are collected can be used for reporting CLABSI data. Operating rooms (including cardiac cath labs, c-section rooms, and interventional radiology) and outpatient locations are not valid locations for this type of surveillance. See attached list of CDC/NHSN Location Types to identify Special Care Areas or Oncology Locations. https://www.cdc.gov/nhsn/xls/analysis/nhsn-data-dictionary.xlsx

12. Definition of Infection Window Period: Infection Window Period is defined as the 7-days during which all site-specific infection criteria must be met. It includes the day the first positive diagnostic test that is an element of the site-specific infection criterion, was obtained, the 3 calendar days before and the 3 calendar days after. For purposes of defining the Infection Window Period the following are considered diagnostic tests:

- laboratory specimen collection
- imaging test
- procedure or exam

13. Definition of Repeat Infection Timeframe (RIT): The RIT is a 14-day timeframe during which no new infections of the same type are reported. The date of event is Day 1 of the 14-day RIT. Additional pathogens recovered during the RIT from the same type of infection are added to the event.

The RIT will apply at the level of specific type of infection with the exception of BSI, UTI, and PNEU where the RIT will apply at the major type of infection.

14. Definition of Date of Event (DOE): The Date of Event is the date the first element used to meet an NHSN site-specific infection criterion occurs for the first time within the seven-day infection window period.

15. Definition of Location of Attribution: The location to which the CLABSI is attributed.

16. Definition of birthweight: Birthweight is the weight of the infant at the time of birth and should not be changed as the infant gains weight. The birthweight categories are as follows:

A = 750 g or less; B = 751-1000 g; C = 1001-1500 g; D = 1501-2500 g; E = >2500 g.

17. Definitions for facility physician education status: Teaching statuses: major, graduate, undergraduate - Major: Facility has a program for medical students and post-graduate medical training; Graduate: Facility has a program for post-graduate medical training (i.e., residency and/or fellowships); Undergraduate: Facility has a program for medical students only.

Exclusions from CLABSI:

1. Bloodstream Infections (BSI) accompanied by documentation of observed or suspected injection into an IV line by the patient during the BSI Infection Window Period are excluded as CLABSIs regardless of presence of central line.

2. Group B Streptococcus identified from blood, with a date of event during the first 6 days of life, are excluded as CLABSIs regardless of presence of central line.

3. Occasionally, a patient with both a central line and another vascular access device* will have pus at the other access site. If there is pus at the site of one of the following vascular access devices and a specimen collected from that site has at least one matching organism to an organism identified in blood this will be considered an LCBI but not a CLABSI for NHSN reporting purposes.

*Vascular access devices included in this exception are limited to:

- Arterial catheters
- Arteriovenous fistulae
- Arteriovenous grafts
- Atrial catheters (also known as transthoracic intra-cardiac catheters, those catheters inserted directly into the right or left atrium via the heart wall)
- Hemodialysis reliable outflow (HERO) dialysis catheters
- Intra-aortic balloon pump (IABP) devices
- Non-accessed CL (those neither inserted nor used during current admission)
- Peripheral IV or Midlines

4. CLABSIs in which any of the following organisms are the only pathogens identified are excluded:

- Blastomyces spp.
- Histoplasma spp.
- Coccidioides spp.
- Paracoccidioides spp.
- Cryptococcus spp.
- Pneumocystis spp.
- Any virus
- Parasites

5. If the date of blood specimen collection is on or after the date of documentation of evidence of consent AND the patient is being supported for organ donation purposes, an event identified using the blood specimen result should not be reported as CLABSI.

6. MBI CLABSI events will be excluded from the CLABSI measure

7. Munchausen Syndrome by Proxy (MSBP): If during the current admission, there is documentation of known or suspected (MSBP), also known as factitious disorder imposed on another and a CL has been in place for more than 2 days on a BSI DOE, these events are considered LCBIs but are NOT considered central line associated.

8. Epidermolysis bullosa (EB): If during the current admission, there is a diagnosis of and a CL has been in place for more than 2 days on a BSI DOE, these events are considered LCBIs but are NOT considered central line associated.

9. Extracorporeal life support (ECMO): A BSI meeting LCBI criteria with an eligible central line where ECMO is present for more than 2 days on the BSI DOE, and is still in place on the DOE or the day before, will be considered an LCBI but not a CLABSI for NHSN reporting purposes.

10. Ventricular assist device (VAD): A BSI meeting LCBI criteria with an eligible central line where ECMO is present for more than 2 days on the BSI DOE, and is still in place on the DOE or the day before, will be considered an LCBI but not a CLABSI for NHSN reporting purposes.

DENOMINATOR STATEMENT

Total number of predicted healthcare-associated CLABSI among patients in bedded inpatient care locations, calculated using the facility's number of central line days and the following significant risk factors:

- Acute Care Hospitals: CDC location, facility bed size, medical school affiliation, facility type, birthweight category (NICU locations only)
- Critical Access Hospitals: no significant risk factors, calculation based intercept only model
- Inpatient Rehabilitation Facilities: Proportion of admissions with stroke, proportion of admissions in other non-specific diagnostic categories
- Long Term Acute Care Hospitals: CDC location type , facility bed size, average length of stay, proportion of admissions on a ventilator, proportion of admissions on hemodialysis

DENOMINATOR DETAILS

Methodologies for counting central line days differ according to the location of the patients being monitored. Numbers of central line days attributed to each location are counted for each data period utilizing the following definitions and guidelines. In locations that are not neonatal ICUs, SCA or oncology locations, all CL days for that location and data period are summed. For neonatal ICU central line days counts are stratified by birthweight category. CL day counts for Special Care Areas or Oncology Locations are stratified by temporary vs. permanent central line type.

For locations other than specialty care areas/oncology (SCA/ONC) and NICUs (e.g., ICUs, step-down units, wards), the denominator sampling method can be used. (Refer to sampling method in the Device-Associated BSI protocol available at www.cdc.gov/nhsn/PDFs/pscManual/4PSC_CLABScurrent.pdf)

1. Definition of central line day: For each patient, a day that at least one central line was present at the time of the CL day count.

2. Definition of CDC Location (acute care hospitals, long term acute care hospitals): Each patient care area in a facility that is monitored in NHSN is "mapped" to one or more CDC Locations. The specific CDC Location code is determined by the type of patients cared for in that area according to the 80% Rule. That is, if 80% of patients are of a certain type (e.g., pediatric patients with orthopedic problems) then that area is designated as that type of location (in this case, an Inpatient Pediatric Orthopedic Ward).
https://www.cdc.gov/nhsn/pdfs/pscmanual/15locationsdescriptions_current.pdf

3. Definition of Medical school affiliation categories:

a. Major – facility has a program for medical students and post-graduate medical training

b. Graduate – facility has a program for post-graduate medical training (i.e., residency and/or fellowships)

c. Undergraduate: facility has a program for medical students only

4. Definition of Facility bed size: Number of beds set up and staffed in the healthcare facility

5. Setting (Freestanding or Within a Hospital): Describes physical placement of LTACH or IRF and does not define financial or administrative relationship with other healthcare facility types.

6. Average Length of Stay: number of patient days during the calendar year divided by the number of admissions during the calendar year

7. Proportion of admissions within a diagnostic category: number of admissions during the calendar year where the primary diagnosis is of that type (e.g., traumatic spinal cord dysfunction) divided by the total number of admissions during the calendar year

EXCLUSIONS

Data from patients who are not assigned to an inpatient bed are excluded from the denominator counts, including outpatient clinics, 24-hour observation units, and emergency department visits. Inpatient rehab locations and inpatient psychiatric locations that have their own Centers for Medicare and Medicaid Services (CMS) Certification Number (CCN) are excluded.

EXCLUSION DETAILS

See S.8. Definition of inpatient - A patient who is located in an inpatient location for care and treatment at the time of the daily inpatient census count.

RISK ADJUSTMENT

Statistical risk model

STRATIFICATION

The final risk model for the CLABSI SIR in Acute Care Hospitals includes: CDC locations, facility bed size, medical school affiliation, and facility type. For NICU locations the risk factor included in the final model was birthweight category. See S7 above

TYPE SCORE

Ratio better quality = lower score

ALGORITHM

The Standardized Infection Ratio (SIR) for annual and quarterly data aggregation and analysis of CLABSI events is calculated for each healthcare facility for a specified time period. The SIR is an

indirect standardization method for summarizing healthcare associated infection (HAI) experience, including CLABSI events, in a single group of data or across any number of stratified groups of data. To produce the SIR:

1. Identify number of observed healthcare-associated CLABSIs for a given time period by adding the total number of observed CLABSIs across the facility.

2. Calculate the number of predicted healthcare-associated CLABSIs for each CDC location using a negative binomial regression model and the risk factors described above.

3. Calculate the number of predicted healthcare-associated CLABSIs for the facility and time period by adding the predicted number of CLABSIs for each location across the facility.

4. Divide the number of observed healthcare-associated CLABSIs (1 above) by the number of predicted healthcare-associated CLABSIs (3 above) to obtain the SIR.

5. Perform a Poisson test to compare the SIR obtained in 4 above to the nominal value of 1. P-value and confidence interval will be calculated, which can be used to assess significance of SIR.

(The NHSN analysis tool will perform the calculations once the patient infection data and denominator information are entered into the system.)

The Adjusted Ranking Metric (ARM) for annual data aggregation and analysis of HAI events, including CLABSI events, combines the method of indirect standardization used to calculate the unadjusted SIR described above with a Bayesian random effects hierarchical model to account for the potentially low precision and/or reliability inherent in the unadjusted SIR. A Bayesian posterior distribution constructed through Monte Carlo Markov Chain sampling is used to produce the adjusted numerator. The ARM enables more meaningful statistical differentiation between hospitals by accounting for differences in patient case-mix, exposure volume (e.g. patient days, central line-days, surgical procedure volume), and unmeasured factors that are not reflected in the unadjusted SIR and that cause variation between healthcare facilities. Accounting for these sources of variability enables better measure discrimination between facilities and leads to more reliable performance rankings. To produce the ARM:

1. Identify the number of CLABSI in each location

2. Obtain the adjusted number of observed CLABSIs by using a Bayesian posterior distribution constructed through Monte Carlo Markov Chain sampling which results from a Bayesian random effects model.

3. Total these numbers for an observed number of CLABSIs

4. Obtain the predicted number of CLABSIs in the same locations by multiplying the observed central line days according to the factors significantly associated with predicting CLABSI incidence as identified through a Log-linear Negative Binomial Regression Model.

5. Divide the total number of adjusted CLABSI events (“3” above) by the predicted number of CLABSIs (“5” above).

6. Result = ARM

0204 Skill mix (Registered Nurse [RN], Licensed Vocational/Practical Nurse [LVN/LPN], unlicensed assistive personnel [UAP], and contract)

STEWARD

American Nurses Association

DESCRIPTION

NSC-12.1 - Percentage of total productive nursing hours worked by RN (employee and contract) with direct patient care responsibilities by hospital unit.

NSC-12.2 - Percentage of total productive nursing hours worked by LPN/LVN (employee and contract) with direct patient care responsibilities by hospital unit.

NSC-12.3 - Percentage of total productive nursing hours worked by UAP (employee and contract) with direct patient care responsibilities by hospital unit.

NSC-12.4 - Percentage of total productive nursing hours worked by contract or agency staff (RN, LPN/LVN, and UAP) with direct patient care responsibilities by hospital unit.

Note that the skill mix of the nursing staff (NSC-12.1, NSC-12.2, and NSC-12.3) represent the proportions of total productive nursing hours by each type of nursing staff (RN, LPN/LVN, and UAP); NSC-12.4 is a separate rate.

Measure focus is structure of care quality in acute care hospital units.

TYPE

Structure

DATA SOURCE

Management Data, Other Database: National Database of Nursing Quality Indicators(R) [NDNQI(R)]; Hospitals have NDNQI guidelines and Excel spreadsheets to guide data collection; data are provided to NDNQI via web based data entry or XML upload.

LEVEL

Facility, Other

SETTING

Inpatient/Hospital

NUMERATOR STATEMENT

Four separate numerators are as follows:

RN hours – Productive nursing care hours worked by RNs with direct patient care responsibilities for each hospital in-patient unit during the calendar month.

LPN/LVN hours – Productive nursing care hours worked by LPNs/LVNs with direct patient care responsibilities for each hospital in-patient unit during the calendar month.

UAP hours – Productive nursing care hours worked by UAP with direct patient care responsibilities for each hospital in-patient unit during the calendar month.

Contract or agency hours – Productive nursing care hours worked by nursing staff (contract or agency staff) with direct patient care responsibilities for each hospital in-patient unit during the calendar month.

NUMERATOR DETAILS

Nursing care hours are defined as the number of productive hours worked by nursing staff (registered nurse [RN], licensed vocational/practical nurse [LVN/LPN], and unlicensed assistive personnel [UAP]) assigned to the unit who have direct patient care responsibilities for greater than 50% of their shift.

Productive hours are actual direct patient care hours worked by nursing staff including overtime, not budgeted or scheduled hours. Vacation, sick time, orientation, education leave, or committee time are considered non-productive hours. However, orientation programs vary from hospital to hospital. Once orientees reach the point where they are considered part of the staffing matrix, their work hours are charged to the unit and they would be replaced if they call in sick, then their hours are counted as productive.

Direct patient care responsibilities: Patient centered nursing activities by unit-based staff in the presence of the patient and activities that occur away from the patient that are patient related:

- Medication administration
- Nursing treatments
- Nursing rounds
- Admission, transfer, discharge activities
- Patient teaching
- Patient communication
- Coordination of patient care
- Documentation time
- Treatment planning
- Patient screening (e.g. risk) and assessment

Nursing staff included are either staff employed by the facility or temporary staff who are not employed by the facility (contracted/agency staff). Float staff—those are assigned to a unit other than their unit of employment on an as-needed basis—must be counted and reported in the unit's total nursing care hours where they provided direct patient care.

Included nursing staff:

Staff who are counted in the unit's staffing matrix, and

Are replaced if they call in sick, and

Work hours are charged to the unit's cost center

Excluded nursing staff:

1)Persons whose primary responsibility is administrative in nature

2)Specialty teams, patient educators, or case managers who are not assigned to a specific unit

3)Unit secretaries or clerks, monitor technicians, and other with no direct patient care responsibilities (Therapy assistants, student nurses who are fulfilling educational requirements, sitters who either are not employed by the facility or who are employed by the facility, but are not providing typical UAP activities)

Unlicensed Assistive Personnel (UAPs): Individuals trained to function in an assistive role to nurses in the provision of patient care, as delegated by and under the supervision of the registered nurse. Typical activities performed by UAPs may include (but are not limited to): taking vital signs, bathing, feeding, or dressing patients, assisting patients with transfers, ambulation or toileting.

Included UAPs: nursing assistants, orderlies, patient care technicians/assistants, graduate nurses (not yet licensed) who have completed unit orientation.

Mental Health Technicians (MHT): For Psychiatric In-Patient Units ONLY

Individuals functioning in an assistive role, for which your facility requires course work or training that is different from UAP. They may be licensed or unlicensed. MHT hours are included in UAP hours when reporting, but their hours are collected separately from UAP hours if persons in this job position also meet the following criteria:

• They are engaged in direct care activities greater than 50% time, and

• Their position is staffed 24/7 and replaced when they call in sick, and

• Their hours are included in the nursing staff budget

Data Elements:

RN hours (Employee)

RN hours (Contract/Agency)

LPN/LVN hours (Employee)

LPN/LVN hours (Contract/Agency)

UAP hours (Employee)

UAP hours (Contract/Agency)

MHT hours (Employee)

MHT hours (Contract/Agency)

Year

Month

Type of Unit

DENOMINATOR STATEMENT

Denominator is the total number of productive hours worked by employee or contract nursing staff with direct patient care responsibilities (RN, LPN/LVN, and UAP) for each hospital in-patient unit during the calendar month.

DENOMINATOR DETAILS

Same as numerator; Total number of productive hours worked by nursing staff with direct patient care responsibilities for each in-patient unit is obtained by summing all number of productive hours worked by specific nursing staff with direct patient care responsibilities (RN, LPN/LVN, or UAP) for each hospital in-patient unit during the calendar month.

Nursing staff included are either staff employed by the facility or temporary staff who are not employed by the facility (contracted/agency staff). Float staff—those are assigned to a unit other than their unit of employment on an as-needed basis—must be counted and reported in the unit's total nursing care hours where they provided direct patient care.

Included nursing staff:

Staff who are counted in the unit's staffing matrix, and

Are replaced if they call in sick, and

Work hours are charged to the unit's cost center.

Excluded nursing staff:

1)Persons whose primary responsibility is administrative in nature

2)Specialty teams, patient educators, or case managers who are not assigned to a specific unit

3)Unit secretaries or clerks, monitor technicians, and other with no direct patient care responsibilities

Data Elements:

RN hours (Employee)

RN hours (Contract/Agency)

LPN/LVN hours (Employee)

LPN/LVN hours (Contract/Agency)

UAP hours (Employee)

UAP hours (Contract/Agency)

MHT hours (Employee)

MHT hours (Contract/Agency)

Month

Year

Type of Unit

EXCLUSIONS

Same as numerator; nursing staff with no direct patient care responsibilities are excluded.

EXCLUSION DETAILS

Excluded nursing staff:

Persons whose primary responsibility is administrative in nature.

Specialty teams, patient educators, or case managers who are not assigned to a specific unit.

Unit secretaries or clerks, monitor technicians, and other with no direct patient care responsibilities.

RISK ADJUSTMENT

Other Each unit is stratified by unit type (e.g., critical care, step down, medical), which is not identical to risk, but may be related.

STRATIFICATION

Stratification variables are patient population and unit type. Units are stratified by patient population first and then unit type based on acuity level, age, or type of service provided.

1. Patient population

1) Adult population: limited to units generally caring for patients over 16 years old.

2) Pediatric population: limited to units generally caring for patients under 18 years old.

3) Neonate population: limited to units caring for newborn infants.

4) Psychiatric population: units caring for patients with psychiatric disorders.

5) Rehabilitation population: limited to distinct acute rehabilitation units providing intensive therapy 5 days/week.

2. Unit types by population

1) Adult population

Critical Care

Highest level of care, includes all types of intensive care units. Optional specialty designations include: Burn, Cardiothoracic, Coronary Care, Medical, Neurology, Pulmonary, Surgical and Trauma.

Step-Down

Limited to units that provide care for patients requiring a lower level of care than critical care units and higher level of care than provided on medical/surgical units. Examples include progressive care or intermediate care units. Telemetry alone is not an indicator of acuity level.

Medical

Units that care for patients admitted to medical services, such as internal medicine, family practice, or cardiology. Optional specialty designations include: BMT (Bone Marrow Transplant), Cardiac, GI, Infectious Disease, Neurology, Oncology, Renal or Respiratory.

Surgical

Units that care for patients admitted to surgical services, such as general surgery, neurosurgery, or orthopedics. Optional specialty designations include: Bariatric, Cardiothoracic, Gynecology, Neurosurgery, Orthopedic, Plastic Surgery, Transplant or Trauma.

Medical-Surgical Combined

Units that care for patients admitted to either medical or surgical services. Optional specialty designations include: Cardiac, Neuro/Neurosurgery or Oncology.

Critical Access

A unit located in a Critical Access Hospital that cares for a combination of patients that may include critical care, medical-surgical, skilled nursing (swing bed) and/or obstetrics.

2) Pediatric population

Refer to Adult unit type descriptions for corresponding unit types.

Critical care

Step-Down

Medical

Surgical

Medical-Surgical Combined

3) Neonate population

The three unit types below (Level I, II, and III/IV) are based on the Guidelines for Perinatal Care, 5th Ed., which are used by state certification programs. Level I, II, and III/IV neonatal units are the highest level of infant care provided, and are specified by sequential level of acuity.

Well-baby Nursery

Level I Continuing Care

Level II Intermediate Care

Level III/IV Critical Care

4) Psychiatric population

Adult

Units caring for adult patients with acute psychiatric disorders.

Child/Adolescent

Units caring for children and/or adolescents, predominantly ages 2-18 years old, with acute psychiatric disorders.

Geripsych

Units caring for elderly patients with acute psychiatric disorders.

Other (Behavioral Health, Specialty, Multiple Psychiatric Unit Types)

Behavioral Health

Units caring for individuals of any age with eating disorders or substance abuse (alcohol and drugs) diagnoses.

Specialty

Units caring for patients of any age with dual diagnoses (e.g., mental illness and mental retardation, or substance abuse and an additional mental illness diagnosis).

Multiple Psychiatric Unit Types

Units caring for patients that encompass 3 or more of the above unit types, but for which no one unit type comprises greater than 50% of the entire unit.

5) Rehabilitation population

Adult

Limited to units generally caring for rehab patients over 16 years old. Optional specialty designations include: Brain Injury/SCI, Cardiopulmonary, Neuro/Stroke and Orthopedic/Amputee Rehab units.

Pediatric

Limited to units generally caring for rehab patients under 18 years old.

TYPE SCORE

Rate/proportion better quality = higher score

ALGORITHM

Eligible unit identified and selected; input nursing care hours for each eligible staff category by month; then perform calculations to produce the quarterly nursing care hours for each eligible staff category by summing monthly values of the 3 months; then calculate the total nursing care hours by summing quarterly nursing care hours for each eligible staff category; then divide the quarterly nursing care hours for each eligible staff category by the total quarterly nursing care hours.

COPYRIGHT / DISCLAIMER

0205 Nursing Hours per Patient Day

STEWARD

American Nurses Association

DESCRIPTION

NSC-13.1 (RN hours per patient day) – The number of productive hours worked by RNs with direct patient care responsibilities per patient day for each in-patient unit in a calendar month.

NSC-13.2 (Total nursing care hours per patient day) – The number of productive hours worked by nursing staff (RN, LPN/LVN, and UAP) with direct patient care responsibilities per patient day for each in-patient unit in a calendar month.

Measure focus is structure of care quality in acute care hospital units.

TYPE

Structure

DATA SOURCE

Management Data, Other Database: National Database of Nursing Quality Indicators(R) [NDNQI(R)]; Hospitals have NDNQI guidelines and Excel spreadsheets to guide data collection; data are provided to NDNQI via web based data entry or XML upload.

LEVEL

Facility, Other

SETTING

Inpatient/Hospital

NUMERATOR STATEMENT

Total number of productive hours worked by nursing staff with direct patient care responsibilities for each hospital in-patient unit during the calendar month.

NUMERATOR DETAILS

Nursing care hours are defined as the number of productive hours worked by nursing staff (registered nurse [RN], licensed vocational/practical nurse [LVN/LPN], and unlicensed assistive personnel [UAP]) assigned to the unit who have direct patient care responsibilities for greater than 50% of their shift.

Productive hours are actual direct patient care hours worked by nursing staff including overtime, not budgeted or scheduled hours. Vacation, sick time, orientation, education leave, or committee time are considered non-productive hours. However, orientation programs vary from hospital to hospital. Once orientees reach the point where they are considered part of the staffing matrix, their work hours are charged to the unit, and they would be replaced if they call in sick, then their hours are counted as productive.

Direct patient care responsibilities: Patient centered nursing activities by unit-based staff in the presence of the patient and activities that occur away from the patient that are patient related:

- Medication administration
- Nursing treatments

- Nursing rounds
- Admission, transfer, discharge activities
- Patient teaching
- Patient communication
- Coordination of patient care
- Documentation time
- Treatment planning
- Patient screening (e.g. risk) and assessment

Nursing staff included are either staff employed by the facility or temporary staff who are not employed by the facility (contracted/agency staff). Float staff—those are assigned to a unit other than their unit of employment on an as-needed basis—must be counted and reported in the unit's total nursing care hours where they provided direct patient care.

Included nursing staff:

Staff who are counted in the unit's staffing matrix, and

Are replaced if they call in sick, and

Work hours are charged to the unit's cost center.

Excluded nursing staff:

Persons whose primary responsibility is administrative in nature.

Specialty teams, patient educators, or case managers who are not assigned to a specific unit.

Unit secretaries or clerks, monitor technicians, and other with no direct patient care responsibilities (Therapy assistants, student nurses who are fulfilling educational requirements, sitters who either are not employed by the facility or who are employed by the facility, but are not providing typical UAP activities).

Unlicensed Assistive Personnel (UAPs): Individuals trained to function in an assistive role to nurses in the provision of patient care, as delegated by and under the supervision of the registered nurse. Typical activities performed by UAPs may include (but are not limited to): taking vital signs, bathing, feeding, dressing patients, assisting patients with transfers, ambulation, or toileting.

Included UAPs: nursing assistants, orderlies, patient care technicians/assistants, graduate nurses (not yet licensed) who have completed unit orientation.

Mental Health Technicians (MHT): For Psychiatric In-Patient Units ONLY

Individuals functioning in an assistive role, for which your facility requires course work or training that is different from UAP. They may be licensed or unlicensed. MHT hours are included in UAP hours when reporting, but their hours are collected separately from UAP hours if persons in this job position also meet the following criteria:

- They are engaged in direct care activities greater than 50% time, and
- Their position is staffed 24/7 and replaced when they call in sick, and
- Their hours are included in the nursing staff budget

Data Elements:

RN hours (Employee)

RN hours (Contract/Agency)

LPN/LVN hours (Employee)

LPN/LVN hours (Contract/Agency)

UAP hours (Employee)

UAP hours (Contract/Agency)

MHT hours (Employee)

MHT hours (Contract/Agency)

Year

Month

Type of Unit

DENOMINATOR STATEMENT

Denominator is the total number of patient days for each in-patient unit during the calendar month. Patient days must be from the same unit in which nursing care hours are reported.

DENOMINATOR DETAILS

Conceptually, a patient day is 24 hours, beginning the hour of admission. The operational definitions of patient days are described in the section labeled Patient Day Reporting Methods.

The total number of patient days for each in-patient unit is collected by the calendar month using one of patient day reporting methods.

With the growth in the number of short stay in-patient units, included patients are in-patient and short stay patients (i.e., variously called short stay, observation, or same day surgery patients who receive care on a reporting in-patient unit for less than 24 hours).

Four (4) Patient Days reporting methods are as follows:

Method 1-Midnight Census

This is adequate for units that have all in-patient admissions. It is the least accurate method for units that have both in-patient and short stay patients. At the end of the month, sum the daily midnight census counts (the number of patients on the unit at midnight each day).

Method 2-Midnight Census + Patient Days from Actual Hours for Short Stay Patients

This is an accurate method for units that have both in-patients and short stay patients. The short stay “days” should be reported separately from midnight census and will be summed by NDNQI to obtain patient days. The total daily hours for short stay patients should be summed for the month and divided by 24.

Method 3-Patient Days from Actual Hours

This is the most accurate method. An increasing number of facilities have accounting systems that track the actual time spent in the facility by each patient. Sum actual hours for all patients, whether in-patient or short stay, and divide by 24.

Method 4-Patient Days from Multiple Census Reports

Some facilities collect censuses multiple times per day (e.g., every 4 hours or each shift). This method has shown to be as accurate as Method 3. Patient days based on midnight and noon census have shown to be sufficient in adjusting for short stay patients. A sum of the daily average censuses can be calculated to determine patient days for the month on the unit.

For all patient day reporting methods, it is recommended that facilities consistently use the same method for a reporting unit over time. Each unit should report patient days using the method that most accurate for the nursing work load. For some hospitals in which the midnight

census may be the only available measure of patient census, units with short stay patients should use either Method 2 or Method 3, if feasible.

Data Elements:

Month

Year

Patient Days Reporting method

Type of Unit

Patient days from Midnight census

Patient days from actual hours (depending on method selected)

EXCLUSIONS

Patient days from some non-reporting unit types, such as Emergency Department, peri-operative unit, and obstetrics, are excluded.

EXCLUSION DETAILS

Patient days must be from the same unit as the nursing care hours.

Data regarding nursing care hours in some units (e.g., Emergency Department, peri-operative unit, and obstetrics) have not been collected. Patient days from these types of units are excluded.

RISK ADJUSTMENT

Other Each unit is stratified by unit type (e.g., critical care, step down, medical), which is not identical to risk, but may be related.

STRATIFICATION

Stratification variables are patient population and unit type. Units are stratified by patient population first and then unit type based on acuity level, age, or type of service provided.

1. Patient population

1) Adult population: limited to units generally caring for patients over 16 years old.

2) Pediatric population: limited to units generally caring for patients under 18 years old.

3) Neonate population: limited to units caring for newborn infants.

4) Psychiatric population: units caring for patients with psychiatric disorders.

5) Rehabilitation population: limited to distinct acute rehabilitation units providing intensive therapy 5 days/week.

2. Unit types by population

1) Adult population

Critical Care

Highest level of care, includes all types of intensive care units. Optional specialty designations include: Burn, Cardiothoracic, Coronary Care, Medical, Neurology, Pulmonary, Surgical and Trauma.

Step-Down

Limited to units that provide care for patients requiring a lower level of care than critical care units and higher level of care than provided on medical/surgical units. Examples include progressive care or intermediate care units. Telemetry alone is not an indicator of acuity level.

Medical

Units that care for patients admitted to medical services, such as internal medicine, family practice, or cardiology. Optional specialty designations include: BMT (Bone Marrow Transplant), Cardiac, GI, Infectious Disease, Neurology, Oncology, Renal or Respiratory.

Surgical

Units that care for patients admitted to surgical services, such as general surgery, neurosurgery, or orthopedics. Optional specialty designations include: Bariatric, Cardiothoracic, Gynecology, Neurosurgery, Orthopedic, Plastic Surgery, Transplant or Trauma.

Medical-Surgical Combined

Units that care for patients admitted to either medical or surgical services. Optional specialty designations include: Cardiac, Neuro/Neurosurgery or Oncology.

Critical Access

A unit located in a Critical Access Hospital that cares for a combination of patients that may include critical care, medical-surgical, skilled nursing (swing bed) and/or obstetrics.

2) Pediatric population

Refer to Adult unit type descriptions for corresponding unit types.

Critical care

Step-Down

Medical

Surgical

Medical-Surgical Combined

3) Neonate population

The three unit types below (Level I, II, and III/IV) are based on the Guidelines for Perinatal Care, 5th Ed., which are used by state certification programs. Level I, II, and III/IV neonatal units are the highest level of infant care provided, and are specified by sequential level of acuity.

Well-baby Nursery

Level I Continuing Care

Level II Intermediate Care

Level III/IV Critical Care

4) Psychiatric population

Adult

Units caring for adult patients with acute psychiatric disorders.

Child/Adolescent

Units caring for children and/or adolescents, predominantly ages 2-18 years old, with acute psychiatric disorders.

Geripsych

Units caring for elderly patients with acute psychiatric disorders.

Other (Behavioral Health, Specialty, Multiple Psychiatric Unit Types)

Behavioral Health

Units caring for individuals of any age with eating disorders or substance abuse (alcohol and drugs) diagnoses.

Specialty

Units caring for patients of any age with dual diagnoses (e.g., mental illness and mental retardation, or substance abuse and an additional mental illness diagnosis).

Multiple Psychiatric Unit Types

Units caring for patients that encompass 3 or more of the above unit types, but for which no one unit type comprises greater than 50% of the entire unit.

5) Rehabilitation population

Adult

Limited to units generally caring for rehab patients over 16 years old. Optional specialty designations include: Brain Injury/SCI, Cardiopulmonary, Neuro/Stroke and Orthopedic/Amputee Rehab units.

Pediatric

Limited to units generally caring for rehab patients under 18 years old.

TYPE SCORE

Rate/proportion better quality = higher score

ALGORITHM

Eligible unit identified and selected; input patient days (including method) for each respective unit by month; input nursing care hours for each eligible staff category by month; then perform calculations to produce each of the quarter patient days and quarter nursing care hours by summing monthly values of the 3 months; then divide the quarterly nursing care hours by the quarterly patients days.

COPYRIGHT / DISCLAIMER

2720 National Healthcare Safety Network (NHSN) Antimicrobial Use Measure

STEWARD

Centers for Disease Control and Prevention

DESCRIPTION

This measure assesses antimicrobial use in hospitals based on medication administration data that hospitals collect electronically at the point of care and report via electronic file submissions to CDC's National Healthcare Safety Network (NHSN). The antimicrobial use data that are in scope for this measure are antibacterial agents administered to adult and pediatric patients in a specified set of ward and intensive care unit locations: medical ICU, medical-surgical ICU, surgical ICU (adult only), medical ward, medical-surgical ward, surgical ward, general hematology-oncology ward (adult only), and step-down unit (adult only). The measure compares antimicrobial use that the hospitals report with antimicrobial use that is predicted on

the basis of nationally aggregated data. The measure is comprised of a discrete set of ratios, Standardized Antimicrobial Administration Ratios (SAARs), each of which summarizes observed-to-predicted antimicrobial use for one of 40 antimicrobial agent-patient care location combinations. The SAARs are designed to serve as high value targets or high level indicators for antimicrobial stewardship programs (ASPs). SAAR values that are outliers are intended to prompt analysis of possible overuse, underuse, or inappropriate use of antimicrobials, subsequent actions aimed at improving the quality of antimicrobial prescribing, and impact evaluations of ASP interventions.

TYPE

Process

DATA SOURCE

Paper Medical Records, Registry Data

LEVEL

Facility

SETTING

Inpatient/Hospital

NUMERATOR STATEMENT

Days of antimicrobial therapy for antimicrobial agents administered to adult and pediatric patients in medical ICU, medical-surgical ICU, surgical ICU (adult only), medical ward, medical-surgical ward, surgical ward, general hematology-oncology ward (adult only), and step-down unit (adult only).

NUMERATOR DETAILS

An antimicrobial day (also known as a day of therapy) is defined by any amount of a specific antimicrobial agent administered in a calendar day to a particular patient as documented in an electronic medication administration record (eMAR) and/or bar coding medication record (BCMA). All antimicrobial days for specified categories of antibacterial agents administered in specified patient care locations—adult and pediatric medical ICU, medical-surgical ICU, surgical ICU (adult only), medical ward, medical-surgical ward, surgical ward, general hematology-oncology ward (adult only), and step-down unit (adult only)—are summed for each location across months and comprise the numerator data for the measure. The specified categories of antimicrobial agents are: 1) Broad spectrum antibacterial agents predominantly used for hospital-onset infections, 2) Broad spectrum antibacterial agents predominantly used for community-acquired infections, 3) Antibacterial agents predominately used for resistant Gram-positive infections, 4) Narrow spectrum beta-lactam agents, 5) Antifungal agents predominantly used for invasive candidiasis, 6) Antibacterial agents posing the highest risk for CDI, 7) Azithromycin (pediatrics only), 8) All antibacterial agents.

See attached Table 1. NHSN Antimicrobial Use Measure proposal for lists and descriptions of patient care locations and antibacterial agent categories

DENOMINATOR STATEMENT

Days present for each patient care location—adult and pediatric medical ICU, medical-surgical ICU, surgical ICU (adult only), medical ward, medical-surgical ward, surgical ward, general hematology-oncology ward (adult only), and step-down unit (adult only) is defined as the number of patients who were present for any portion of each day of a calendar month for each location. The day of admission, discharge, and transfer to and from locations are included in days present. All days present are summed for each location and month, and the aggregate sums for each location-month combination comprise the denominator data for the measure.

DENOMINATOR DETAILS

See attached Table 1b. NHSN Antimicrobial Use Measure proposal for list and description of patient care locations included in the measure.

EXCLUSIONS

Hospital patient care locations other than adult and pediatric medical ICU, medical-surgical ICU, surgical ICU (adult only), medical ward, medical-surgical ward, surgical ward, general hematology-oncology ward (adult only), and step-down unit (adult only) are excluded from this measure.

EXCLUSION DETAILS

See Table 1b. NHSN Antimicrobial Use Measure for description of patient care locations. Listed locations are included in the measure; all other locations are excluded.

RISK ADJUSTMENT

Statistical risk model

STRATIFICATION

Antimicrobial use data is stratified by hospital-specific and patient care location-specific variables: hospital teaching status (major [medical school and post-graduate training], graduate only [residents and/or fellows], undergraduate only [medical students], not a teaching hospital); hospital bedsize; hospital ICU bedsize; percentage of ICU beds among total beds (number ICU beds/total number hospital beds); average length of hospital stay (number annual admissions/ number annual patient days); patient care location.

TYPE SCORE

Ratio better quality = score within a defined interval

ALGORITHM

The Standardized Antimicrobial Administration Ratio (SAAR), the ratio of observed to predicted antimicrobial use, is a score that can be above, equal to, or below 1.0. A high score (above 1.0) that achieves statistical significance may indicate excessive antimicrobial use. A score that is not significantly different than 1.0 indicates antimicrobial use that is equivalent to the referent population's antimicrobial use. A low score (below 1.0) that achieves statistical significance may indicate antimicrobial under use.

Each SAAR is calculated as follows:

1. Identify the antimicrobial days reported for each patient care location included in the SAAR for the measurement period

2. Total each of these numbers for an observed number of antimicrobial days

3. Obtain the predicted antimicrobial days in the same patient care locations by multiplying the observed days present by the corresponding antimicrobial use rate in the standard population obtained from the relevant regression model

4. Sum the predicted antimicrobial days for the patient care locations included in the SAAR

5. Divide the total number of antimicrobial days by the predicted number of antimicrobial days

6. Result = SAAR

A discrete set of SAARs comprise the antimicrobial use measure: SAARs that are intended to serve as high value targets for antimicrobial stewardship programs and SAARs that are intended to serve as high level indicators of all antimicrobial use across multiple patient care locations.

High value targets – SAARs for 38 different antibacterial agent-patient care location combinations (24 adult, 14 pediatric)

Adult

1. Broad spectrum antibacterial agents predominantly used for hospital-onset infections – adult medical, medical-surgical, and surgical intensive care units

2. Broad spectrum antibacterial agents predominantly used for hospital-onset infections – adult medical, medical-surgical, and surgical wards

3. Broad spectrum antibacterial agents predominantly used for hospital-onset infections – adult general hematology-oncology wards

4. Broad spectrum antibacterial agents predominantly used for hospital-onset infections – adult step-down units

5. Broad spectrum antibacterial agents predominantly used for community-acquired infections – adult medical, medical-surgical, and surgical intensive care units

6. Broad spectrum antibacterial agents predominantly used for community-acquired infections – adult medical, medical-surgical, and surgical wards

7. Broad spectrum antibacterial agents predominantly used for community-acquired infections – adult general hematology-oncology wards

8. Broad spectrum antibacterial agents predominantly used for community-acquired infections – adult step-down units

9. Antibacterial agents predominantly used for resistant Gram-positive infections – adult medical, medical-surgical, and surgical intensive care units

10. Antibacterial agents predominantly used for resistant Gram-positive infections – adult medical, medical-surgical, and surgical wards

11. Antibacterial agents predominantly used for resistant Gram-positive infections – adult general hematology-oncology wards

12. Antibacterial agents predominantly used for resistant Gram-positive infections – adults step-down units

13. Narrow spectrum beta-lactam agents – adult medical, medical-surgical, and surgical intensive care units

14. Narrow spectrum beta-lactam agents – adult medical, medical-surgical, and surgical wards

15. Narrow spectrum beta-lactam agents – adult general hematology-oncology wards

16. Narrow spectrum beta-lactam agents – adult step-down units

17. Antibacterial agents posing highest risk for CDI – adult medical, medical-surgical, and surgical intensive care units

18. Antibacterial agents posing highest risk for CDI – adult medical, medical-surgical, and surgical wards

19. Antibacterial agents posing highest risk for CDI – adult general hematology-oncology wards

20. Antibacterial agents posing highest risk for CDI – adult step-down units

21. Antifungal agents predominantly used for invasive candidiasis – adult medical, medical-surgical, and surgical intensive care units

22. Antifungal agents predominantly used for invasive candidiasis – adult medical, medical-surgical, and surgical wards

23. Antifungal agents predominantly used for invasive candidiasis – adult general hematology-oncology wards

24. Antifungal agents predominantly used for invasive candidiasis – adult step-down units

Pediatric

1. Broad spectrum antibacterial agents predominantly used for hospital-onset infections – pediatric medical and medical-surgical intensive care units

2. Broad spectrum antibacterial agents predominantly used for hospital-onset infections – pediatric medical, medical-surgical, and surgical wards

3. Broad spectrum antibacterial agents predominantly used for community-acquired infections – pediatric medical and medical-surgical intensive care units

4. Broad spectrum antibacterial agents predominantly used for community-acquired infections – pediatric medical, medical-surgical, and surgical wards

5. Antibacterial agents predominantly used for resistant Gram-positive infections – pediatric medical and medical-surgical intensive care units

6. Antibacterial agents predominantly used for resistant Gram-positive infections – pediatric medical, medical-surgical, and surgical wards

7. Narrow spectrum beta-lactam agents – pediatric medical and medical-surgical intensive care units

8. Narrow spectrum beta-lactam agents – pediatric medical, medical-surgical, and surgical wards

9. Azithromycin – pediatric medical and medical-surgical intensive care units

10. Azithromycin – pediatric medical, medical-surgical, and surgical wards

11. Antibacterial agents posing highest risk for CDI – pediatric medical and medical-surgical intensive care units

12. Antibacterial agents posing highest risk for CDI – pediatric medical, medical-surgical, and surgical wards

13. Antifungal agents predominantly used for invasive candidiasis – pediatric medical and medical-surgical intensive care units

14. Antifungal agents predominantly used for invasive candidiasis – pediatric medical, medical-surgical, and surgical wards

High level indicators – SAARs for 2 different antibacterial agent-patient care location combinations

Adult

1. All antibacterial agents – adult medical, medical-surgical, and surgical intensive care units and wards, general hematology-oncology wards, step-down units

Pediatric

1. All antibacterial agents – pediatric medical intensive care units and wards, medical-surgical intensive care units and wards, and surgical wards

COPYRIGHT / DISCLAIMER

2726 Prevention of Central Venous Catheter (CVC)-Related Bloodstream Infections

STEWARD

American Society of Anesthesiologists

DESCRIPTION

Percentage of patients, regardless of age, who undergo central venous catheter (CVC) insertion for whom CVC was inserted with all elements of maximal sterile barrier technique, hand hygiene, skin preparation and, if ultrasound is used, sterile ultrasound techniques followed

TYPE

Process

DATA SOURCE

Registry Data Measure data was collected from the Anesthesia Quality Institute (AQI) National Anesthesia Clinical Outcomes Registry (NACOR).

LEVEL

Clinician : Group/Practice, Clinician : Individual

SETTING

Inpatient/Hospital

NUMERATOR STATEMENT

Patients for whom central venous catheter (CVC) was inserted with all elements of maximal sterile barrier technique*, hand hygiene, skin preparation and, if ultrasound is used, sterile ultrasound techniques** followed

Definitions:

*Maximal sterile barrier technique includes ALL of the following elements:

- cap
- mask
- sterile gown
- sterile gloves
- sterile full body drape

** Sterile ultrasound techniques require sterile gel and sterile probe covers

NUMERATOR DETAILS

Performance Met: CPT® II Code: 6030F- All elements of maximal sterile barrier technique, hand hygiene, skin preparation and, if ultrasound is used, sterile ultrasound techniques followed

Denominator Exception: CPT® II Code: 6030F-1P- Documentation of medical reason(s) for not following all elements of maximal sterile barrier technique, hand hygiene, skin preparation and, if ultrasound is used, sterile ultrasound techniques during CVC insertion (including increased risk of harm to patient if adherence to aseptic technique would cause delay in CVC insertion).

Performance Not Met: CPT® II Code: 6030F-8P- All elements of maximal sterile barrier technique, hand hygiene, skin preparation and, if ultrasound is used, sterile ultrasound techniques not followed, reason not otherwise specified.

DENOMINATOR STATEMENT

All patients, regardless of age, who undergo CVC insertion

DENOMINATOR DETAILS

Patient procedure during the performance period (CPT): 36555, 36556, 36557, 36558, 36560, 36561, 36563, 36565, 36566, 36568, 36569, 36570, 36571, 36572, 36573, 36578, 36580, 36581, 36582, 36583, 36584, 36585, 93503

EXCLUSIONS

None

The measure includes a denominator exception as indicated by reporting 6030F-1P for the numerator: Documentation of medical reason(s) for not following all elements of maximal sterile barrier technique, hand hygiene, skin preparation and, if ultrasound is used, sterile ultrasound techniques during CVC insertion (including increased risk of harm to patient if adherence to aseptic technique would cause delay in CVC insertion)

EXCLUSION DETAILS

NA

The measure includes denominator exception as indicated by reporting 6030F-1P for the numerator: Documentation of medical reason(s) for not following all elements of maximal sterile barrier technique, hand hygiene, skin preparation and, if ultrasound is used, sterile ultrasound techniques during CVC insertion (including increased risk of harm to patient if adherence to aseptic technique would cause delay in CVC insertion)

RISK ADJUSTMENT

No risk adjustment or risk stratification

STRATIFICATION

The measure is not stratified.

TYPE SCORE

Rate/proportion better quality = higher score

ALGORITHM

1. Start with Denominator

2. Check Procedure Performed:

a. If Procedure as Listed in the Denominator equals No, do not include in Eligible Population. Stop

Processing.

b. If Procedure as Listed in the Denominator equals Yes, include in the Eligible Population.

3. Denominator Population:

a. Denominator Population is all Eligible Procedures in the Denominator.

4. Start Numerator

5. Check All Elements of Maximal Sterile Barrier Technique Followed:

a. If All Elements of Maximal Sterile Barrier Technique Followed equals Yes, include in Data Completeness Met and Performance Met.

b. If All Elements of Maximal Sterile Barrier Technique Followed equals No, proceed to check Documentation of Medical Reasons for All Elements of Maximal Sterile Barrier Technique Not Followed.

6. Check Documentation of Medical Reasons for All Elements of Maximal Sterile Barrier Technique Not Followed:

a. If Documentation of Medical Reasons for All Elements of Maximal Sterile Barrier Technique Not Followed equals Yes, include in Data Completeness Met and Denominator Exception.

b. If Documentation of Medical Reasons for All Elements of Maximal Sterile Barrier Technique Not Followed equals No, proceed to check All Elements of Maximal Sterile Barrier Technique Not Followed, Reason Not Otherwise Specified.

7. Check All Elements of Maximal Sterile Barrier Technique Not Followed, Reason Not Otherwise Specified:

a. If All Elements of Maximal Sterile Barrier Technique Not Followed, Reason Not Otherwise Specified equals Yes, include in the Data Completeness Met and Performance Not Met.

b. If All Elements of Maximal Sterile Barrier Technique Not Followed, Reason Not Otherwise Specified equals No, proceed to check Data Completeness Not Met.

8. Check Data Completeness Not Met:

a. If Data Completeness Not Met, the Quality Data Code or equivalent was not submitted.

COPYRIGHT / DISCLAIMER

AMA-convened Physician Consortium for Performance Improvement® (AMA-PCPI), now known as the PCPI, nor their members shall be responsible for any use of the Measures.

The AMA's and AMA-PCPI's significant past efforts and contributions to the development and updating of the Measures is acknowledged. ASA is solely responsible for the review and enhancement ("Maintenance") of the Measures as of May 15, 2014.

ASA encourages use of the Measures by other health care professionals, where appropriate.

THE MEASURES AND SPECIFICATIONS ARE PROVIDED "AS IS" WITHOUT WARRANTY OF ANY KIND.

Limited proprietary coding is contained in the Measure specifications for convenience. Users of the proprietary code sets should obtain all necessary licenses from the owners of these code sets. ASA, the AMA, the PCPI and its members and former members of the AMA-PCPI disclaim all liability for use or accuracy of any Current Procedural Terminology (CPT®) or other coding contained in the specifications.

3498e Hospital Harm - Pressure Injury

STEWARD

Centers for Medicare and Medicaid Services (CMS)

DESCRIPTION

This electronic clinical quality measure (eCQM) assesses the proportion of inpatient admissions for patients ages 18 years and older who develop a new stage 2, stage 3, stage 4 pressure injury, deep tissue pressure injury, or unstageable pressure injury during hospitalization.

TYPE

Outcome

DATA SOURCE

Electronic Health Records Hospitals collect EHR data using certified electronic health record technology (CEHRT). The MAT output, which includes the human readable and XML artifacts of the clinical quality language (CQL) for the measure are contained in the eCQM specifications attached. No additional tools are used for data collection for eCQMs.

LEVEL

Facility

SETTING

Inpatient/Hospital

NUMERATOR STATEMENT

The number of hospital inpatient admissions during which a patient developed a new stage 2, stage 3, stage 4 pressure injury, deep tissue pressure injury, or unstageable pressure injury that was not documented as present in the first 24 hours of hospital arrival.

NUMERATOR DETAILS

This is an eCQM, and therefore uses electronic health record data to calculate the measure score. The time period for data collection is during an inpatient hospitalization, beginning at hospital arrival (whether through Emergency Department, observation stay, or directly admitted as inpatient). All data elements necessary to calculate this measure are defined within value sets, described below and available in the VSAC.

Pressure ulcer stage is defined by the VSAC as Pressure Ulcer Stage (2.16.840.1.113883.11.20.9.35).

To access the value sets for the measure, please visit the Value Set Authority Center (VSAC), sponsored by the National Library of Medicine, at https://vsac.nlm.nih.gov/.

DENOMINATOR STATEMENT

All patients 18 years or older at the start of the encounter and discharged inpatient hospital admission during the measurement period. The measure includes inpatient admissions which began in the Emergency Department or in observational status.

DENOMINATOR DETAILS

This measure includes all inpatient admissions for patients aged 18 years and older at the time of admission, and all payers. Measurement period is one year. This measure is at the hospital-by-admission-level; only one numerator event is counted per admission.

Inpatient Encounters are represented using the value set of Encounter Inpatient (2.16.840.1.113883.3.666.5.307).

Emergency Department visits are represented using the value set of Emergency Department Visit (2.16.840.1.113883.3.117.1.7.1.292).

Patients whom had observation encounters are represented using the value set of Observation Services (2.16.840.1.113762.1.4.1111.143).

To access the value sets for the measure, please visit the Value Set Authority Center (VSAC), sponsored by the National Library of Medicine, at https://vsac.nlm.nih.gov/.

EXCLUSIONS

There are no denominator exclusions.

EXCLUSION DETAILS

N/A; there are no denominator exclusions.

RISK ADJUSTMENT

No risk adjustment or risk stratification

STRATIFICATION

N/A; this measure is not stratified.

TYPE SCORE

Rate/proportion better quality = lower score

ALGORITHM

Target population

Inpatient admission encounters, all payer, where individuals are aged 18 years or older at the start of the admission and are discharged within the measurement period.

To create the denominator:

1. If the inpatient admission was during the measurement period, go to Step 2. If not, do not include in measure population.

2. Determine the patient's age in years. The patient's age is equal to the admission date minus the birth date. If the patient is 18 years or older, include in the measure population. If less than 18 years old, do not include in the measure population.

To create the numerator:

1. Of encounters in the denominator, include any qualifying inpatient admissions which include a stage 2, stage 3, stage 4, deep tissue pressure injury, or unstageable pressure injury that was not documented within first 24 hours after hospital arrival.

2. Of the events, keep one (the first) qualifying event per encounter. This measure counts one harm per encounter.

See algorithm flowchart attached as appendix.

COPYRIGHT / DISCLAIMER

3502 Hybrid Hospital-Wide (All-Condition, All-Procedure) Risk-Standardized Mortality Measure

STEWARD

Centers for Medicare & Medicaid Services (CMS)

DESCRIPTION

The measure estimates a hospital-level 30-day risk-standardized mortality rate (RSMR), defined as death from any cause within 30 days after the index admission date for patients who are between the ages of 50 and 94.

Please note that in parallel with the hybrid HWM measure, we are submitting a claims-only HWM measure. Note that ultimately the claims and hybrid measures will be harmonized and use the same exact cohort specifications. The intent is that prior to implementation, the two measures will be exactly the same, with the exception of the additional risk adjustment added

by the CCDE in the hybrid measure. This is analogous to the currently endorsed and implemented hybrid hospital-wide readmissions measure (NQF 1789 and NQF 2879e).

Because of the homology between the claims and hybrid HWM measures, there is no reason to suspect that the results of analyses done for the claims-only measure would differ in any significant way from results of analyses for a nationally representative hybrid measure.

Below we highlight the differences between the two measures, including specifications, data used, and testing which reflect limitations of data availability, as well as actual intended differences in the measure (risk adjustment).

Differences in the measure, data, and testing that reflect limitations in data availability

1. Dataset used for development, some testing (see below for differences), and measure results:
    a. The claims-only measure uses nation-wide Medicare FFS claims and the enrollment database.
    b. The hybrid measure uses an electronic health record (EHR) database from 21 hospitals in the Kaiser Permanente network which includes inpatient claims data information.
2. Age of patients in cohort:
    a. The claims-only measure includes Medicare FFS patients, age 65-94.
    b. The hybrid measure includes all patients age 50-94 (see later discussion for justification)
3. External empiric validity testing
    a. Not possible for the hybrid measure, due to limited data availability. We provide results from the claims-only measure within the hybrid testing form.
4. Socioeconomic risk factor analyses
    a. Not possible for the hybrid measure, due to limited data availability. We provide results from the claims-only measure within the hybrid testing form.
5. Exclusion analyses
    a. To be representative of what we expect the impact would be of the measures' exclusions in a nation-wide sample, we provide the results from the claims-only measure.
6. Meaningful differences
    a. To be representative of what we expect the range of performance would be in a nation-wide sample, we provide the distribution results from the claims-only measure.
7. Difference between the two measures when fully harmonized, prior to implementation:
8. Risk adjustment:
    a. The claims-only measure uses administrative claims data only for risk adjustment
    b. The hybrid measure adds 10 clinical risk variables, derived from a set of core clinical data elements (CCDE) extracted from the EHR.

TYPE

Outcome

DATA SOURCE

Claims, Electronic Health Records, Other Clinical-Hybrid Dataset

Constructed using Kaiser Permanente Northern California matched administrative claims and electronic health record (EHR) data, admission dates from October 1, 2015 – December 30, 2016. This data source was used for measure testing. (An earlier Kaiser dataset from that included all admissions for adult patients to any of their member hospitals between January 1, 2009 and June 30, 2015 was used for measure development, as described in the attached methodology report).

The two data sources listed below were used for testing the claims-based measure; the hybrid testing form includes some testing data from the claims-based measure (for example, for the social risk factor and external validation analyses).

HWM claims-only datasets:

Medicare Part A Inpatient Claims Data

The index dataset contains administrative inpatient hospitalization data for Medicare FFS beneficiaries, aged 65-94 on admission. The history dataset includes administrative inpatient hospitalization data on each patient for the 12 months prior to the index admission. This data was used along with the Medicare Enrollment Database (EDB) for testing the claims-based measure.

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. It was also used to determine hospice enrollment.

LEVEL

Facility

SETTING

Inpatient/Hospital, Other Home-based primary care and home-based palliative care); Settings include: Home, Boarding home, Domiciliary, Assisted Living Facilities, Rest Home or Custodial Care Services

NUMERATOR STATEMENT

The outcome for this measure is 30-day, all-cause mortality. Mortality is defined as death from any cause, either during or after admission, within 30 days of the index admission date.

NUMERATOR DETAILS

The measure outcome is death from any cause within 30 days of the admission date of the index admission. The numerator is a binary variable (1=yes/0=no) that indicates whether the patient died within 30 days of the index admission date.

DENOMINATOR STATEMENT

The cohort includes inpatient admissions for a wide variety of conditions for patients aged between 50 and 94 years old who were discharged from short-term acute care hospitals. If a patient has more than one admission during the measurement year, one admission is randomly selected for inclusion in the measure. Additional details are provided in S.7 Denominator Details.

The age range for this measure differs from that of the claims-only measure due to the limited size of the dataset used for testing. The intent is to harmonize the age range of the hybrid measure with the age range of the claims-only measure, so that both will include admissions for patients age 65-94.

DENOMINATOR DETAILS

The index cohort includes all inpatient admissions for patients aged 50-94 years old. (Note: The intention is to fully harmonize the cohort definition with the claims-only measure so that both measures will capture admissions for patients age 65-94. We deviated from that definition during development and testing due to the limited dataset available that included the EHR data elements needed to calculate this measure. Note that the risk model already includes age in years, as a risk variable.)

An index admission is the hospitalization to which the mortality outcome is attributed and includes admissions for patients:

1. Not transferred from another acute care facility

Rationale: Admissions to an acute cate hospital within one day of discharge from another acute care hospital are considered transfers. Transferred patients are included in the measure cohort, but it is the initial hospitalization rather than any “transfer-in” hospitalization(s), that is included as the hospitalization to which the mortality outcome is attributed (the index admission).

2. Aged between 50 and 94 years

The hybrid measure is intended for the Medicare FFS population but was tested in a limited dataset due to the EHR data elements included. The use of a small dataset required that we expand the sample by including admissions from patients ages 50 to 94 years. Note that the measure already adjusts for age.

3. Not admitted for primary psychiatric diagnoses

Rationale: Patients admitted for psychiatric treatment are typically cared for in separate psychiatric facilities that are not comparable to short-term acute care hospitals (see data dictionary, HWM Non-Acute Care Inclusion tab).

4. Not admitted for rehabilitation

Rationale: These admissions are not typically to a short-term acute care hospital and are not for acute care (see data dictionary, HWM Non-Acute Care Inclusion tab).

5. Not enrolled in hospice at the time of, or 12 months prior to, their index admission

Rationale: Patients enrolled in hospice in the prior 12 months or at the time of admission are unlikely to have 30-day survival as a primary goal

6. Not enrolled in hospice within two days of admission

Rationale: There is not a single, correct approach regarding patients enrolled in hospice during admission or upon discharge – mortality may or may not represent a quality signal for this group of patients and hospice enrollment is inadequate to differentiate this issue. However, for most patients and/or families who had the discussion and agreed to enroll in hospice within two days of admission, 30-day survival is not likely the primary goal due to their condition and not the quality of care received.

7. Not with a principal diagnosis of cancer and enrolled in hospice during their index admission

Rationale: Patients admitted primarily for cancer who are enrolled in hospice during admission are unlikely to have 30-day survival as a primary goal of care. (see data dictionary, HWM Cancer Inclusion tab).

8. Without any diagnosis of metastatic cancer

Rationale: Although some patients admitted with a diagnosis of metastatic cancer will have 30-day survival as a primary goal of care, for many such patients admitted to the hospital, death may be a clinically reasonable and patient-centered outcome. (see data dictionary, HWM Metastatic Cancer Inclusion tab).

9. Not with a principal discharge diagnosis, or a secondary diagnosis that is present on admission (POA) for a condition which hospitals have limited ability to influence survival

Rationale: Hospitals have little ability to impact mortality for some conditions. This list of conditions (see data dictionary, HWM ICD-10 Inclusion tab) was determined through independent review, by several clinicians, of conditions associated with high mortality. The decisions were also reviewed with our Technical Expert Panel (TEP) and Technical Work Group. Admissions are not included in the cohort if the patient had a principal diagnosis code that is on this list, or a secondary code with POA that is on the list.

In addition, for patients with multiple admissions, the measure selects only one admission, at random, for inclusion. There is no practical statistical modeling approach that can account or adjust for the complex relationship between the number of admissions and risk of mortality in the context of a hospital-wide mortality measure. Random selection ensures that providers are not penalized for a “last” admission during the measurement period; selecting the last admission would not be as accurate a reflection of the risk of death as random selection, as the last admission is inherently associated with a higher mortality risk. Random selection is also used in CMS’s condition-specific mortality measures. Note that random selection reduces the number of admissions, but does not exclude any patients from the measure.

The cohort is defined using ICD-10 Clinical Modification codes identified in Medicare Part A Inpatient claims data. The measure aggregates the ICD-10 principal diagnosis and all procedure codes of the index admission into clinically coherent groups of conditions and procedures (condition categories or procedure categories) using the Agency for Healthcare Research and Quality (AHRQ) Clinical Classifications System (CCS). There is a total of 285 mutually exclusive AHRQ condition categories, most of which are single, homogenous diseases such as pneumonia or acute myocardial infarction. Some are aggregates of conditions, such as “other bacterial infections”. There is a total of 231 mutually exclusive procedure categories. Using the AHRQ CCS procedure and condition categories, the measure assigns each index hospitalization to one of 15 mutually exclusive divisions. The divisions were created based upon clinical coherence, consistency of mortality risk, adequate patient and hospital case volume for stable results reporting, and input from clinicians, patients, and patient caregivers on usability.

The measure first assigns admissions with qualifying AHRQ procedure categories to one of six surgery divisions by identifying a defining surgical procedure. The defining surgical procedure is identified using the following algorithm: 1) if a patient only has one major surgical procedure then that procedure is the defining surgical procedure; 2) if a patient has more than one major surgical procedure, the first dated procedure performed during the index admission is the defining surgical procedure; 3) if there is more than one major surgical procedure on that earliest date, the procedure with the highest mortality rate is the defining surgical procedure. These divisions include admissions likely cared for by surgical teams.

The surgical divisions are: Surgical Cancer (see note below), Cardiothoracic Surgery, General Surgery, Neurosurgery, Orthopedic Surgery, and Other Surgical Procedures.

For the Surgical Cancer division, any admission that includes a surgical procedure and a principal discharge diagnosis code of cancer is assigned to the Surgical Cancer division. This division and the logic behind it was implemented in response to feedback from our Technical Expert Panel.

The measure then assigns the remaining admissions into one of the nine non-surgical divisions based on the AHRQ diagnostic CCS of the principal discharge diagnosis. The non-surgical divisions are: Cancer, Cardiac, Gastrointestinal, Infectious Disease, Neurology, Orthopedic, Pulmonary, Renal, Other Conditions.

The full list of the specific diagnosis and procedure AHRQ CCS categories used to define the divisions are attached in the Data Dictionary.

EXCLUSIONS

The measure excludes index admissions for patients:

1. With inconsistent or unknown vital status (from claims data) or other unreliable claims data;

2. Discharged against medical advice (AMA);

3. With an admission for spinal cord injury (CCS 227), skull and face fractures (CCS 228), Intracranial Injury (CCS 233), Crushing injury or internal injury (CCS 234), Open wounds of head/neck/trunk (CCS 235), and burns (CCS 240); and

4. With a principal discharge diagnosis within a CCS with fewer than 100 admissions in that division within the measurement year.

EXCLUSION DETAILS

1. With inconsistent or unknown vital status (from claims data) or other unreliable claims data.

Rationale: The measure does not include stays for patients where the admission date is after the date of death, or where the date of death occurs before the date of discharge but the patient was discharged alive because these are likely errors in the data.

2. Discharged against medical advice (AMA)

Rationale: Providers did not have the opportunity to deliver full care and prepare the patient for discharge.

3. With an admission for spinal cord injury (CCS 227), skull and face fractures (CCS 228), Intracranial Injury (CCS 233), Crushing injury or internal injury (CCS 234), Open wounds of head/neck/trunk (CCS 235), and burns (CCS 240).

Rationale: Even though a hospital likely can influence the outcome of some of these conditions, in many cases death events are not a signal of poor quality of care when patients present with these conditions. These conditions are also infrequent events that are unlikely to be uniformly distributed across hospitals.

4. With a principal discharge diagnosis within a CCS with fewer than 100 admissions in that division within the measurement year.

Rationale: To calculate a stable and precise risk model, there are a minimum number of admissions that are needed. In addition, a minimum number of admissions and/or outcome events are required to inform grouping admissions into larger categories. These admissions present challenges to both accurate risk prediction and coherent risk grouping and are therefore excluded.

Note: During measure development we analyzed different volume cut-offs (25, 50 and 100). Using cut-off values below 100 resulted in too many CCS codes in some of the divisions (the CCS category codes are used in risk adjustment) which resulted in non-convergence of those division-level risk models. The total number of patients excluded is very small (13,597 or 0.21% of admissions for a cut off of 100). During measure development we also explored the option of pooling low-volume CCS codes (CCS<100 patients) into one group, however, the heterogeneity in mortality rates for the individual ICD-10 codes in those groups would preclude adequate risk adjustment. The TEP supported excluding these admissions.

RISK ADJUSTMENT

Statistical risk model

STRATIFICATION

N/A

TYPE SCORE

Rate/proportion better quality = lower score

ALGORITHM

The measure estimates hospital-level, risk-standardized mortality rates (RSMRs) within 30 days of hospital admission using hierarchical logistical regression models through a Bayesian Markov Chain Monte Carlo (MCMC) procedure. In brief, we used hierarchical logistic regression to model the log-odds of mortality for each of the 15 service-line divisions. Death within 30 days was modeled as a function of patient-level demographic and clinical characteristics and a random hospital-level intercept. This model specification accounts for within-hospital correlation of the observed outcomes and models the assumption that underlying differences in quality among the health care facilities being evaluated lead to systematic differences in outcomes. We estimated a separate hierarchical logistic regression model for each service-line division. In order to obtain the variance and interval estimates, we fit the hierarchical model under the Bayesian framework along with the Markov Chain Monte Carlo (MCMC) technique.

Admissions are assigned to one of 15 mutually exclusive divisions (groups of discharge condition categories and procedure categories). For each division and each hospital with patients in that division, the standardized mortality ratio (SMR) is calculated as the ratio of the number of “predicted” deaths to the number of “expected” deaths at a given hospital. The predicted number of deaths is based on the hospital’s performance with its observed case mix and service mix, and 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 for each cohort is added to the sum of the estimated regression coefficients multiplied by patient characteristics. The results are transformed via an inverse logit function and summed over all patients attributed to a hospital to get a predicted value. The expected number of deaths is based on the nation’s performance with that hospital’s case mix and service mix and 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 transformed via an inverse logit function and summed over all patients in the hospital to get an expected value. This approach is analogous to a ratio of “observed” to “expected” used in other types of statistical analyses. It conceptually allows a particular hospital’s performance, given its case mix and service mix, to be compared to an average hospital’s performance with the same case mix and service mix. Thus, a lower ratio

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

To assess hospital performance for each reporting period, the measure re-estimates the model coefficients using the data in that period.

The division-level SMRs are then pooled for each hospital using an inverse variance-weighted geometric mean to create a hospital-wide composite SMR. (Note that in the case of the hybrid measure, we are presenting data from 9 of the total 15 divisions due to limitations in availability of electronic health records data). The hospital-wide SMR is then multiplied by the national observed mortality rate to produce the RSMR.

COPYRIGHT / DISCLAIMER

3503e Hospital Harm – Severe Hypoglycemia

STEWARD

Centers for Medicare & Medicaid Services (CMS)

DESCRIPTION

This electronic clinical quality measure (eCQM) assesses the proportion of inpatient admissions for patients aged 18 years and older who received at least one antihyperglycemic medication during their hospitalization, and who suffered a severe hypoglycemic event (blood glucose less than 40 mg/dL) within 24 hours of the administration of an antihyperglycemic agent.

TYPE

Outcome

DATA SOURCE

Electronic Health Records Hospitals collect EHR data using certified electronic health record technology (CEHRT). The MAT output, which includes the human readable and XML artifacts of the clinical quality language (CQL) for the measure are contained in the eCQM specifications attached. No additional tools are used for data collection for eCQMs.

LEVEL

Facility

SETTING

Inpatient/Hospital

NUMERATOR STATEMENT

The number of inpatient admissions during which a test for blood glucose with a result less than 40 mg/dL (severe hypoglycemia) where the event follows the administration of an antihyperglycemic medication within 24 hours.

NUMERATOR DETAILS

This is an eCQM, and therefore uses electronic health record data to calculate the measure score. The time period for data collection is during an inpatient hospitalization, beginning at

hospital arrival (whether through Emergency Department, observation stay, or directly admitted as inpatient).

All data elements necessary to calculate this measure are defined within value sets available in the VSAC, and listed below.

Glucose tests are represented by LOINC Codes in the value set Glucose Lab Test (2.16.840.1.113762.1.4.1045.134). Codes include both laboratory and point-of-care glucose tests, including venous or arterial blood and serum or plasma.

The antihyperglycemic medications are defined by the value set of Hypoglycemics (2.16.840.1.113762.1.4.1179.3). This value set includes medications and insulin capable of causing hypoglycemia in a patient.

To access the value sets for the measure, please visit the Value Set Authority Center (VSAC), sponsored by the National Library of Medicine, at https://vsac.nlm.nih.gov/.

DENOMINATOR STATEMENT

All patients 18 years or older at the start of the encounter with a discharged inpatient hospital admission during the measurement period who were given at least one antihyperglycemic medication during their hospital stay. The measure includes inpatient admissions which began in the Emergency Department or in observation status.

DENOMINATOR DETAILS

This measure includes all encounters aged 18 years and older at the time of admission, and all payers. Measurement period is one year. This measure is at the hospital-by-admission level; only one numerator event is counted per admission.

Inpatient Encounters are represented using the value set of Encounter Inpatient (2.16.840.1.113883.3.666.5.307).

Emergency Department visits are represented using the value set of Emergency Department Visit (2.16.840.1.113883.3.117.1.7.1.292).

Patients who had observation encounters are represented using the value set of Observation Services (2.16.840.1.113762.1.4.1111.143).

Encounters who were given at least one antihyperglycemic medication are defined by the value set of Hypoglycemics (2.16.840.1.113762.1.4.1179.3), which also defines the numerator medications. This value set includes medications and insulin capable of causing hypoglycemia in a patient.

To access the value sets for the measure, please visit the Value Set Authority Center, sponsored by the National Library of Medicine, at https://vsac.nlm.nih.gov/.

EXCLUSIONS

N/A, there are no denominator exclusions.

EXCLUSION DETAILS

N/A

RISK ADJUSTMENT

No risk adjustment or risk stratification

STRATIFICATION

N/A; this measure is not stratified.

TYPE SCORE

Rate/proportion better quality = lower score

ALGORITHM

Target population: Inpatient admission encounters, all payer, where individuals are aged 18 years or older at the start of the admission and who were given at least one antihyperglycemic medication during their hospital stay, within the measurement period.

To create the denominator:

1. If the inpatient admission was during the measurement period, go to Step 2. If not, do not include in measure population.

2. Determine the patient's age in years. The patient's age is equal to the admission date minus the birth date. If the patient is 18 years or older, go to Step 3. If less than 18 years old, do not include in the measure population.

3. Determine if there was at least one antihyperglycemic medication (from the Hypoglycemic value set 2.16.840.1.113762.1.4.1179.3) administered during the inpatient hospitalization (including in the Emergency Department or observation stay if later converted into an inpatient admission). If not, do not include in the measure population.

To create the numerator, for each encounter identify:

1. Any instance of a test for blood glucose with a result less than 40 mg/dL during the encounter is considered a severe hypoglycemic event, including values from either laboratory or Point of Care (POC) testing.

2. For any value less than 40mg/dL, determine if there was an antihyperglycemic medication administered by hospital staff within the 24 hours before the event and during the hospitalization (including emergency department and observation stays contiguous with the admission). If not, do not include in the numerator.

a. The 24-hour time frame extends from the end of the medication administration to the start of the blood glucose test.

3. For any value less than 40mg/dL, do not include any events (identified in Step 1) if it was followed by a repeat POC test for blood glucose within 5 minutes of the initial test and with a result greater than 80 mg/dL.

a. Rationale: The measure logic does –not– require a repeat blood glucose test to be performed. The expectation is that in most cases of severe hypoglycemia, the clinical team will be treating the patient and will not immediately repeat the test. However, if the severe hypoglycemic event is suspected to be spurious, for example if the patient is clinically asymptomatic, and a repeat test is performed to confirm that suspicion, this step will remove false positives that can occur in POC testing to ensure hospitals are not penalized for erroneous results. The 5-minute time frame extends from the time that the initial blood glucose test was performed to the time that the repeat blood glucose test was performed.

Only the first qualifying severe hypoglycemic event is counted in the numerator, and only one severe hypoglycemic event is counted per encounter.

3504 Claims-Only Hospital-Wide (All-Condition, All-Procedure) Risk-Standardized Mortality Measure

STEWARD

Centers for Medicare & Medicaid Services (CMS)

DESCRIPTION

The measure estimates a hospital-level 30-day hospital-wide risk-standardized mortality rate (RSMR), defined as death from any cause within 30 days after the index admission date, for Medicare fee-for-service (FFS) patients who are between the ages of 65 and 94.

Please note that in parallel with the claims-only HWM measure, we are submitting a hybrid HWM measure. Note that ultimately the claims and hybrid measures will be harmonized and use the same exact cohort specifications. The intent is that prior to implementation, the two measures will be exactly the same, with the exception of the additional risk adjustment added by the CCDE in the hybrid measure. This is analogous to the currently endorsed and implemented hybrid hospital-wide readmissions measure (NQF 1789 and NQF 2879e).

Because of the homology between the claims and hybrid HWM measures, there is no reason to suspect that the results of analyses done for the claims-only measure would differ in any significant way from results of analyses for a nationally representative hybrid measure.

Below we highlight the differences between the two measures, including specifications, data used, and testing which reflect limitations of data availability, as well as actual intended differences in the measure (risk adjustment).

Differences in the measure, data, and testing that reflect limitations in data availability

1. Dataset used for development, some testing (see below for differences), and measure results:
    a. The claims-only measure uses nation-wide Medicare FFS claims and the enrollment database.
    b. The hybrid measure uses an electronic health record (EHR) database from 21 hospitals in the Kaiser Permanente network which includes inpatient claims data information.
2. Age of patients in cohort:
    a. The claims-only measure includes Medicare FFS patients, age 65-94.
    b. The hybrid measure includes all patients age 50-94 (see later discussion for justification)
3. External empiric validity testing

a. Not possible for the hybrid measure, due to limited data availability. We provide results from the claims-only measure within the hybrid testing form.

4. Socioeconomic risk factor analyses

a. Not possible for the hybrid measure, due to limited data availability. We provide results from the claims-only measure within the hybrid testing form.

5. Exclusion analyses

a. To be representative of what we expect the impact would be of the measures' exclusions in a nation-wide sample, we provide the results from the claims-only measure.

6. Meaningful differences

a. To be representative of what we expect the range of performance would be in a nation-wide sample, we provide the distribution results from the claims-only measure.

7. Difference between the two measures when fully harmonized, prior to implementation:

8. Risk adjustment:

a. The claims-only measure uses administrative claims data only for risk adjustment

b. The hybrid measure adds 10 clinical risk variables, derived from a set of core clinical data elements (CCDE) extracted from the EHR.

TYPE

Outcome

DATA SOURCE

Claims, Enrollment Data, Other Data sources for the Medicare FFS measure:

1. Medicare Part A Inpatient: The index dataset contains administrative inpatient hospitalization data for Medicare FFS beneficiaries, aged 65-94 on admission, hospitalized from July 1, 2016-June 30, 2017. The history dataset includes administrative inpatient hospitalization data on each patient for the 12 months prior to the index admission.

2. Medicare Enrollment Database (EDB): This database contains Medicare beneficiary demographic, benefit/coverage, and vital status information. This data source was used to obtain information on several inclusion/exclusion indicators such as Medicare status on admission as well as vital status. It was also used to determine hospice enrollment.

LEVEL

Facility

SETTING

Inpatient/Hospital

NUMERATOR STATEMENT

The outcome for this measure is 30-day, all-cause mortality. Mortality is defined as death from any cause, either during or after admission, within 30 days of the index admission date.

NUMERATOR DETAILS

The measure outcome is death from any cause within 30 days of the admission date of the index admission, for Medicare FFS patients identified using the Medicare Enrollment Database (EDB). The numerator is a binary variable (1=yes/0=no) that indicates whether the patient died within 30 days of the index admission date.

DENOMINATOR STATEMENT

The cohort includes inpatient admissions for a wide variety of conditions for Medicare FFS patients aged between 65 and 94 years old who were admitted to short-term acute care hospitals. If a patient has more than one admission during the measurement year, one admission is randomly selected for inclusion in the measure. Additional details are provided in S.7 Denominator Details.

DENOMINATOR DETAILS

An index admission is the hospitalization to which the mortality outcome is attributed and includes admissions for patients:

1. Enrolled in Medicare FFS Part A for at least 12 months prior to the date of admission and during the index admission

Rationale: Claims data are consistently available only for Medicare FFS beneficiaries. The 12-month prior enrollment criterion ensures a full year of administrative data is available for risk adjustment.

2. Not transferred from another acute care facility

Rationale: Admissions to an acute cate hospital within one day of discharge from another acute care hospital are considered transfers. Transferred patients are included in the measure cohort, but it is the initial hospitalization rather than any “transfer-in” hospitalization(s), that is included as the hospitalization to which the mortality outcome is attributed (the index admission).

3. Aged between 65 and 94 years

Rationale: Medicare patients younger than 65 are not included in the measure because they usually qualify for the program due to severe disability and are considered to be clinically distinct from Medicare patients 65 and over. Patients over age 94 are not included to avoid holding hospitals responsible for the survival of the very elderly patients, who may be less likely to have survival as a primary goal.

Note that the hybrid measure (submitted for NQF endorsement in parallel with the claims-only measure) differs from the claims-only measure in terms of the age range of included admissions; the hybrid measure includes all inpatient admissions for patients aged 50-94 years old. The intention is to fully harmonize the cohort definitions for the two measures, so that both measures will capture admissions for patients age 65-94. We deviated from that definition during development and testing for the hybrid measure due to the limited dataset available that included the EHR data elements needed to calculate the hybrid measure. Note that the risk model already includes age in years, as a risk variable.)

4. Not admitted for primary psychiatric diagnoses

Rationale: Patients admitted for psychiatric treatment are typically cared for in separate psychiatric facilities that are not comparable to short-term acute care hospitals (see data dictionary, HWM Non-Acute Care Inclusion tab).

5. Not admitted for rehabilitation

Rationale: These admissions are not typically to a short-term acute care hospital and are not for acute care (see data dictionary, HWM Non-Acute Care Inclusion tab).

6. Not enrolled in hospice at the time of, or 12 months prior to, their index admission

Rationale: Patients enrolled in hospice in the prior 12 months or at the time of admission are unlikely to have 30-day survival as a primary goal.

7. Not enrolled in hospice within two days of admission

Rationale: There is not a single, correct approach regarding patients enrolled in hospice during admission or upon discharge – mortality may or may not represent a quality signal for this group of patients and hospice enrollment is inadequate to differentiate this issue. However, for most patients and/or families who had the discussion and agreed to enroll in hospice within two days of admission, 30-day survival is not likely the primary goal due to their condition and not the quality of care received.

8. Not with a principal diagnosis of cancer and enrolled in hospice during their index admission

Rationale: Patients admitted primarily for cancer who are enrolled in hospice during admission are unlikely to have 30-day survival as a primary goal of care. (see data dictionary, HWM Cancer Inclusion tab).

9. Without any diagnosis of metastatic cancer

Rationale: Although some patients admitted with a diagnosis of metastatic cancer will have 30-day survival as a primary goal of care, for many such patients admitted to the hospital, death may be a clinically reasonable and patient-centered outcome. (see data dictionary, HWM Metastatic Cancer Inclusion tab).

10. Not with a principal discharge diagnosis, or a secondary diagnosis that is present on admission (POA) for a condition which hospitals have limited ability to influence survival

Rationale: Hospitals have little ability to impact mortality for some conditions. This list of conditions (see data dictionary, HWM ICD-10 Inclusion tab) was determined through independent review, by several clinicians, of conditions associated with high mortality. The decisions were also reviewed with our Technical Expert Panel (TEP) and Technical Work Group. Admissions are not included in the cohort if the patient had a principal diagnosis code that is on this list, or a secondary code with POA that is on the list.

In addition, for patients with multiple admissions, the measure selects only one admission, at random, for inclusion. There is no practical statistical modeling approach that can account or adjust for the complex relationship between the number of admissions and risk of mortality in the context of a hospital-wide mortality measure. Random selection ensures that providers are not penalized for a “last” admission during the measurement period; selecting the last admission would not be as accurate a reflection of the risk of death as random selection, as the last admission is inherently associated with a higher mortality risk. Random selection is also used in CMS’s condition-specific mortality measures. Note that random selection reduces the number of admissions, but does not exclude any patients from the measure.

The cohort is defined using ICD-10 Clinical Modification codes identified in Medicare Part A Inpatient claims data. The measure aggregates the ICD-10 principal diagnosis and all procedure codes of the index admission into clinically coherent groups of conditions and procedures (condition categories or procedure categories) using the Agency for Healthcare Research and Quality (AHRQ) Clinical Classifications System (CCS). There is a total of 285 mutually exclusive AHRQ condition categories, most of which are single, homogenous diseases such as pneumonia or acute myocardial infarction. Some are aggregates of conditions, such as “other bacterial

infections". There is a total of 231 mutually exclusive procedure categories. Using the AHRQ CCS procedure and condition categories, the measure assigns each index hospitalization to one of 15 mutually exclusive divisions. The divisions were created based upon clinical coherence, consistency of mortality risk, adequate patient and hospital case volume for stable results reporting, and input from clinicians, patients, and patient caregivers on usability.

The measure first assigns admissions with qualifying AHRQ procedure categories to one of six surgery divisions by identifying a defining surgical procedure. The defining surgical procedure is identified using the following algorithm: 1) if a patient only has one major surgical procedure then that procedure is the defining surgical procedure; 2) if a patient has more than one major surgical procedure, the first dated procedure performed during the index admission is the defining surgical procedure; 3) if there is more than one major surgical procedure on that earliest date, the procedure with the highest mortality rate is the defining surgical procedure. These divisions include admissions likely cared for by surgical teams.

The surgical divisions are: Surgical Cancer (see note below), Cardiothoracic Surgery, General Surgery, Neurosurgery, Orthopedic Surgery, and Other Surgical Procedures.

For the Surgical Cancer division, any admission that includes a surgical procedure and a principal discharge diagnosis code of cancer is assigned to the Surgical Cancer division. This division and the logic behind it was implemented in response to feedback from our Technical Expert Panel.

The measure then assigns the remaining admissions into one of the nine non-surgical divisions based on the AHRQ diagnostic CCS of the principal discharge diagnosis. The non-surgical divisions are: Cancer, Cardiac, Gastrointestinal, Infectious Disease, Neurology, Orthopedic, Pulmonary, Renal, Other Conditions.

The full list of the specific diagnosis and procedure AHRQ CCS categories used to define the divisions are attached in the Data Dictionary.

EXCLUSIONS

The measure excludes index admissions for patients:

1. With inconsistent or unknown vital status (from claims data) or other unreliable claims data;
2. Discharged against medical advice (AMA);
3. With an admission for spinal cord injury (CCS 227), skull and face fractures (CCS 228), Intracranial Injury (CCS 233), Crushing injury or internal injury (CCS 234), Open wounds of head/neck/trunk (CCS 235), and burns (CCS 240); and
4. With a principal discharge diagnosis within a CCS with fewer than 100 admissions within the measurement year.

EXCLUSION DETAILS

1. With inconsistent or unknown vital status (from claims data) or other unreliable claims data

Rationale: The measure does not include stays for patients where the admission date is after the date of death in the Medicare Enrollment Database, or where the date of death occurs before the date of discharge but the patient was discharged alive because these are likely errors in the data.

2. Discharged against medical advice (AMA)

Rationale: Providers did not have the opportunity to deliver full care and prepare the patient for discharge.

3. With an admission for spinal cord injury (CCS 227), skull and face fractures (CCS 228), Intracranial Injury (CCS 233), Crushing injury or internal injury (CCS 234), Open wounds of head/neck/trunk (CCS 235), and burns (CCS 240)

Rationale: Even though a hospital likely can influence the outcome of some of these conditions, in many cases death events are not a signal of poor quality of care when patients present with these conditions. These conditions are also infrequent events that are unlikely to be uniformly distributed across hospitals.

4. With a principal discharge diagnosis within a CCS with fewer than 100 admissions in that division within the measurement year.

Rationale: To calculate a stable and precise risk model, there are a minimum number of admissions that are needed. In addition, a minimum number of admissions and/or outcome events are required to inform grouping admissions into larger categories. These admissions present challenges to both accurate risk prediction and coherent risk grouping and are therefore excluded.

Note: During measure development we analyzed different volume cut-offs (25, 50 and 100). Using cut-off values below 100 resulted in too many CCS codes in some of the divisions (the CCS category codes are used in risk adjustment) which resulted in non-convergence of those division-level risk models. The total number of patients excluded is very small (13,597 or 0.21% of admissions for a cut off of 100). During measure development we also explored the option of pooling low-volume CCS codes (CCS<100 patients) into one group, however, the heterogeneity in mortality rates for the individual ICD-10 codes in those groups would preclude adequate risk adjustment. The TEP supported excluding these admissions.

RISK ADJUSTMENT

Statistical risk model

STRATIFICATION

N/A

TYPE SCORE

Rate/proportion better quality = lower score

ALGORITHM

The measure estimates hospital-level, risk-standardized mortality rates (RSMRs) within 30 days of hospital admission using hierarchical logistical regression models through a Bayesian Markov Chain Monte Carlo (MCMC) procedure. In brief, we used hierarchical logistic regression to model the log-odds of mortality for each of the 15 service-line divisions. Death within 30 days was modeled as a function of patient-level demographic and clinical characteristics and a random hospital-level intercept. This model specification accounts for within-hospital correlation of the observed outcomes and models the assumption that underlying differences in quality among the health care facilities being evaluated lead to systematic differences in outcomes. We estimated a separate hierarchical logistic regression model for each service-line division. In order to obtain the variance and interval estimates, we fit the hierarchical model under the Bayesian framework along with the Markov Chain Monte Carlo (MCMC) technique.

Admissions are assigned to one of 15 mutually exclusive divisions (groups of discharge condition categories and procedure categories). For each division and each hospital with patients in that division, the standardized mortality ratio (SMR) is calculated as the ratio of the number of

"predicted" deaths to the number of "expected" deaths at a given hospital. The predicted number of deaths is based on the hospital's performance with its observed case mix and service mix, and 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 for each cohort is added to the sum of the estimated regression coefficients multiplied by patient characteristics. The results are transformed via an inverse logit function and summed over all patients attributed to a hospital to get a predicted value. The expected number of deaths is based on the nation's performance with that hospital's case mix and service mix and 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 transformed via an inverse logit function and summed over all patients in the hospital to get an expected value. This approach is analogous to a ratio of "observed" to "expected" used in other types of statistical analyses. It conceptually allows a particular hospital's performance, given its case mix and service mix, to be compared to an average hospital's performance with the same case mix and service mix. Thus, a lower ratio indicates lower-than-expected mortality rates or better quality, while a higher ratio indicates higher-than-expected mortality rates or worse quality.

To assess hospital performance for each reporting period, the measure re-estimates the model coefficients using the data in that period.

The division-level SMRs are then pooled for each hospital using an inverse variance-weighted geometric mean to create a hospital-wide composite SMR. The hospital-wide SMR is then multiplied by the national observed mortality rate to produce the RSMR.

Appendix E1: Related and Competing Measures (tabular format)

Comparison of NQF 3502, 1789, 1550, 0468, 1893, 2558, 0230, 0229, 2876, 0347 and 0530

	3502 Hybrid Hospital-Wide (All-Condition, All-Procedure) Risk-Standardized Mortality Measure	1789 Hospital-Wide All-Cause Unplanned Readmission Measure (HWR)	1550 Hospital-level risk-standardized complication rate (RSCR) following elective primary total hip arthroplasty (THA) and/or total knee arthroplasty (TKA)	0468 Hospital 30-day, all-cause, risk-standardized mortality rate (RSMR) following pneumonia hospitalization	1893 Hospital 30-Day, all-cause, risk-standardized mortality rate (RSMR) following chronic obstructive pulmonary disease (COPD) hospitalization	2558 Hospital 30-Day, All-Cause, Risk-Standardized Mortality Rate (RSMR) Following Coronary Artery Bypass Graft (CABG) Surgery
Steward	Centers for Medicare & Medicaid Services (CMS)	Centers for Medicare & Medicaid Services (CMS)	Centers for Medicare & Medicaid Services	Centers for Medicare & Medicaid Services (CMS)	Centers for Medicare & Medicaid Services	Centers for Medicare & Medicaid Services
Description	The measure estimates a hospital-level 30-day risk-standardized mortality rate (RSMR), defined as death from any cause within 30 days after the index admission date for patients who are between the ages of 50 and 94. Please note that in parallel with the hybrid HWM measure, we are submitting a claims-only HWM measure. Note that ultimately the claims and hybrid measures will be harmonized and use the same exact cohort specifications. The intent is that prior to implementation, the two measures will be exactly the same, with the exception of the additional risk adjustment added by the CCDE in the hybrid measure. This is analogous to the currently endorsed and implemented hybrid hospital-wide readmissions measure (NQF 1789 and NQF 2879e). Because of the homology between the claims and hybrid HWM measures, there is no reason to suspect that the results of analyses done for the claims-only measure would differ in any significant way from results of analyses for a nationally representative hybrid measure. Below we highlight the differences between the two measures, including specifications, data used, and testing which reflect limitations of data availability, as well as actual intended differences in the measure (risk adjustment). Differences in the measure, data, and testing that reflect limitations in data availability	For the hospital-wide readmission (HWR) measure that was previously endorsed and is used in the Hospital Inpatient Quality Reporting Program (IQR), the measure estimates a hospital-level risk-standardized readmission rate (RSRR) of unplanned, all-cause readmission after admission for any eligible condition within 30 days of hospital discharge. The measure reports a single summary RSRR, derived from the volume-weighted results of five different models, one for each of the following specialty cohorts based on groups of discharge condition categories or procedure categories: surgery/gynecology; general medicine; cardiorespiratory; cardiovascular; and neurology, each of which will be described in greater detail below. The measure also indicates the hospital-level standardized risk ratios (SRR) for each of these five specialty cohorts. The outcome is defined as unplanned readmission for any cause within 30 days of the discharge date for the index admission (the admission included in the measure cohort). A specified set of planned readmissions do not count in the readmission outcome. CMS annually reports the measure for patients who are 65 years or older, are enrolled in fee-for-service (FFS) Medicare, and hospitalized in non-federal hospitals. For the All-Cause Readmission (ACR) measure version used in the Shared Savings Program (SSP), the measure estimates an Accountable Care Organization (ACO)	The measure estimates a hospital-level risk-standardized complication rate (RSCR) associated with elective primary THA and TKA in Medicare Fee-For-Service beneficiaries who are 65 years and older. The outcome (complication) is defined as any one of the specified complications occurring from the date of index admission to 90 days post date of the index admission (the admission included in the measure cohort). The target population is patients 18 and over. CMS annually reports the measure for patients who are 65 years or older, are enrolled in fee-for-service (FFS) Medicare, and hospitalized in non-federal acute-care hospitals.	This measure estimates a hospital-level, 30-day risk-standardized mortality rate (RSMR) for patients discharged from the hospital with a principal discharge diagnosis of pneumonia, including aspiration pneumonia or a principal discharge diagnosis of sepsis (not severe sepsis) with a secondary discharge diagnosis of pneumonia (including aspiration pneumonia) coded as present on admission (POA). Mortality is defined as death from any cause within 30 days of the index admission date. The Centers for Medicare & Medicaid Services (CMS) annually reports the measure for patients who are 65 years or older and are either Medicare fee-for-service (FFS) beneficiaries and hospitalized in non-federal acute care hospitals.	This measure estimates a hospital-level, 30-day risk-standardized mortality rate (RSMR) for patients discharged from the hospital with a principal discharge diagnosis of COPD or a principal discharge diagnosis of respiratory failure with a secondary discharge diagnosis of acute exacerbation of COPD. Mortality is defined as death from any cause within 30 days of the index admission date. The Centers for Medicare & Medicaid Services (CMS) annually reports the measure for patients who are 65 years or older and are Medicare fee-for-service (FFS) beneficiaries hospitalized in non-federal acute care hospitals	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.

	3502 Hybrid Hospital-Wide (All-Condition, All-Procedure) Risk-Standardized Mortality Measure	1789 Hospital-Wide All-Cause Unplanned Readmission Measure (HWR)	1550 Hospital-level risk-standardized complication rate (RSCR) following elective primary total hip arthroplasty (THA) and/or total knee arthroplasty (TKA)	0468 Hospital 30-day, all-cause, risk-standardized mortality rate (RSMR) following pneumonia hospitalization	1893 Hospital 30-Day, all-cause, risk-standardized mortality rate (RSMR) following chronic obstructive pulmonary disease (COPD) hospitalization	2558 Hospital 30-Day, All-Cause, Risk-Standardized Mortality Rate (RSMR) Following Coronary Artery Bypass Graft (CABG) Surgery
	1. Dataset used for development, some testing (see below for differences), and measure results: a. The claims-only measure uses nation-wide Medicare FFS claims and the enrollment database. b. The hybrid measure uses an electronic health record (EHR) database from 21 hospitals in the Kaiser Permanente network which includes inpatient claims data information. 2. Age of patients in cohort: a. The claims-only measure includes Medicare FFS patients, age 65-94. b. The hybrid measure includes all patients age 50-94 (see later discussion for justification) 3. External empiric validity testing a. Not possible for the hybrid measure, due to limited data availability. We provide results from the claims-only measure within the hybrid testing form. 4. Socioeconomic risk factor analyses a. Not possible for the hybrid measure, due to limited data availability. We provide results from the claims-only measure within the hybrid testing form. 5. Exclusion analyses a. To be representative of what we expect the impact would be of the measures' exclusions in a nation-wide sample, we provide the results from the claims-only measure. 6. Meaningful differences a. To be representative of what we expect the range of performance would be in a nation-wide sample, we provide the distribution results from the claims-only measure. Difference between the two measures when fully	facility-level RSRR of unplanned, all-cause readmission after admission for any eligible condition within 30 days of hospital discharge. The ACR measure is calculated using the same five specialty cohorts and estimates an ACO-level standardized risk ratio for each. CMS annually reports the measure for patients who are 65 years or older, are enrolled in FFS Medicare and are ACO assigned beneficiaries.				

	3502 Hybrid Hospital-Wide (All-Condition, All-Procedure) Risk-Standardized Mortality Measure	1789 Hospital-Wide All-Cause Unplanned Readmission Measure (HWR)	1550 Hospital-level risk-standardized complication rate (RSCR) following elective primary total hip arthroplasty (THA) and/or total knee arthroplasty (TKA)	0468 Hospital 30-day, all-cause, risk-standardized mortality rate (RSMR) following pneumonia hospitalization	1893 Hospital 30-Day, all-cause, risk-standardized mortality rate (RSMR) following chronic obstructive pulmonary disease (COPD) hospitalization	2558 Hospital 30-Day, All-Cause, Risk-Standardized Mortality Rate (RSMR) Following Coronary Artery Bypass Graft (CABG) Surgery
	harmonized, prior to implementation: 1. Risk adjustment: a. The claims-only measure uses administrative claims data only for risk adjustment b. The hybrid measure adds 10 clinical risk variables, derived from a set of core clinical data elements (CCDE) extracted from the EHR.					
Type	Outcome	Outcome	Outcome	Outcome	Outcome	Outcome
Data Source	Claims, Electronic Health Records, Other Clinical-Hybrid Dataset Constructed using Kaiser Permanente Northern California matched administrative claims and electronic health record (EHR) data, admission dates from October 1, 2015 – December 30, 2016. This data source was used for measure testing. (An earlier Kaiser dataset from that included all admissions for adult patients to any of their member hospitals between January 1, 2009 and June 30, 2015 was used for measure development, as described in the attached methodology report). The two data sources listed below were used for testing the claims-based measure; the hybrid testing form includes some testing data from the claims-based measure (for example, for the social risk factor and external validation analyses). HWM claims-only datasets: Medicare Part A Inpatient Claims Data The index dataset contains administrative inpatient hospitalization data for Medicare FFS beneficiaries, aged 65-94 on admission. The history dataset includes administrative inpatient hospitalization data on each patient for the 12 months prior to the index admission. This data was used along with the	Claims Data sources for the Medicare FFS measure: HWR 1. Medicare Part A claims data for calendar years 2007 and 2008 were combined and then randomly split into two equal subsets (development sample and validation sample). Risk variable selection was done using the development sample, the risk models for each of the five specialty cohorts in the measure were applied to the validation sample and the models' performance was compared. In addition we re-tested the models in Medicare Part A claims data from calendar year 2009 to look for temporal stability in the models' performance. The number of measured entities and index admissions are listed below by specialty cohort. 2. Medicare Enrollment Database (EDB): This database contains Medicare beneficiary demographic, benefit/coverage, and vital status information. This data source was used to obtain information on several inclusion/exclusion indicators such as Medicare status on admission and following discharge from index admission ACR 1. Medicare Part A claims data for calendar years 2013, 2014, and 2015.	Claims, Other, Paper Medical Records Data sources: The currently publically reported measure is specified and has been tested using: 1. Medicare Part A inpatient and Part B outpatient claims: This data source contains claims data for FFS inpatient and outpatient services including: Medicare inpatient hospital care, outpatient hospital services, as well as inpatient and outpatient physician claims for the 12 months prior to an index admission. 2. Medicare Enrollment Database (EDB): This database contains Medicare beneficiary demographic, benefit/coverage, and vital status information. This data source was used to obtain information on several inclusion/exclusion indicators such as Medicare status on admission as well as vital status at discharge. These data have previously been shown to accurately reflect patient vital status (Fleming et al., 1992). During original measure development we validated the administrative claims-based definition of THA/TKA complication (original model specification) against a medical record data. 3. Data abstracted from medical records from eight participating hospitals (approximately 96 records per hospital; 644 total records) for	Claims, Other, Paper Medical Records Data sources for the Medicare FFS measure: 1. Medicare Part A inpatient and Part B outpatient claims: This data source contains claims data for FFS inpatient and outpatient services including: Medicare inpatient hospital care, outpatient hospital services, as well as inpatient and outpatient physician claims for the 12 months prior to an index admission. 2. Medicare Enrollment Database (EDB): This database contains Medicare beneficiary demographic, benefit/coverage, and vital status information. This data source was used to obtain information on several inclusion/exclusion indicators such as Medicare status on admission as well as vital status. These data have previously been shown to accurately reflect patient vital status (Fleming et al., 1992). 3. 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 SES composite index score. 4. Data sources for the all-payer update: For our analyses to examine use in all-payer data, we used all-payer data from California in addition to CMS data for Medicare FFS patients aged 65 years or over (65+) in California hospitals. California is a diverse state, and, with more	Claims, Other, Paper Medical Records Data sources for the Medicare FFS measure: 1. Medicare Part A inpatient and Part B outpatient claims: This data source contains claims data for FFS inpatient and outpatient services including: Medicare inpatient hospital care, outpatient hospital services, as well as inpatient and outpatient physician claims for the 12 months prior to an index admission. 2. Medicare Enrollment Database (EDB): This database contains Medicare beneficiary demographic, benefit/coverage, and vital status information. This data source was used to obtain information on several inclusion/exclusion indicators such as Medicare status on admission as well as vital status. These data have previously been shown to accurately reflect patient vital status (Fleming et al., 1992). 3. 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 SES composite index score. 4. Data sources for the all-payer testing: For our analyses to examine use in all-payer data, we used all-payer data from California. California is a diverse state, and, with more than 37 million residents, California represents 12% of the US population. We used the California Patient Discharge Data, a large, linked database of patient hospital	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

	3502 Hybrid Hospital-Wide (All-Condition, All-Procedure) Risk-Standardized Mortality Measure	1789 Hospital-Wide All-Cause Unplanned Readmission Measure (HWR)	1550 Hospital-level risk-standardized complication rate (RSCR) following elective primary total hip arthroplasty (THA) and/or total knee arthroplasty (TKA)	0468 Hospital 30-day, all-cause, risk-standardized mortality rate (RSMR) following pneumonia hospitalization	1893 Hospital 30-Day, all-cause, risk-standardized mortality rate (RSMR) following chronic obstructive pulmonary disease (COPD) hospitalization	2558 Hospital 30-Day, All-Cause, Risk-Standardized Mortality Rate (RSMR) Following Coronary Artery Bypass Graft (CABG) Surgery
	Medicare Enrollment Database (EDB) for testing the claims-based measure. 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. It was also used to determine hospice enrollment. No data collection instrument provided Attachment Del18b2HOP5HWMHybridDataDictionary01072019.xlsx	2. Medicare Enrollment Database (EDB). 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. Available in attached appendix at A.1 Attachment NQF_1789_NQF_Data_Dictionary_05-26-17_v1.0.xlsx	Medicare beneficiaries over the age of 65 years who had a qualifying THA/TKA procedure between January 1 2007 and December 31, 2008. The measure was also specified and testing using an all-payer claims dataset although it is only publically reported using the data sources listed above 4. California Patient Discharge Data is a large, linked database of patient hospital admissions in the state of California. Using all-payer data from California, we performed analyses to determine whether the THA/TKA complication measure can be applied to all adult patients, including not only FFS Medicare patients aged 65 years or over, but also non-FFS Medicare patients aged 18-64 years at the time of admission. Additional Data source used for analysis of the impact of SES variables on the measure's risk model. Note, the variables derived from these data are not included in the measure as specified 5. The American Community Survey (2009-2013): The American Community Survey data is collected annually and an aggregated 5-years data was used to calculate the AHRQ socioeconomic status (SES) composite index score. Reference: Fleming C., Fisher ES, Chang CH, Bubolz D, Malenda J. Studying outcomes and hospital utilization in the elderly: The advantages of a merged data base for Medicare and Veterans Affairs Hospitals. Medical Care. 1992; 30(5): 377-91. Suter LG, Parzynski CS, Grady JN, et al. 2014 Procedure Specific Complication Measure Updates and Specifications Report: Elective Primary Total Hip Arthroplasty (THA) and/or Total Knee Arthroplasty (TKA)	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 2009, there were 3,193,904 adult discharges from 446 non-Federal acute care hospitals. Records are linked by a unique patient identification number, allowing us to determine patient history from previous hospitalizations and to evaluate rates of both readmission and mortality (via linking with California vital statistics records). Using all-payer data from California as well as CMS Medicare FFS data for California hospitals, we performed analyses to determine whether the pneumonia mortality measure can be applied to all adult patients, including not only FFS Medicare patients aged 65 or over, but also non-FFS Medicare patients aged 18-64 years at the time of admission. Reference: Fleming C., Fisher ES, Chang CH, Bubolz D, Malenda 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_0468_Pneumonia_Mortality_Data_Dictionary_09-26-17_v1.0.xls	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 COPD mortality measure can be applied to all adult patients, including not only FFS Medicare patients aged 65 or over, but also non-FFS Medicare patients aged 18-64 years at the time of admission. Reference: Fleming C., Fisher ES, Chang CH, Bubolz D, Malenda 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_1893_COPD_Mortality_NQF_Data_Dictionary_v1.0_091818_kl.xlsx	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

	3502 Hybrid Hospital-Wide (All-Condition, All-Procedure) Risk-Standardized Mortality Measure	1789 Hospital-Wide All-Cause Unplanned Readmission Measure (HWR)	1550 Hospital-level risk-standardized complication rate (RSCR) following elective primary total hip arthroplasty (THA) and/or total knee arthroplasty (TKA)	0468 Hospital 30-day, all-cause, risk-standardized mortality rate (RSMR) following pneumonia hospitalization	1893 Hospital 30-Day, all-cause, risk-standardized mortality rate (RSMR) following chronic obstructive pulmonary disease (COPD) hospitalization	2558 Hospital 30-Day, All-Cause, Risk-Standardized Mortality Rate (RSMR) Following Coronary Artery Bypass Graft (CABG) Surgery
			Risk-Standardized Complication Measure (Version 3.0). 2014 No data collection instrument provided Attachment NQF_1550_HipKnee_Complication_Data_Dictionary_v1.0.xlsx			
Level	Facility	Facility, Integrated Delivery System	Facility	Facility	Facility	Facility
Setting	Inpatient/Hospital, Other Home-based primary care and home-based palliative care); Settings include: Home, Boarding home, Domiciliary, Assisted Living Facilities, Rest Home or Custodial Care Services	Inpatient/Hospital, Outpatient Services	Inpatient/Hospital	Inpatient/Hospital	Inpatient/Hospital	Inpatient/Hospital
Numerator Statement	The outcome for this measure is 30-day, all-cause mortality. Mortality is defined as death from any cause, either during or after admission, within 30 days of the index admission date.	The outcome for the HWR measure is 30-day readmission. We define readmission as an inpatient admission for any cause, with the exception of certain planned readmissions, within 30 days from the date of discharge from an eligible index admission. If a patient has more than one unplanned admission (for any reason) within 30 days after discharge from the index admission, only one is counted as a readmission. The measure looks for a dichotomous yes or no outcome of whether each admitted patient has an unplanned readmission within 30 days. However, if the first readmission after discharge is considered planned, any subsequent unplanned readmission is not counted as an outcome for that index admission because the unplanned readmission could be related to care provided during the intervening planned readmission rather than during the index admission. The outcome for the ACR measure is also 30-day readmission. The outcome is defined identically to what is described above for the HWR measure.	The outcome for this measure is any complication occurring during the index admission (not coded present on arrival) to 90 days post-date of the index admission. Complications are counted in the measure only if they occur during the index hospital admission or during a readmission. The complication outcome is a dichotomous (yes/no) outcome. If a patient experiences one or more of these complications in the applicable time period, the complication outcome for that patient is counted in the measure as a “yes”.	The outcome for this measure is 30-day, all-cause mortality. We define mortality as death from any cause within 30 days of the index admission date for patients discharged from the hospital with a principal discharge diagnosis of pneumonia, including aspiration pneumonia, or a principal discharge diagnosis of sepsis (not including severe sepsis) with a secondary discharge diagnosis of pneumonia (including aspiration pneumonia) coded as POA and no secondary discharge diagnosis of severe sepsis. Additional details are provided in S.5 Numerator Details.	The outcome for this measure is 30-day, all-cause mortality. We define mortality as death from any cause within 30 days of the index admission date for patients discharged from the hospital with either a principal discharge diagnosis of COPD or a principal discharge diagnosis of respiratory failure with a secondary discharge diagnosis of acute exacerbation of COPD. Additional details are provided in S.5 Numerator Details.	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	The measure outcome is death from any cause within 30 days of the admission date of the index	The measure counts readmissions to any acute care hospital for any cause within 30 days of the date of	The composite complication is a dichotomous outcome (yes for any complication(s); no for	This measure estimates a hospital-level, 30-day risk-standardized mortality rate (RSMR) for patients discharged	Outcome definition This measure counts death from any cause within 30 days of the index admission date.	In the current publicly reported measure, we identify deaths for Medicare FFS patients 65 years or older in the

	3502 Hybrid Hospital-Wide (All-Condition, All-Procedure) Risk-Standardized Mortality Measure	1789 Hospital-Wide All-Cause Unplanned Readmission Measure (HWR)	1550 Hospital-level risk-standardized complication rate (RSCR) following elective primary total hip arthroplasty (THA) and/or total knee arthroplasty (TKA)	0468 Hospital 30-day, all-cause, risk-standardized mortality rate (RSMR) following pneumonia hospitalization	1893 Hospital 30-Day, all-cause, risk-standardized mortality rate (RSMR) following chronic obstructive pulmonary disease (COPD) hospitalization	2558 Hospital 30-Day, All-Cause, Risk-Standardized Mortality Rate (RSMR) Following Coronary Artery Bypass Graft (CABG) Surgery
	admission. The numerator is a binary variable (1=yes/0=no) that indicates whether the patient died within 30 days of the index admission date.	discharge of the index admission, excluding planned readmissions as defined below. Planned Readmission Algorithm (Version 4.0) The Planned Readmission Algorithm is a set of criteria for classifying readmissions as planned among the general Medicare population using Medicare administrative claims data. The algorithm identifies admissions that are typically planned and may occur within 30 days of discharge from the hospital. The Planned Readmission Algorithm has three fundamental principles: 1. A few specific, limited types of care are always considered planned (obstetric delivery, transplant surgery, maintenance chemotherapy/immunotherapy, rehabilitation); 2. Otherwise, a planned readmission is defined as a non-acute readmission for a scheduled procedure; and 3. Admissions for acute illness or for complications of care are never planned. The algorithm was developed in 2011 as part of the Hospital-Wide Readmission measure. In 2013, CMS applied the algorithm to its other readmission measures. The Planned Readmission Algorithm and associated code tables are attached in data field S.2b (Data Dictionary or Code Table).	no complications). Therefore, if a patient experiences one or more complications, the outcome variable will get coded as a "yes". Complications are counted in the measure only if they occur during the index hospital admission (and are not present on admission) or during a readmission. The complications captured in the numerator are identified during the index admission OR associated with a readmission up to 90 days post-date of index admission, depending on the complication. The follow-up period for complications from date of index admission is as follows: The follow-up period for AMI, pneumonia, and sepsis/septicemia/shock is seven days from the date of index admission because these conditions are more likely to be attributable to the procedure if they occur within the first week after the procedure. Additionally, analyses indicated a sharp decrease in the rate of these complications after seven days. Death, surgical site bleeding, and pulmonary embolism are followed for 30 days following admission because clinical experts agree these complications are still likely attributable to the hospital performing the procedure during this period and rates for these complications remained elevated until roughly 30 days post admission. The measure follow-up period is 90 days after admission for mechanical complications and periprosthetic joint infection/wound infection. Experts agree that mechanical complications and periprosthetic joint infection/wound infections due to the index THA/TKA occur	from the hospital with a principal discharge diagnosis of pneumonia, including aspiration pneumonia or a principal discharge diagnosis of sepsis (not severe sepsis) with a secondary discharge diagnosis of pneumonia (including aspiration pneumonia) coded as present on admission (POA). Mortality is defined as death from any cause within 30 days of the index admission date. The Centers for Medicare & Medicaid Services (CMS) annually reports the measure for patients who are 65 years or older and are either Medicare fee-for-service (FFS) beneficiaries and hospitalized in non-federal acute care hospitals.	Rationale: From a patient perspective, death is the most critical outcome regardless of cause. Outcomes occurring within 30 days of admission can be influenced by hospital care and appropriate transition to the non-acute care setting. The 30-day time frame is a clinically meaningful period for hospitals to collaborate with their communities to reduce mortality (Simoes et al., 2018; Dharmarajan et al., 2015). Identifying deaths in the Medicare FFS population As currently reported, we identify deaths for FFS Medicare patients 65 years and older in the Medicare Enrollment Database (EDB). Reference: 1. Simoes J, Grady J, Purvis D, et al. 2018 Condition-Specific Measures Updates and Specifications Report Hospital-Level 30-Day Risk-Standardized Mortality Measures. http://www.qualitynet.org/dcs/ContentServer?c=Page&pagename=QnetPublic/Page/QnetTier3&cid=1163010421830. Accessed June 6, 2018. 2. Dharmarajan K, Hsieh AF, Kulkarni VT, et al. 2015 Trajectories of risk after hospitalization for heart failure, acute myocardial infarction, or pneumonia: retrospective cohort study. BMJ (Clinical researched);350:h411	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.

	3502 Hybrid Hospital-Wide (All-Condition, All-Procedure) Risk-Standardized Mortality Measure	1789 Hospital-Wide All-Cause Unplanned Readmission Measure (HWR)	1550 Hospital-level risk-standardized complication rate (RSCR) following elective primary total hip arthroplasty (THA) and/or total knee arthroplasty (TKA)	0468 Hospital 30-day, all-cause, risk-standardized mortality rate (RSMR) following pneumonia hospitalization	1893 Hospital 30-Day, all-cause, risk-standardized mortality rate (RSMR) following chronic obstructive pulmonary disease (COPD) hospitalization	2558 Hospital 30-Day, All-Cause, Risk-Standardized Mortality Rate (RSMR) Following Coronary Artery Bypass Graft (CABG) Surgery
			up to 90 days following THA/TKA. The measure counts all complications occurring during the index admission regardless of when they occur. For example, if a patient experiences an AMI on day 10 of the index admission, the measure will count the AMI as a complication, although the specified follow-up period for AMI is seven days. Clinical experts agree with this approach, as such complications likely represent the quality of care provided during the index admission. As of 2014 reporting, the measure does not count complications in the complications outcome that are coded as POA during the index admission; this prevents identifying a condition as a complication of care if it was present on admission for the THA/TKA procedure. For full list of ICD-9 and ICD-10 codes defining complications, see the Data Dictionary attached in field S.2b., sheet "Complication Codes ICD9-ICD10".			
Denominator Statement	The cohort includes inpatient admissions for a wide variety of conditions for patients aged between 50 and 94 years old who were discharged from short-term acute care hospitals. If a patient has more than one admission during the measurement year, one admission is randomly selected for inclusion in the measure. Additional details are provided in S.7 Denominator Details. The age range for this measure differs from that of the claims-only measure due to the limited size of the dataset used for testing. The intent is to harmonize the age range of the hybrid measure with the age range of the claims-only measure, so that both will include admissions for patients age 65-94.	The measure at the hospital level includes admissions for Medicare beneficiaries who are 65 years and older and are discharged from all non-federal, acute care inpatient US hospitals (including territories) with a complete claims history for the 12 months prior to admission. The measure at the ACO level includes all relevant admissions for ACO assigned beneficiaries who are 65 and older and are discharged from all non-Federal short-stay acute care hospitals, including critical access hospitals. Additional details are provided in S.9 Denominator Details.	The target population for the publically reported measure includes admissions for Medicare FFS beneficiaries who are at least 65 years of age undergoing elective primary THA and/or TKA procedures. Additional details are provided in S.9 Denominator Details.	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 aged 18 years and older discharged from the hospital with a principal discharge diagnosis of pneumonia (including aspiration pneumonia) or a principal discharge diagnosis of sepsis (not including severe sepsis) with a secondary diagnosis of pneumonia (including aspiration pneumonia) coded as POA and no secondary diagnosis of severe sepsis coded as POA, and with a complete claims history for the 12 months prior to admission. The measure is currently publicly reported by CMS for those patients 65 years and older who are	This claims-based measure can be used in either of two patient cohorts: (1) patients aged 65 years or older or (2) patients aged 40 years or older. We have tested the measure in both age groups. The cohort includes admissions for patients discharged from the hospital with either a principal discharge diagnosis of COPD, or a principal discharge diagnosis of respiratory failure with a secondary diagnosis of acute exacerbation of COPD; and with a complete claims history for the 12 months prior to admission. The measure is currently publicly reported by CMS for those patients 65 years and older who are Medicare FFS beneficiaries admitted to non-federal hospitals Additional details are provided in S.7 Denominator Details.	This claims-based measure can be used in either of two patient cohorts: (1) patients aged 65 years or older or (2) patients aged 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.

	3502 Hybrid Hospital-Wide (All-Condition, All-Procedure) Risk-Standardized Mortality Measure	1789 Hospital-Wide All-Cause Unplanned Readmission Measure (HWR)	1550 Hospital-level risk-standardized complication rate (RSCR) following elective primary total hip arthroplasty (THA) and/or total knee arthroplasty (TKA)	0468 Hospital 30-day, all-cause, risk-standardized mortality rate (RSMR) following pneumonia hospitalization	1893 Hospital 30-Day, all-cause, risk-standardized mortality rate (RSMR) following chronic obstructive pulmonary disease (COPD) hospitalization	2558 Hospital 30-Day, All-Cause, Risk-Standardized Mortality Rate (RSMR) Following Coronary Artery Bypass Graft (CABG) Surgery
				Medicare FFS beneficiaries admitted to non-federal acute care hospitals. Additional details are provided in S.7 Denominator Details.		
Denominator Details	The index cohort includes all inpatient admissions for patients aged 50-94 years old. (Note: The intention is to fully harmonize the cohort definition with the claims-only measure so that both measures will capture admissions for patients age 65-94. We deviated from that definition during development and testing due to the limited dataset available that included the EHR data elements needed to calculate this measure. Note that the risk model already includes age in years, as a risk variable.) An index admission is the hospitalization to which the mortality outcome is attributed and includes admissions for patients: 1. Not transferred from another acute care facility Rationale: Admissions to an acute cate hospital within one day of discharge from another acute care hospital are considered transfers. Transferred patients are included in the measure cohort, but it is the initial hospitalization rather than any "transfer-in" hospitalization(s), that is included as the hospitalization to which the mortality outcome is attributed (the index admission). 2. Aged between 50 and 94 years The hybrid measure is intended for the Medicare FFS population but was tested in a limited dataset due to the EHR data elements included. The use of a small dataset required that we expand the sample by including admissions from patients ages 50 to 94 years. Note that the measure already adjusts for age.	To be included in the hospital level measure, cohort patients must be: 1. Enrolled in Medicare fee-for-service (FFS) Part A for the 12 months prior to the date of admission and during the index admission; 2. Aged 65 or over; 3. Discharged alive from a non-federal short-term acute care hospital; and 4. Not transferred to another acute care facility. The ACO version of this measure has the additional criterion that only hospitalizations for ACO-assigned beneficiaries that meet all of the other criteria listed above are included. The cohort definition is otherwise identical to that of the HWR described below. The measure aggregates the ICD-9 principal diagnosis and all procedure codes of the index admission into clinically coherent groups of conditions and procedures (condition categories or procedure categories) using the AHRQ CCS. There are a total of 285 mutually exclusive AHRQ condition categories, most of which are single, homogenous diseases such as pneumonia or acute myocardial infarction. Some are aggregates of conditions, such as "other bacterial infections." There are a total of 231 mutually exclusive procedure categories. Using the AHRQ CCS procedure and condition categories, the measure assigns each index hospitalization to one of five mutually exclusive specialty cohorts: surgery/gynecology, cardiorespiratory, cardiovascular, neurology, and medicine. The rationale behind this	To be included in the measure cohort used in public reporting, patients must meet the following additional inclusion criteria: 1. Enrolled in Medicare fee-for-service (FFS) Part A and Part B for the 12 months prior to the date of admission; and enrolled in Part A during the index admission; 2. Aged 65 or older 3. Having a qualifying elective primary THA/TKA procedure; elective primary THA/TKA procedures are defined as those procedures without any of the following: • Femur, hip, or pelvic fractures coded in the principal or secondary discharge diagnosis field of the index admission • Partial hip arthroplasty (PHA) procedures (with a concurrent THA/TKA); partial knee arthroplasty procedures are not distinguished by ICD9 codes and are currently captured by the THA/TKA measure • Revision procedures with a concurrent THA/TKA • Resurfacing procedures with a concurrent THA/TKA • Mechanical complication coded in the principal discharge • Malignant neoplasm of the pelvis, sacrum, coccyx, lower limbs, or bone/bone marrow or a disseminated malignant neoplasm coded in the principal discharge diagnosis field • Removal of implanted devises/prostheses • Transfer status from another acute care facility for the THA/TKA Patients are eligible for inclusion in the denominator if they had an elective primary THA and/or a TKA AND had	To be included in the measure cohort used in public reporting, patients must meet the following inclusion criteria: 1. Have a principal discharge diagnosis of pneumonia (including aspiration pneumonia) or sepsis (not including severe sepsis) with a secondary diagnosis of pneumonia (including aspiration pneumonia) coded as POA and no secondary diagnosis of severe sepsis coded as POA; 2. Enrolled in Medicare fee-for-service (FFS) Part A and Part B for the 12 months prior to the date of index admission, and enrolled in Part A during the index admission; 3. Aged 65 or over; and 4. Not transferred from another acute care facility ICD-9 and ICD-10 cohort codes are included in the attached Data Dictionary.	To be included in the measure cohort used in public reporting, patients must meet the following inclusion criteria: 1. Have principal discharge diagnosis of COPD or principal discharge diagnosis of respiratory failure with a secondary diagnosis of COPD with exacerbation; 2. Enrolled in Medicare fee-for-service (FFS) Part A and Part B for the 12 months prior to the date of index admission, and enrolled in Part A during the index admission, beneficiaries; 3. Aged 65 or over; and 4. Not transferred from another acute care facility. ICD-9 and ICD-10 cohort codes are included in the attached Data Dictionary.	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.

	3502 Hybrid Hospital-Wide (All-Condition, All-Procedure) Risk-Standardized Mortality Measure	1789 Hospital-Wide All-Cause Unplanned Readmission Measure (HWR)	1550 Hospital-level risk-standardized complication rate (RSCR) following elective primary total hip arthroplasty (THA) and/or total knee arthroplasty (TKA)	0468 Hospital 30-day, all-cause, risk-standardized mortality rate (RSMR) following pneumonia hospitalization	1893 Hospital 30-Day, all-cause, risk-standardized mortality rate (RSMR) following chronic obstructive pulmonary disease (COPD) hospitalization	2558 Hospital 30-Day, All-Cause, Risk-Standardized Mortality Rate (RSMR) Following Coronary Artery Bypass Graft (CABG) Surgery
	3. Not admitted for primary psychiatric diagnoses Rationale: Patients admitted for psychiatric treatment are typically cared for in separate psychiatric facilities that are not comparable to short-term acute care hospitals (see data dictionary, HWM Non-Acute Care Inclusion tab). 4. Not admitted for rehabilitation Rationale: These admissions are not typically to a short-term acute care hospital and are not for acute care (see data dictionary, HWM Non-Acute Care Inclusion tab). 5. Not enrolled in hospice at the time of, or 12 months prior to, their index admission Rationale: Patients enrolled in hospice in the prior 12 months or at the time of admission are unlikely to have 30-day survival as a primary goal 6. Not enrolled in hospice within two days of admission Rationale: There is not a single, correct approach regarding patients enrolled in hospice during admission or upon discharge – mortality may or may not represent a quality signal for this group of patients and hospice enrollment is inadequate to differentiate this issue. However, for most patients and/or families who had the discussion and agreed to enroll in hospice within two days of admission, 30-day survival is not likely the primary goal due to their condition and not the quality of care received. 7. Not with a principal diagnosis of cancer and enrolled in hospice during their index admission Rationale: Patients admitted primarily for cancer who are enrolled in hospice during admission are unlikely to have 30-day survival as a primary goal of care. (see data dictionary,	organization is that conditions typically cared for by the same team of clinicians are expected to experience similar added (or reduced) levels of readmission risk. The measure first assigns admissions with qualifying AHRQ procedure categories to the Surgery/Gynecology Cohort. This cohort includes admissions likely cared for by surgical or gynecological teams. The measure then sorts admissions into one of the four remaining specialty cohorts based on the AHRQ diagnosis category of the principal discharge diagnosis: The Cardiorespiratory Cohort includes several condition categories with very high readmission rates such as pneumonia, chronic obstructive pulmonary disease, and heart failure. These admissions are combined into a single cohort because they are often clinically indistinguishable and patients are often simultaneously treated for several of these diagnoses. The Cardiovascular Cohort includes condition categories such as acute myocardial infarction that in large hospitals might be cared for by a separate cardiac or cardiovascular team. The Neurology Cohort includes neurologic condition categories such as stroke that in large hospitals might be cared for by a separate neurology team. The Medicine Cohort includes all non-surgical patients who were not assigned to any of the other cohorts. The full list of the specific diagnosis and procedure AHRQ CCS categories used to define the specialty cohorts are attached in data field S.2b (Data Dictionary or Code Table).	continuous enrollment in Part A and Part B Medicare fee-for-service (FFS) 12 months prior to the date of index admission. This measure can also be used for an all-payer population aged 18 years and older. We have explicitly tested the measure in both patients aged 18+ years and those aged 65+ years (see Section 2b4.11 of the Testing Attachment for details, 2b4.11). International Classification of Diseases, 9th Revision, Clinical Modification (ICD-9-CM) codes used to define the cohort for each measure are: ICD-9-CM codes used to define a THA or TKA: 81.51 Total Hip Replacement 81.54 Total Knee Replacement ICD-10 Codes that define a THA or TKA: 0SR90J9 Replacement of Right Hip Joint with Synthetic Substitute, Cemented, Open Approach 0SR90JA Replacement of Right Hip Joint with Synthetic Substitute, Uncemented, Open Approach 0SR90JZ Replacement of Right Hip Joint with Synthetic Substitute, Open Approach 0SRB0J9 Replacement of Left Hip Joint with Synthetic Substitute, Cemented, Open Approach 0SRB0JA Replacement of Left Hip Joint with Synthetic Substitute, Uncemented, Open Approach 0SRB0JZReplacement of Left Hip Joint with Synthetic Substitute, Open Approach 0SRC07Z Replacement of Right Knee Joint with Autologous Tissue Substitute, Open Approach 0SRC0JZReplacement of Right Knee Joint with Synthetic Substitute, Open Approach 0SRC0KZ Replacement of Right Knee Joint with Nonautologous Tissue Substitute, Open Approach 0SRD07Z Replacement of Left Knee Joint with			

	3502 Hybrid Hospital-Wide (All-Condition, All-Procedure) Risk-Standardized Mortality Measure	1789 Hospital-Wide All-Cause Unplanned Readmission Measure (HWR)	1550 Hospital-level risk-standardized complication rate (RSCR) following elective primary total hip arthroplasty (THA) and/or total knee arthroplasty (TKA)	0468 Hospital 30-day, all-cause, risk-standardized mortality rate (RSMR) following pneumonia hospitalization	1893 Hospital 30-Day, all-cause, risk-standardized mortality rate (RSMR) following chronic obstructive pulmonary disease (COPD) hospitalization	2558 Hospital 30-Day, All-Cause, Risk-Standardized Mortality Rate (RSMR) Following Coronary Artery Bypass Graft (CABG) Surgery
	HWM Cancer Inclusion tab). 8. Without any diagnosis of metastatic cancer Rationale: Although some patients admitted with a diagnosis of metastatic cancer will have 30-day survival as a primary goal of care, for many such patients admitted to the hospital, death may be a clinically reasonable and patient-centered outcome. (see data dictionary, HWM Metastatic Cancer Inclusion tab). 9. Not with a principal discharge diagnosis, or a secondary diagnosis that is present on admission (POA) for a condition which hospitals have limited ability to influence survival Rationale: Hospitals have little ability to impact mortality for some conditions. This list of conditions (see data dictionary, HWM ICD-10 Inclusion tab) was determined through independent review, by several clinicians, of conditions associated with high mortality. The decisions were also reviewed with our Technical Expert Panel (TEP) and Technical Work Group. Admissions are not included in the cohort if the patient had a principal diagnosis code that is on this list, or a secondary code with POA that is on the list. In addition, for patients with multiple admissions, the measure selects only one admission, at random, for inclusion. There is no practical statistical modeling approach that can account or adjust for the complex relationship between the number of admissions and risk of mortality in the context of a hospital-wide mortality measure. Random selection ensures that providers are not penalized for a “last” admission during the measurement period; selecting the last admission would not		Autologous Tissue Substitute, Open Approach 0SRD0JZ Replacement of Left Knee Joint with Synthetic Substitute, Open Approach 0SRD0KZReplacement of Left Knee Joint with Nonautologous Tissue Substitute, Open Approach 0SRT07Z Replacement of Right Knee Joint, Femoral Surface with Autologous Tissue Substitute, Open Approach 0SRT0JZ Replacement of Right Knee Joint, Femoral Surface with Synthetic Substitute, Open Approach 0SRT0KZ Replacement of Right Knee Joint, Femoral Surface with Nonautologous Tissue Substitute, Open Approach 0SRU07Z Replacement of Left Knee Joint, Femoral Surface with Autologous Tissue Substitute, Open Approach 0SRU0JZ Replacement of Left Knee Joint, Femoral Surface with Synthetic Substitute, Open Approach 0SRU0KZ Replacement of Left Knee Joint, Femoral Surface with Nonautologous Tissue Substitute, Open Approach 0SRV07Z Replacement of Right Knee Joint, Tibial Surface with Autologous Tissue Substitute, Open Approach 0SRV0JZ Replacement of Right Knee Joint, Tibial Surface with Synthetic Substitute, Open Approach 0SRV0KZ Replacement of Right Knee Joint, Tibial Surface with Nonautologous Tissue Substitute, Open Approach 0SRW07Z Replacement of Left Knee Joint, Tibial Surface with Autologous Tissue Substitute, Open Approach 0SRW0JZ Replacement of Left Knee Joint, Tibial Surface with Synthetic Substitute, Open Approach 0SRW0KZ Replacement of Left Knee Joint, Tibial Surface with Nonautologous Tissue			

	3502 Hybrid Hospital-Wide (All-Condition, All-Procedure) Risk-Standardized Mortality Measure	1789 Hospital-Wide All-Cause Unplanned Readmission Measure (HWR)	1550 Hospital-level risk-standardized complication rate (RSCR) following elective primary total hip arthroplasty (THA) and/or total knee arthroplasty (TKA)	0468 Hospital 30-day, all-cause, risk-standardized mortality rate (RSMR) following pneumonia hospitalization	1893 Hospital 30-Day, all-cause, risk-standardized mortality rate (RSMR) following chronic obstructive pulmonary disease (COPD) hospitalization	2558 Hospital 30-Day, All-Cause, Risk-Standardized Mortality Rate (RSMR) Following Coronary Artery Bypass Graft (CABG) Surgery
	be as accurate a reflection of the risk of death as random selection, as the last admission is inherently associated with a higher mortality risk. Random selection is also used in CMS's condition-specific mortality measures. Note that random selection reduces the number of admissions, but does not exclude any patients from the measure. The cohort is defined using ICD-10 Clinical Modification codes identified in Medicare Part A Inpatient claims data. The measure aggregates the ICD-10 principal diagnosis and all procedure codes of the index admission into clinically coherent groups of conditions and procedures (condition categories or procedure categories) using the Agency for Healthcare Research and Quality (AHRQ) Clinical Classifications System (CCS). There is a total of 285 mutually exclusive AHRQ condition categories, most of which are single, homogenous diseases such as pneumonia or acute myocardial infarction. Some are aggregates of conditions, such as "other bacterial infections". There is a total of 231 mutually exclusive procedure categories. Using the AHRQ CCS procedure and condition categories, the measure assigns each index hospitalization to one of 15 mutually exclusive divisions. The divisions were created based upon clinical coherence, consistency of mortality risk, adequate patient and hospital case volume for stable results reporting, and input from clinicians, patients, and patient caregivers on usability. The measure first assigns admissions with qualifying AHRQ procedure categories to one of six surgery divisions by identifying a defining surgical procedure. The defining surgical		Substitute, Open Approach An ICD-9 to ICD-10 crosswalk is attached in field S.2b. (Data Dictionary or Code Table). Elective primary THA/TKA procedures are defined as those procedures without any of the following: 1) Femur, hip, or pelvic fractures coded in principal or secondary discharge diagnosis fields of the index admission 2) Partial hip arthroplasty (PHA) procedures with a concurrent THA/TKA 3) Revision procedures with a concurrent THA/TKA 4) Resurfacing procedures with a concurrent THA/TKA 5) Mechanical complication coded in the principal discharge 6) Malignant neoplasm of the pelvis, sacrum, coccyx, lower limbs, or bone/bone marrow or a disseminated malignant neoplasm coded in the principal discharge diagnosis field 7) Removal of implanted devises/prostheses 8) Transfer status from another acute care facility for the THA/TKA For a full list of ICD-9 and ICD-10 codes defining the following see attached Data Dictionary, sheet "THA TKA Cohort Codes Part 2."			

	3502 Hybrid Hospital-Wide (All-Condition, All-Procedure) Risk-Standardized Mortality Measure	1789 Hospital-Wide All-Cause Unplanned Readmission Measure (HWR)	1550 Hospital-level risk-standardized complication rate (RSCR) following elective primary total hip arthroplasty (THA) and/or total knee arthroplasty (TKA)	0468 Hospital 30-day, all-cause, risk-standardized mortality rate (RSMR) following pneumonia hospitalization	1893 Hospital 30-Day, all-cause, risk-standardized mortality rate (RSMR) following chronic obstructive pulmonary disease (COPD) hospitalization	2558 Hospital 30-Day, All-Cause, Risk-Standardized Mortality Rate (RSMR) Following Coronary Artery Bypass Graft (CABG) Surgery
	procedure is identified using the following algorithm: 1) if a patient only has one major surgical procedure then that procedure is the defining surgical procedure; 2) if a patient has more than one major surgical procedure, the first dated procedure performed during the index admission is the defining surgical procedure; 3) if there is more than one major surgical procedure on that earliest date, the procedure with the highest mortality rate is the defining surgical procedure. These divisions include admissions likely cared for by surgical teams. The surgical divisions are: Surgical Cancer (see note below), Cardiothoracic Surgery, General Surgery, Neurosurgery, Orthopedic Surgery, and Other Surgical Procedures. For the Surgical Cancer division, any admission that includes a surgical procedure and a principal discharge diagnosis code of cancer is assigned to the Surgical Cancer division. This division and the logic behind it was implemented in response to feedback from our Technical Expert Panel. The measure then assigns the remaining admissions into one of the nine non-surgical divisions based on the AHRQ diagnostic CCS of the principal discharge diagnosis. The non-surgical divisions are: Cancer, Cardiac, Gastrointestinal, Infectious Disease, Neurology, Orthopedic, Pulmonary, Renal, Other Conditions. The full list of the specific diagnosis and procedure AHRQ CCS categories used to define the divisions are attached in the Data Dictionary.					
Exclusions	The measure excludes index admissions for patients:	The measure excludes index admissions for patients:	This measure excludes index admissions for patients:	This mortality measure excludes index admissions for patients:	The mortality measure excludes index admissions for patients:	The CABG surgery mortality measure excludes index admissions for patients:

	3502 Hybrid Hospital-Wide (All-Condition, All-Procedure) Risk-Standardized Mortality Measure	1789 Hospital-Wide All-Cause Unplanned Readmission Measure (HWR)	1550 Hospital-level risk-standardized complication rate (RSCR) following elective primary total hip arthroplasty (THA) and/or total knee arthroplasty (TKA)	0468 Hospital 30-day, all-cause, risk-standardized mortality rate (RSMR) following pneumonia hospitalization	1893 Hospital 30-Day, all-cause, risk-standardized mortality rate (RSMR) following chronic obstructive pulmonary disease (COPD) hospitalization	2558 Hospital 30-Day, All-Cause, Risk-Standardized Mortality Rate (RSMR) Following Coronary Artery Bypass Graft (CABG) Surgery
	1. With inconsistent or unknown vital status (from claims data) or other unreliable claims data; 2. Discharged against medical advice (AMA); 3. With an admission for spinal cord injury (CCS 227), skull and face fractures (CCS 228), Intracranial Injury (CCS 233), Crushing injury or internal injury (CCS 234), Open wounds of head/neck/trunk (CCS 235), and burns (CCS 240); and 4. With a principal discharge diagnosis within a CCS with fewer than 100 admissions in that division within the measurement year.	1. Admitted to Prospective Payment System (PPS)-exempt cancer hospitals; 2. Without at least 30 days post-discharge enrollment in FFS Medicare; 3. Discharged against medical advice (AMA); 4. Admitted for primary psychiatric diagnoses; 5. Admitted for rehabilitation; or 6. Admitted for medical treatment of cancer.	1. Without at least 90 days post-discharge enrollment in FFS Medicare; 2. Who were discharged against medical advice (AMA); or, 3. Who had more than two THA/TKA procedure codes during the index hospitalization. After applying these exclusion criteria, we randomly select one index admission for patients with multiple index admissions in a calendar year. We therefore exclude the other eligible index admissions in that year.	1. Discharged alive on the day of admission or the following day who were not transferred to another acute care facility; 2. With inconsistent or unknown vital status or other unreliable demographic (age and gender) data; 3. Enrolled in the Medicare hospice program any time in the 12 months prior to the index admission, including the first day of the index admission; or, 4. Discharged against medical advice. For patients with more than one admission for a given condition in a given year, only one index admission for that condition is randomly selected for inclusion in the cohort. Similarly, for the three-year combined data, when index admissions occur during the transition between measure reporting periods (June and July of each year) and both are randomly selected for inclusion in the measure, the measure includes only the June admission. The July admissions are excluded to avoid assigning a single death to two admissions.	1. With inconsistent or unknown vital status or other unreliable demographic (age and gender) data; 2. Enrolled in the Medicare hospice program any time in the 12 months prior to the index admission, including the first day of the index admission; or 3. Discharged against medical advice For patients with more than one admission for a given condition in a given year, only one index admission for that condition is randomly selected for inclusion in the cohort. Additional admissions within that year are excluded. Similarly, for the three-year combined data, when index admissions occur during the transition between measure reporting periods (June and July of each year) and both are randomly selected for inclusion in the measure, the measure includes only the June admission. The July admissions are excluded to avoid assigning a single death to two admissions.	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	1. With inconsistent or unknown vital status (from claims data) or other unreliable claims data. Rationale: The measure does not include stays for patients where the admission date is after the date of death, or where the date of death occurs before the date of discharge but the patient was discharged alive because these are likely errors in the data. 2. Discharged against medical advice (AMA) Rationale: Providers did not have the opportunity to deliver full care and prepare the patient for discharge. 3. With an admission for spinal cord injury (CCS 227), skull and face fractures (CCS 228), Intracranial Injury (CCS 233), Crushing injury or internal injury (CCS	1. Admitted to a PPS-exempt cancer hospital, identified by the Medicare provider ID. 2. Admissions without at least 30 days post-discharge enrollment in FFS Medicare are determined using data captured in the Medicare Enrollment Database (EDB). 3. Discharges against medical advice (AMA) are identified using the discharge disposition indicator in claims data. 4. Admitted for primary psychiatric disease, identified by a principal diagnosis in one of the specific AHRQ CCS categories listed in the attached data dictionary. 5. Admitted for rehabilitation care, identified by the specific ICD-9 diagnosis codes included in CCS 254 (Rehabilitation care; fitting of prostheses;	This measure excludes index admissions for patients: 1. Without at least 90 days post-discharge enrollment in FFS Medicare Rationale: The 90-day complication outcome cannot be assessed in this group since claims data are used to determine whether a complication of care occurred. 2. Who were discharged against medical advice (AMA); or, Rationale: Providers did not have the opportunity to deliver full care and prepare the patient for discharge. 3. Who had more than two THA/TKA procedure codes during the index hospitalization Rationale: Although clinically possible, it is highly unlikely that patients would receive	1. Inconsistent vital status or unreliable data are identified if any of the following conditions are met 1) the patient's age is greater than 115 years; 2) if the discharge date for a hospitalization is before the admission date; 3) if the patient has a sex other than 'male' or 'female'. 2. Hospice enrollment in the 12 months prior to or on the index admission is identified using hospice enrollment data. 3. Discharges against medical advice (AMA) are identified using the discharge disposition indicator. After exclusions #1-3 are applied, the measure randomly selects one index admission per patient per year for inclusion in the cohort so that each episode of care is mutually independent with the same probability of the	1. Inconsistent vital status or unreliable demographic data in the claims Rationale: We do not include stays for patients where the age is greater than 115, where the gender is neither male nor female, where the admission date is after the date of death in the Medicare Enrollment Database, or where the date of death occurs before the date of discharge but the patient was discharged alive. Enrolled in the Medicare hospice program any time in the 12 months prior to the index admission, including the first day of the index admission. Enrollment to Medicare beneficiaries is determined using the Medicare Enrollment Database. Rationale: These patients are likely continuing to seek comfort measures only, so mortality is not necessarily an adverse	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

	3502 Hybrid Hospital-Wide (All-Condition, All-Procedure) Risk-Standardized Mortality Measure	1789 Hospital-Wide All-Cause Unplanned Readmission Measure (HWR)	1550 Hospital-level risk-standardized complication rate (RSCR) following elective primary total hip arthroplasty (THA) and/or total knee arthroplasty (TKA)	0468 Hospital 30-day, all-cause, risk-standardized mortality rate (RSMR) following pneumonia hospitalization	1893 Hospital 30-Day, all-cause, risk-standardized mortality rate (RSMR) following chronic obstructive pulmonary disease (COPD) hospitalization	2558 Hospital 30-Day, All-Cause, Risk-Standardized Mortality Rate (RSMR) Following Coronary Artery Bypass Graft (CABG) Surgery
	234), Open wounds of head/neck/trunk (CCS 235), and burns (CCS 240). Rationale: Even though a hospital likely can influence the outcome of some of these conditions, in many cases death events are not a signal of poor quality of care when patients present with these conditions. These conditions are also infrequent events that are unlikely to be uniformly distributed across hospitals. 4. With a principal discharge diagnosis within a CCS with fewer than 100 admissions in that division within the measurement year. Rationale: To calculate a stable and precise risk model, there are a minimum number of admissions that are needed. In addition, a minimum number of admissions and/or outcome events are required to inform grouping admissions into larger categories. These admissions present challenges to both accurate risk prediction and coherent risk grouping and are therefore excluded. Note: During measure development we analyzed different volume cut-offs (25, 50 and 100). Using cut-off values below 100 resulted in too many CCS codes in some of the divisions (the CCS category codes are used in risk adjustment) which resulted in non-convergence of those division-level risk models. The total number of patients excluded is very small (13,597 or 0.21% of admissions for a cut off of 100). During measure development we also explored the option of pooling low-volume CCS codes (CCS<100 patients) into one group, however, the heterogeneity in mortality rates for the individual ICD-10 codes in those groups would preclude adequate risk adjustment. The TEP supported excluding these admissions.	and adjustment of devices). 6. Admitted for medical treatment of cancer, identified by the specific AHRQ CCS categories listed in the attached data dictionary.	more than two elective THA/TKA procedures in one hospitalization, which may reflect a coding error.	outcome. Additional admissions within that year are excluded. For each patient, the probability of death increases with each subsequent admission and therefore the episodes of care are not mutually independent. For the three-year combined data, when index admissions occur during the transition between measure reporting periods (June and July of each year) and both are randomly selected for inclusion in the measure, the measure includes only the June admission. The July admissions are excluded to avoid assigning a single death to two admissions. Individual codes with descriptors can be found in the attached Data Dictionary.	outcome or signal of poor quality care. 2. Discharges against medical advice (AMA) are identified using the discharge disposition indicator in the claim. Rationale: Providers did not have the opportunity to deliver full care and prepare the patient for discharge. Individual codes with descriptors can be found in the attached Data Dictionary.	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.

	3502 Hybrid Hospital-Wide (All-Condition, All-Procedure) Risk-Standardized Mortality Measure	1789 Hospital-Wide All-Cause Unplanned Readmission Measure (HWR)	1550 Hospital-level risk-standardized complication rate (RSCR) following elective primary total hip arthroplasty (THA) and/or total knee arthroplasty (TKA)	0468 Hospital 30-day, all-cause, risk-standardized mortality rate (RSMR) following pneumonia hospitalization	1893 Hospital 30-Day, all-cause, risk-standardized mortality rate (RSMR) following chronic obstructive pulmonary disease (COPD) hospitalization	2558 Hospital 30-Day, All-Cause, Risk-Standardized Mortality Rate (RSMR) Following Coronary Artery Bypass Graft (CABG) Surgery
Risk Adjustment	Statistical risk model	Statistical risk model	Statistical risk model	Statistical risk model	Statistical risk model	Statistical risk model
Stratification	N/A	N/A	N/A	N/A	N/A	N/A
Type Score	Rate/proportion better quality = lower score	Rate/proportion better quality = lower score	Rate/proportion better quality = lower score	Rate/proportion better quality = lower score	Rate/proportion better quality = lower score	Rate/proportion better quality = lower score
Algorithm	The measure estimates hospital-level, risk-standardized mortality rates (RSMRs) within 30 days of hospital admission using hierarchical logistical regression models through a Bayesian Markov Chain Monte Carlo (MCMC) procedure. In brief, we used hierarchical logistic regression to model the log-odds of mortality for each of the 15 service-line divisions. Death within 30 days was modeled as a function of patient-level demographic and clinical characteristics and a random hospital-level intercept. This model specification accounts for within-hospital correlation of the observed outcomes and models the assumption that underlying differences in quality among the health care facilities being evaluated lead to systematic differences in outcomes. We estimated a separate hierarchical logistic regression model for each service-line division. In order to obtain the variance and interval estimates, we fit the hierarchical model under the Bayesian framework along with the Markov Chain Monte Carlo (MCMC) technique. Admissions are assigned to one of 15 mutually exclusive divisions (groups of discharge condition categories and procedure categories). For each division and each hospital with patients in that division, the standardized mortality ratio (SMR) is calculated as the ratio of the number of "predicted" deaths to the number of "expected" deaths at a given hospital. The predicted number of	This measure estimates a hospital-level 30-day all-cause RSRR using hierarchical logistic regression models. In brief, the approach simultaneously models data at the patient, and hospital levels to account for variance in patient outcomes within and between hospitals (Normand et al., 2007). At the patient level, it models the log-odds of readmission within 30 days of discharge using age, selected clinical covariates, and a hospital -specific effect. At the hospital level, the approach models the hospital-specific effects as arising from a normal distribution. The hospital effect represents the underlying risk of a readmission, after accounting for patient risk. The hospital-specific effects are given a distribution to account for the clustering (non-independence) of patients within the same hospital (Normand et al., 2007). If there were no differences among hospitals, then after adjusting for patient risk, the hospital effects should be identical across all hospitals. Admissions are assigned to one of five mutually exclusive specialty cohort groups consisting of related conditions or procedures. For each specialty cohort group, the standardized readmission ratio (SRR) is calculated as the ratio of the number of "predicted" readmissions to the number of "expected" readmissions at a given hospital. For each hospital, the numerator of the ratio is the number of readmissions within 30 days predicted	The measure estimates hospital-level RSCRs following elective primary THA/TKA using hierarchical logistic regression models. In brief, the approach simultaneously models data at the patient and hospital levels to account for variance in patient outcomes within and between hospitals (Normand and Shahian, 2007). At the patient level, it models the log-odds of a complication occurring within 90 days of the index admission using age, sex, selected clinical covariates, and a hospital-specific intercept. At the hospital level, it models the hospital-specific intercepts as arising from a normal distribution. The hospital intercept represents the underlying risk of a complication at the hospital, after accounting for patient risk. The hospital-specific intercepts are given a distribution to account for the clustering (non-independence) of patients within the same hospital. If there were no differences among hospitals, then after adjusting for patient risk, the hospital intercepts should be identical across all hospitals. The RSCR is calculated as the ratio of the number of "predicted" to the number of "expected" admissions with a complication at a given hospital, multiplied by the national observed complication rate. For each hospital, the numerator of the ratio is the number of complications within 90 days predicted on the basis of the hospital's performance with its observed case mix, and the denominator	The measure estimates hospital-level 30-day all-cause RSMRs following hospitalization for pneumonia using hierarchical logistic regression models. In brief, the approach simultaneously models data at the patient and hospital levels to account for variance in patient outcomes within and between hospitals (Normand and Shahian, 2007). At the patient level, it models the log-odds of mortality within 30 days of index admission using age, sex, selected clinical covariates, and a hospital-specific intercept. At the hospital level, it models the hospital-specific intercepts as arising from a normal distribution. The hospital intercept represents the underlying risk of a mortality at the hospital, after accounting for patient risk. The hospital-specific intercepts are given a distribution to account for the clustering (non-independence) of patients within the same hospital. If there were no differences among hospitals, then after adjusting for patient risk, the hospital intercepts should be identical across all hospitals. The RSMR is calculated as the ratio of the number of "predicted" 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 on the basis of 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	The measure estimates hospital-level 30-day all-cause RSMRs following hospitalization for COPD using hierarchical logistic regression models. In brief, the approach simultaneously models data at the patient and hospital levels to account for variance in patient outcomes within and between hospitals (Normand and Shahian, 2007). At the patient level, it models the log-odds of mortality within 30 days of index admission using age, sex, selected clinical covariates, and a hospital-specific intercept. At the hospital level, it models the hospital-specific intercepts as arising from a normal distribution. The hospital intercept represents the underlying risk of a mortality at the hospital, after accounting for patient risk. The hospital-specific intercepts are given a distribution to account for the clustering (non-independence) of patients within the same hospital. If there were no differences among hospitals, then after adjusting for patient risk, the hospital intercepts should be identical across all hospitals. The RSMR is calculated as the ratio of the number of "predicted" 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 on the basis of 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 for a comparison of a particular hospital's	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

	3502 Hybrid Hospital-Wide (All-Condition, All-Procedure) Risk-Standardized Mortality Measure	1789 Hospital-Wide All-Cause Unplanned Readmission Measure (HWR)	1550 Hospital-level risk-standardized complication rate (RSCR) following elective primary total hip arthroplasty (THA) and/or total knee arthroplasty (TKA)	0468 Hospital 30-day, all-cause, risk-standardized mortality rate (RSMR) following pneumonia hospitalization	1893 Hospital 30-Day, all-cause, risk-standardized mortality rate (RSMR) following chronic obstructive pulmonary disease (COPD) hospitalization	2558 Hospital 30-Day, All-Cause, Risk-Standardized Mortality Rate (RSMR) Following Coronary Artery Bypass Graft (CABG) Surgery
	deaths is based on the hospital's performance with its observed case mix and service mix, and 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 for each cohort is added to the sum of the estimated regression coefficients multiplied by patient characteristics. The results are transformed via an inverse logit function and summed over all patients attributed to a hospital to get a predicted value. The expected number of deaths is based on the nation's performance with that hospital's case mix and service mix and 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 transformed via an inverse logit function and summed over all patients in the hospital to get an expected value. This approach is analogous to a ratio of "observed" to "expected" used in other types of statistical analyses. It conceptually allows a particular hospital's performance, given its case mix and service mix, to be compared to an average hospital's performance with the same case mix and service mix. Thus, a lower ratio indicates lower-than-expected mortality rates or better quality, while a higher ratio indicates higher-than-expected mortality rates or worse quality. To assess hospital performance for each reporting period, the measure re-estimates the model coefficients using the data in that period. The division-level SMRs are then pooled for each hospital using an inverse variance-weighted geometric mean to create a	based on the hospital's performance with its observed case mix and service mix, and the denominator is the number of readmissions expected based on the nation's performance with that hospital's case mix and service mix. This approach is analogous to a ratio of "observed" to "expected" used in other types of statistical analyses. It conceptually allows a particular hospital's performance, given its case mix and service mix, to be compared to an average hospital's performance with the same case mix and service mix. Thus, a lower ratio indicates lower-than-expected readmission rates or better quality, while a higher ratio indicates higher-than-expected readmission rates or worse quality. For each specialty cohort, the "predicted" number of readmissions (the numerator) is calculated by using the coefficients estimated by regressing the risk factors (found in Table D.9) and the hospital-specific effect on the risk of readmission. The estimated hospital-specific effect for each cohort is added to the sum of the estimated regression coefficients multiplied by patient characteristics. The results are log transformed and summed over all patients attributed to a hospital to get a predicted value. The "expected" number of readmissions (the denominator) is obtained in the same manner, but a common effect using all hospitals in our sample is added in place of the hospital-specific effect. The results are log transformed and summed over all patients in the hospital to get an expected value. To assess hospital performance for each reporting period, we re-estimate the model	is the number of complications expected based on the nation's performance with that hospital's case mix. This approach is analogous to a ratio of "observed" to "expected" used in other types of statistical analyses. It conceptually allows for a comparison of a particular hospital's performance given its case mix to an average hospital's performance with the same case mix. Thus, a lower ratio indicates lower-than-expected complication rates or better quality, and a higher ratio indicates higher-than-expected complication rates or worse quality. The "predicted" number of admissions with a complication (the numerator) is calculated by using the coefficients estimated by regressing the risk factors and the hospital-specific intercept on the risk of having an admission with a complication. The estimated hospital-specific intercept is added to the sum of the estimated regression coefficients multiplied by the patient characteristics. The results are log transformed and summed over all patients attributed to a hospital to get a predicted value. The "expected" number of admissions with a complication (the denominator) is obtained in the same manner, but a common intercept using all hospitals in our sample is added in place of the hospital-specific effect. The results are log transformed and summed over all patients in the hospital to get an expected value. To assess hospital performance for each reporting period, we re-estimate the model coefficients using the years of data in that period. This calculation transforms the ratio of predicted over expected into a rate	is analogous to a ratio of "observed" to "expected" used in other types of statistical analyses. It conceptually allows for a comparison of a particular hospital's performance given its case mix to an average hospital's performance with the same case mix. Thus, a lower ratio indicates lower-than-expected mortality rates or better quality, and 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 intercept 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 intercept using all hospitals in our sample is added in place of the hospital-specific intercept. 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	performance given its case mix to an average hospital's performance with the same case mix. Thus, a lower ratio indicates lower-than-expected mortality rates or better quality, and 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 intercept 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 intercept using all hospitals in our sample is added in place of the hospital-specific intercept. 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 readmission rate. The hierarchical logistic regression models are described fully in the original methodology report (Krumholz et al., 2005). References: 1. Normand S-LT, Shahian DM. 2007. Statistical and Clinical Aspects of Hospital Outcomes Profiling. Stat Sci 22(2): 206-226. 2. Krumholz H, Normand S, Galusha D, et al. 2005. Risk-Adjustment Models for AMI and HF 30-Day Mortality Methodology.	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

	3502 Hybrid Hospital-Wide (All-Condition, All-Procedure) Risk-Standardized Mortality Measure	1789 Hospital-Wide All-Cause Unplanned Readmission Measure (HWR)	1550 Hospital-level risk-standardized complication rate (RSCR) following elective primary total hip arthroplasty (THA) and/or total knee arthroplasty (TKA)	0468 Hospital 30-day, all-cause, risk-standardized mortality rate (RSMR) following pneumonia hospitalization	1893 Hospital 30-Day, all-cause, risk-standardized mortality rate (RSMR) following chronic obstructive pulmonary disease (COPD) hospitalization	2558 Hospital 30-Day, All-Cause, Risk-Standardized Mortality Rate (RSMR) Following Coronary Artery Bypass Graft (CABG) Surgery
	hospital-wide composite SMR. (Note that in the case of the hybrid measure, we are presenting data from 9 of the total 15 divisions due to limitations in availability of electronic health records data). The hospital-wide SMR is then multiplied by the national observed mortality rate to produce the RSMR.	coefficients using the data in that period. The specialty cohort SRRs are then pooled for each hospital using a volume-weighted geometric mean to create a hospital-wide composite SRR. The composite SRR is multiplied by the national observed readmission rate to produce the RSRR. The statistical modeling approach is described fully in Appendix A and in the original methodology report (Horwitz et al., 2012). The ACR quality measure was adapted from the HWR quality measure. The unit of analysis was changed from the hospital to the ACO. This was possible because both the HWR and ACR measures assess readmission performance for a population that clusters patients together (either in hospitals or in ACOs). The goal is to isolate the effects of beneficiary characteristics on the probability that a patient will be readmitted from the effects of being in a specific hospital or ACO. In addition, planned readmissions are excluded for the ACR quality measure in the same way that they are excluded for the HWR measure. The ACR measure is calculated identically to what is described above for the HWR measure. References: Horwitz L, Partovian C, Lin Z, et al. Hospital-Wide All-Cause Unplanned Readmission Measure: Final Technical Report. 2012; http://www.qualitynet.org/dcs/BlobServer?blobkey=id&blobnocache=true&blobwhere=1228889825199&blobheader=multipart%2Foctet-stream&blobheadername1=Content-Disposition&blobheadervalue1=attachment%3Bfilename%3DDryRun_HWR_TechReport_081012.pdf&blobcol=urldata&blobtable=MungoBlobs.	that is compared to the national observed complication rate. The hierarchical logistic regression models are described fully in the original methodology report (Grosso et al., 2012). References: Grosso L, Curtis J, Geary L, et al. Hospital-level Risk-Standardized Complication Rate Following Elective Primary Total Hip Arthroplasty (THA) And/Or Total Knee Arthroplasty (TKA) Measure Methodology Report. 2012. Normand S-LT, Shahian DM. 2007. Statistical and Clinical Aspects of Hospital Outcomes Profiling. Stat Sci 22(2): 206-226.	Outcomes Profiling. Stat Sci 22(2): 206-226. 2. Krumholz H, Normand S, Galusha D, et al. 2005. Risk-Adjustment Models for AMI and HF 30-Day Mortality Methodology.		

	3502 Hybrid Hospital-Wide (All-Condition, All-Procedure) Risk-Standardized Mortality Measure	1789 Hospital-Wide All-Cause Unplanned Readmission Measure (HWR)	1550 Hospital-level risk-standardized complication rate (RSCR) following elective primary total hip arthroplasty (THA) and/or total knee arthroplasty (TKA)	0468 Hospital 30-day, all-cause, risk-standardized mortality rate (RSMR) following pneumonia hospitalization	1893 Hospital 30-Day, all-cause, risk-standardized mortality rate (RSMR) following chronic obstructive pulmonary disease (COPD) hospitalization	2558 Hospital 30-Day, All-Cause, Risk-Standardized Mortality Rate (RSMR) Following Coronary Artery Bypass Graft (CABG) Surgery
		Accessed 30 April, 2014. Normand S-LT, Shahian DM. 2007. Statistical and Clinical Aspects of Hospital Outcomes Profiling. Stat Sci 22(2): 206-226.				
Submission items	5.1 Identified measures: 5a.1 Are specs completely harmonized? Yes 5a.2 If not completely harmonized, identify difference, rationale, impact: This hybrid HWM measure incorporates patient-level clinical data from the EHR into the risk adjustment model, compared to the claims-only hospital-wide mortality measure. This hybrid HWM measure is intended to complement the existing CMS Hospital-Wide All-Cause Risk-Standardized Readmission Measure (NQF #1789) to allow assessment of trends in hospital performance for both readmission and mortality outcomes, similar to other complementary pairs of readmission and mortality measures for specific conditions and procedures. By measuring mortality outcomes across almost all hospitalized patients, this measure will provide an important additional performance assessment that will complement condition- and procedure-specific or other more narrowly defined mortality measures and allow a greater number of patients and hospitals to be evaluated. This HWM measure captures a similarly broad cohort to the CMS Hospital-Wide All-Cause Risk-Standardized Readmission Measure (NQF #1789), and a broader cohort than those of other CMS condition-specific measures. Because the mortality measure is focused on a different outcome, it differs from the existing CMS Hospital-Wide All-Cause Risk Standardized	5.1 Identified measures: 1768 : Plan All-Cause Readmissions (PCR) 1891 : Hospital 30-day, all-cause, risk-standardized readmission rate (RSRR) following chronic obstructive pulmonary disease (COPD) hospitalization 1551 : Hospital-level 30-day risk-standardized readmission rate (RSRR) following elective primary total hip arthroplasty (THA) and/or total knee arthroplasty (TKA) 0695 : Hospital 30-Day Risk-Standardized Readmission Rates following Percutaneous Coronary Intervention (PCI) 0329 : Risk-Adjusted 30-Day All-Cause Readmission Rate 0330 : Hospital 30-day, all-cause, risk-standardized readmission rate (RSRR) following heart failure (HF) hospitalization 0505 : Hospital 30-day all-cause risk-standardized readmission rate (RSRR) following acute myocardial infarction (AMI) hospitalization. 0506 : Hospital 30-day, all-cause, risk-standardized readmission rate (RSRR) following pneumonia hospitalization 5a.1 Are specs completely harmonized? No 5a.2 If not completely harmonized, identify difference, rationale, impact: This measure and the National Committee for Quality Assurance (NCQA) Plan All-Cause Readmissions (PCR) Measure #1768 are related measures, but are not competing because they don't have the same measure focus and same target population. In	5.1 Identified measures: 0534 : Hospital specific risk-adjusted measure of mortality or one or more major complications within 30 days of a lower extremity bypass (LEB). 0564 : Cataracts: Complications within 30 Days Following Cataract Surgery Requiring Additional Surgical Procedures 1551 : Hospital-level 30-day risk-standardized readmission rate (RSRR) following elective primary total hip arthroplasty (THA) and/or total knee arthroplasty (TKA) 2052 : Reduction of Complications through the use of Cystoscopy during Surgery for Stress Urinary Incontinence 5a.1 Are specs completely harmonized? Yes 5a.2 If not completely harmonized, identify difference, rationale, impact: We did not include in our list of related measures any non-outcome measures (for example, process measures) with the same target population as our measure. Because this is an outcome measure, clinical coherence of the cohort takes precedence over alignment with related non-outcome measures. Furthermore, non-outcome measures are limited due to 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	5.1 Identified measures: 0708 : Proportion of Patients with Pneumonia that have a Potentially Avoidable Complication (during the episode time window) 0231 : Pneumonia Mortality Rate (IQI #20) 0506 : Hospital 30-day, all-cause, risk-standardized readmission rate (RSRR) following pneumonia hospitalization 0279 : Community Acquired Pneumonia Admission Rate (PQI 11) 2579 : Hospital-level, risk-standardized payment associated with a 30-day episode of care for pneumonia (PN) 5a.1 Are specs completely harmonized? No 5a.2 If not completely harmonized, identify difference, rationale, impact: The pneumonia mortality measure cohort, version 9.0, is harmonized with the hospital-level, risk-standardized payment associated with a 30-day episode of care for pneumonia cohort. Version 9.2 of the pneumonia mortality measure cohort is, however, not harmonized with the pneumonia payment measure cohort. There is intention to harmonize the pneumonia mortality and payment measure cohorts in the future. We did not include in our list of related measures any non-outcome (for example, process) measures with the same target population as our measure. Because this is an outcome measure, clinical coherence of the cohort takes precedence over alignment with related non-outcome measures. Furthermore, non-outcome measures are limited due to broader patient exclusions. This	5.1 Identified measures: 0701 : Functional Capacity in COPD patients before and after Pulmonary Rehabilitation 0700 : Health-related Quality of Life in COPD patients before and after Pulmonary Rehabilitation 0275 : Chronic Obstructive Pulmonary Disease (COPD) or Asthma in Older Adults Admission Rate (PQI 05) 1891 : Hospital 30-day, all-cause, risk-standardized readmission rate (RSRR) following chronic obstructive pulmonary disease (COPD) hospitalization 5a.1 Are specs completely harmonized? Yes 5a.2 If not completely harmonized, identify difference, rationale, impact: We did not include in our list of related measures any non-outcome (for example, process) measures with the same target population as our measure. Our measure cohort was heavily vetted by clinical experts, a technical expert panel, and a public comment period. Additionally, the measure, with the specified cohort, has been publicly reported since December 2014. Because this is an outcome measure, clinical coherence of the cohort takes precedence over alignment with related non-outcome measures. Furthermore, non-outcome measures are limited due to broader patient exclusions. This is because they typically only include a specific subset of patients who are eligible for that measure (for example, patients who receive a specific medication or undergo a specific procedure). 5b.1 If competing, why superior or rationale for additive value: N/A	5.1 Identified measures: 0114 : Risk-Adjusted Postoperative Renal Failure 0115 : Risk-Adjusted Surgical Re-exploration 0119 : Risk-Adjusted Operative Mortality for CABG 0122 : Risk-Adjusted Operative Mortality for Mitral Valve (MV) Replacement + CABG Surgery 0123 : Risk-Adjusted Operative Mortality for Aortic Valve Replacement (AVR) + CABG Surgery 0129 : Risk-Adjusted Postoperative Prolonged Intubation (Ventilation) 0130 : Risk-Adjusted Deep Sternal Wound Infection 0131 : Risk-Adjusted Stroke/Cerebrovascular Accident 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 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 1502 : Risk-Adjusted Operative Mortality for Mitral Valve (MV) Repair + CABG Surgery 1893 : Hospital 30-Day, all-cause, risk-

	3502 Hybrid Hospital-Wide (All-Condition, All-Procedure) Risk-Standardized Mortality Measure	1789 Hospital-Wide All-Cause Unplanned Readmission Measure (HWR)	1550 Hospital-level risk-standardized complication rate (RSCR) following elective primary total hip arthroplasty (THA) and/or total knee arthroplasty (TKA)	0468 Hospital 30-day, all-cause, risk-standardized mortality rate (RSMR) following pneumonia hospitalization	1893 Hospital 30-Day, all-cause, risk-standardized mortality rate (RSMR) following chronic obstructive pulmonary disease (COPD) hospitalization	2558 Hospital 30-Day, All-Cause, Risk-Standardized Mortality Rate (RSMR) Following Coronary Artery Bypass Graft (CABG) Surgery
	Readmission Measure (NQF #1789) in a couple of ways. First, this HWM measure includes patients with a principal discharge diagnosis of cancer, whereas those patients are not included in the readmission measure. Cancer patients are appropriate to include as many have survival as their primary goal, however due to cancer treatment plans, readmissions are frequently part of the plan and expected and therefore are not a reasonable signal of quality. Another difference between the two measures is the number of divisions or specialty cohorts the patients are divided into in order to more accurately risk adjust for case-mix and service-mix. The readmission measure divides patients into six categories, or "specialty cohorts", while the mortality measure uses 15. This is because the risk of mortality is much more closely related to patient factors than readmission is related to patient factors. PSI-02 (NQF #0357) is another complementary mortality measure, which captures a different patient population and a different outcome compared with the HWM measure submitted with this application. PSI-02 captures patients 18 years of age or older, or obstetric patients, whereas the HWM measure captures patients between the ages of 65 and 94. PSI-02 captures DRGs with less than 0.5% mortality rate, whereas the HWM measure captures all patients within all CCSs, regardless of mortality rate. HWM captures mortality up to 30 days past admission, where AHRQ PSI-02 only captures in-hospital mortality. IQI 90 (NQF #0530) is another complimentary mortality measure, which is a composite measure of the	addition, both have been previously harmonized to the extent possible under the guidance of the National Quality Forum Steering Committee in 2011. Each of these measures has different specifications. NCQA's Measure #1768 counts the number of inpatient stays for patients aged 18 and older during a measurement year that were followed by an acute readmission for any diagnosis to any hospital within 30 days. It contrasts this count with a calculation of the predicted probability of an acute readmission. NCQA's measure is intended for quality monitoring and accountability at the health plan level. This measure estimates the risk-standardized rate of unplanned, all-cause readmissions to a hospital or ACO for any eligible condition within 30 days of hospital discharge for patients aged 18 and older. The measure will result in a single summary risk-adjusted readmission rate for conditions or procedures that fall under five specialties: surgery/gynecology, general medicine, cardiorespiratory, cardiovascular, and neurology. This measure is specified for evaluating hospital or ACO performance. However, despite these differences in cohort specifications, both measures under NQF guidance have been harmonized to the extent possible through modifications such as exclusion of planned readmissions. We did not include in our list of related measures any non-outcome (e.g., process) measures with the same target population as our measure. Because this is an outcome measure, clinical coherence of the cohort takes precedence over alignment with related non-outcome measures.	rationale for additive value: N/A	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). Lastly, this measure and the NQF Inpatient Pneumonia Mortality (AHRQ) Measure #0231 are complementary rather than competing measures. Although they both assess mortality for patients admitted to acute care hospitals with a principal discharge diagnosis of pneumonia, the specified outcomes are different. This measure assesses 30-day mortality while #0231 assesses inpatient mortality. Assessment of 30-day and inpatient mortality outcomes have distinct advantages and uses which make them complementary as opposed to competing. For example the 30-day period provides a broader perspective on hospital care and utilizes standard time period to examine hospital performance to avoid bias by differences in length of stay among hospitals. However, in some settings it may not be feasible to capture post-discharge mortality making the inpatient measure more useable. We have previously consulted with AHRQ to examine harmonization of complementary measures of mortality for patients with AMI and stroke. We have found that the measures are harmonized to the extent possible given that small differences in cohort inclusion and exclusion criteria are warranted on the basis of the use of different outcomes. However, this current measure has been modified from the last endorsed version to include patients with a principal discharge diagnosis of sepsis and a secondary discharge diagnosis of pneumonia that is present on admission. The cohort was also expanded to		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,

	3502 Hybrid Hospital-Wide (All-Condition, All-Procedure) Risk-Standardized Mortality Measure	1789 Hospital-Wide All-Cause Unplanned Readmission Measure (HWR)	1550 Hospital-level risk-standardized complication rate (RSCR) following elective primary total hip arthroplasty (THA) and/or total knee arthroplasty (TKA)	0468 Hospital 30-day, all-cause, risk-standardized mortality rate (RSMR) following pneumonia hospitalization	1893 Hospital 30-Day, all-cause, risk-standardized mortality rate (RSMR) following chronic obstructive pulmonary disease (COPD) hospitalization	2558 Hospital 30-Day, All-Cause, Risk-Standardized Mortality Rate (RSMR) Following Coronary Artery Bypass Graft (CABG) Surgery
	number of in-hospital deaths for a narrow range of conditions (CHF, stroke, hip fracture, pneumonia, acute myocardial infarction and GI hemorrhage). The HWM measure presented in this application captures all deaths after 30 days of admission, for all conditions and procedures. 5b.1 If competing, why superior or rationale for additive value: There are no competing NQF-endorsed measures.	Furthermore, non-outcome measures are limited due to broader patient exclusions. This is because they typically only include a specific subset of patients who are eligible for that measure (for example, patients who receive a specific medication or undergo a specific procedure). 5b.1 If competing, why superior or rationale for additive value: N/A		include patients with a principal discharge diagnosis of aspiration pneumonia. Thus the current measure cohort is no longer harmonized with measure #0231. 5b.1 If competing, why superior or rationale for additive value: N/A		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.

Comparison of NQF 3502, 1789, 1550, 0468, 1893, 2558, 0230, 0229, 2876, 0347 and 0530 continued…

	3502 Hybrid Hospital-Wide (All-Condition, All-Procedure) Risk-Standardized Mortality Measure	0230 Hospital 30-day, all-cause, risk-standardized mortality rate (RSMR) following acute myocardial infarction (AMI) hospitalization	0229 Hospital 30-day, all-cause, risk-standardized mortality rate (RSMR) following heart failure (HF) hospitalization	2876 Hospital 30-day, all-cause, risk-standardized mortality rate (RSMR) following acute ischemic stroke hospitalization with claims-based risk adjustment for stroke severity	0347 Death Rate in Low-Mortality Diagnosis Related Groups (PSI02)	0530 Mortality for Selected Conditions
Steward	Centers for Medicare & Medicaid Services (CMS)	Centers for Medicare & Medicaid Services (CMS)	Centers for Medicare & Medicaid Services	Centers for Medicare & Medicaid Services (CMS)	Agency for Healthcare Research and Quality	Agency for Healthcare Research and Quality
Description	The measure estimates a hospital-level 30-day risk-standardized mortality rate (RSMR), defined as death from any cause within 30 days after the index admission date for patients who are between the ages of 50 and 94. Please note that in parallel with the hybrid HWM measure, we are submitting a claims-only HWM measure. Note that ultimately the claims and hybrid measures will be harmonized and use the same exact cohort specifications. The intent is that prior to implementation, the two measures will be exactly the same, with the exception of the additional risk adjustment added by the CCDE in the hybrid measure. This is analogous to the currently endorsed and implemented hybrid hospital-wide readmissions measure (NQF 1789 and NQF 2879e). Because of the homology between the claims and hybrid HWM measures, there is no reason to suspect that the results of analyses done for the claims-only measure would differ in any significant way from results of analyses for a nationally representative hybrid measure. Below we highlight the differences between the two measures, including specifications, data used, and testing	This measure estimates a hospital-level, 30-day risk-standardized mortality rate (RSMR) for patients discharged from the hospital with a principal diagnosis of acute myocardial infarction (AMI). Mortality is defined as death from any cause within 30 days after the index admission date. The Centers for Medicare & Medicaid Services (CMS) annually reports the measure for patients who are 65 years and older and are Medicare fee-for-service (FFS) beneficiaries hospitalized in non-federal hospitals or patients hospitalized in Veterans Health Administration (VA) facilities.	The measure estimates a hospital-level 30-day risk-standardized mortality rate (RSMR). Mortality is defined as death for any cause within 30 days after the admission date for the index admission, for patients 18 and older discharged from the hospital with a principal diagnosis of heart failure (HF). The Centers for Medicare & Medicaid Services (CMS) annually reports the measure for patients who are 65 years or older and are either Medicare fee-for-service (FFS) beneficiaries and hospitalized in non-federal hospitals or patients hospitalized in Veterans Health Administration (VA) facilities.	This stroke mortality measure estimates the hospital-level, risk-standardized mortality rate (RSMR) for patients discharged from the hospital with a principal discharge diagnosis of acute ischemic stroke. The outcome is all-cause 30-day mortality, defined as death from any cause within 30 days of the index admission date, including in-hospital death, for stroke patients. This is a newly developed measure with a cohort and outcome that is harmonized with the CMS's current publicly reported claims-based stroke mortality measure and includes the National Institutes of Health (NIH) Stroke Scale as an assessment of stroke severity in the risk-adjustment model. This measure uses Medicare fee-for-service (FFS) administrative claims for the cohort derivation, outcome, and risk adjustment.	In-hospital deaths per 1,000 discharges for low mortality (< 0.5%) Diagnosis Related Groups (DRGs) among patients ages 18 years and older or obstetric patients. Excludes cases with trauma, cases with cancer, cases with an immunocompromised state, and transfers to an acute care facility. [NOTE: The software provides the rate per hospital discharge. However, common practice reports the measure as per 1,000 discharges. The user must multiply the rate obtained from the software by 1,000 to report in-hospital deaths per 1,000 hospital discharges.]	A composite measure of in-hospital mortality indicators for selected conditions.

	3502 Hybrid Hospital-Wide (All-Condition, All-Procedure) Risk-Standardized Mortality Measure	0230 Hospital 30-day, all-cause, risk-standardized mortality rate (RSMR) following acute myocardial infarction (AMI) hospitalization	0229 Hospital 30-day, all-cause, risk-standardized mortality rate (RSMR) following heart failure (HF) hospitalization	2876 Hospital 30-day, all-cause, risk-standardized mortality rate (RSMR) following acute ischemic stroke hospitalization with claims-based risk adjustment for stroke severity	0347 Death Rate in Low-Mortality Diagnosis Related Groups (PSI02)	0530 Mortality for Selected Conditions
	which reflect limitations of data availability, as well as actual intended differences in the measure (risk adjustment). Differences in the measure, data, and testing that reflect limitations in data availability 1. Dataset used for development, some testing (see below for differences), and measure results: a. The claims-only measure uses nation-wide Medicare FFS claims and the enrollment database. b. The hybrid measure uses an electronic health record (EHR) database from 21 hospitals in the Kaiser Permanente network which includes inpatient claims data information. 2. Age of patients in cohort: a. The claims-only measure includes Medicare FFS patients, age 65-94. b. The hybrid measure includes all patients age 50-94 (see later discussion for justification) 3. External empiric validity testing a. Not possible for the hybrid measure, due to limited data availability. We provide results from the claims-only measure within the hybrid testing form. 4. Socioeconomic risk factor analyses a. Not possible for the hybrid measure, due to limited data availability. We provide results from the claims-only measure					

	3502 Hybrid Hospital-Wide (All-Condition, All-Procedure) Risk-Standardized Mortality Measure	0230 Hospital 30-day, all-cause, risk-standardized mortality rate (RSMR) following acute myocardial infarction (AMI) hospitalization	0229 Hospital 30-day, all-cause, risk-standardized mortality rate (RSMR) following heart failure (HF) hospitalization	2876 Hospital 30-day, all-cause, risk-standardized mortality rate (RSMR) following acute ischemic stroke hospitalization with claims-based risk adjustment for stroke severity	0347 Death Rate in Low-Mortality Diagnosis Related Groups (PSI02)	0530 Mortality for Selected Conditions
	within the hybrid testing form. 5. Exclusion analyses a. To be representative of what we expect the impact would be of the measures' exclusions in a nation-wide sample, we provide the results from the claims-only measure. 6. Meaningful differences a. To be representative of what we expect the range of performance would be in a nation-wide sample, we provide the distribution results from the claims-only measure. Difference between the two measures when fully harmonized, prior to implementation: 1. Risk adjustment: a. The claims-only measure uses administrative claims data only for risk adjustment b. The hybrid measure adds 10 clinical risk variables, derived from a set of core clinical data elements (CCDE) extracted from the EHR.					
Type	Outcome	Outcome	Outcome	Outcome	Outcome	Composite
Data Source	Claims, Electronic Health Records, Other Clinical-Hybrid Dataset Constructed using Kaiser Permanente Northern California matched administrative claims and electronic health record (EHR) data, admission dates from October 1, 2015 – December 30, 2016. This data source was used for measure testing. (An earlier Kaiser dataset from that included all admissions for adult patients to	Claims, Other, Paper Medical Records Data sources for the Medicare FFS measure: 1. Medicare Part A inpatient and Part B outpatient claims: This data source contains claims data for fee-for service inpatient and outpatient services including: Medicare inpatient hospital care, outpatient hospital services, skilled nursing facility care, some home health agency services, as well as inpatient and outpatient physician	Claims, Other, Paper Medical Records Data sources for the Medicare FFS measure: 1. Medicare Part A inpatient and Part B outpatient claims: This data source contains claims data for FFS inpatient and outpatient services including: Medicare inpatient hospital care, outpatient hospital services, skilled nursing facility care, some home health agency services, as well as inpatient and outpatient physician claims for	Claims (Only), Other, Registry For measure implementation the data sources will be: 1. Medicare Part A inpatient and Part B outpatient claims: This data source contains claims data for fee-for service inpatient and outpatient services including: Medicare inpatient hospital care, outpatient hospital services, skilled nursing facility care, some home health agency services, as	Claims While the measure is tested and specified using data from the Healthcare Cost and Utilization Project (HCUP) (see section 1.1 and 1.2 of the measure testing form), the measure specifications and software are specified to be used with any ICD-9-CM-coded administrative billing/claims/discharge dataset with Present on Admission (POA) information. Note that in Version 5.0 (April 2015), the	Electronic administrative data/claims

	3502 Hybrid Hospital-Wide (All-Condition, All-Procedure) Risk-Standardized Mortality Measure	0230 Hospital 30-day, all-cause, risk-standardized mortality rate (RSMR) following acute myocardial infarction (AMI) hospitalization	0229 Hospital 30-day, all-cause, risk-standardized mortality rate (RSMR) following heart failure (HF) hospitalization	2876 Hospital 30-day, all-cause, risk-standardized mortality rate (RSMR) following acute ischemic stroke hospitalization with claims-based risk adjustment for stroke severity	0347 Death Rate in Low-Mortality Diagnosis Related Groups (PSI02)	0530 Mortality for Selected Conditions
	any of their member hospitals between January 1, 2009 and June 30, 2015 was used for measure development, as described in the attached methodology report). The two data sources listed below were used for testing the claims-based measure; the hybrid testing form includes some testing data from the claims-based measure (for example, for the social risk factor and external validation analyses). HWM claims-only datasets: Medicare Part A Inpatient Claims Data The index dataset contains administrative inpatient hospitalization data for Medicare FFS beneficiaries, aged 65-94 on admission. The history dataset includes administrative inpatient hospitalization data on each patient for the 12 months prior to the index admission. This data was used along with the Medicare Enrollment Database (EDB) for testing the claims-based measure. 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. It was also used to determine hospice enrollment.	claims for the 12 months prior to an index admission. 2. Medicare Enrollment Database (EDB): This database contains Medicare beneficiary demographic, benefit/coverage, and vital status information. This data source was used to obtain information on several inclusion/exclusion indicators such as Medicare status on admission as well as vital status. These data have previously been shown to accurately reflect patient vital status (Fleming et al., 1992). 3. Veterans Health Administration Data: This data source contains claims data for VA inpatient and outpatient services including: inpatient hospital care, outpatient hospital services, skilled nursing facility care, some home health agency services, as well as inpatient and outpatient physician claims for the 12 months prior to and including each index admission. Unlike Medicare FFS patients, VA patients are not required to have been enrolled in Part A and Part B Medicare for the 12 months prior to the date of admission. All-payer data sources: For our analyses to examine use in all-payer data, we used all-payer data from California in addition to CMS data for Medicare FFS 65+ patients in California hospitals. California is a diverse state, and, with more than 37 million residents, California represents 12% of the US population. We used the California Patient Discharge Data, a large, linked database of patient hospital admissions. In 2006, there were approximately 3 million adult discharges from more than 450 non-	the 12 months prior to an index admission. 2. Medicare Enrollment Database (EDB): This database contains Medicare beneficiary demographic, benefit/coverage, and vital status information. This data source was used to obtain information on several inclusion/exclusion indicators such as Medicare status on admission as well as vital status. These data have previously been shown to accurately reflect patient vital status (Fleming et al., 1992). 3. Veterans Health Administration (VA) Data: This data source contains claims data for VA inpatient and outpatient services including: inpatient hospital care, outpatient hospital services, skilled nursing facility care, some home health agency services, as well as inpatient and outpatient physician claims for the 12 months prior to and including each index admission. Unlike Medicare FFS patients, VA patients are not required to have been enrolled in Part A and Part B Medicare for the 12 months prior to the date of admission. All-payer data sources: For our analyses to examine use in all-payer data, we used all-payer data from California in addition to CMS data for Medicare FFS 65+ patients in California hospitals. California is a diverse state, and, with more than 37 million residents, California represents 12% of the US population. We used the California Patient Discharge Data, a	well as inpatient and outpatient physician claims for the 12 months prior to an index admission. 2. Medicare Enrollment Database (EDB): This database contains Medicare beneficiary demographic, benefit/coverage, and vital status information. This data source was used to obtain information on several inclusion/exclusion indicators such as Medicare status on admission, as well as vital status. These data have previously been shown to accurately reflect patient vital status (Fleming et al., 1992). 3. For measure development purposes only, we linked the data sources above with data from the AHA/ASA GWTG-Stroke Registry. The registry data were used to obtain the National Institutes of Health (NIH) Stroke Scale scores and clinical risk variables. When this measure is implemented NIH Stroke Scale scores will be derived from ICD-10 codes in Medicare claims. Reference: Fleming C, Fisher ES, Chang CH, Bubolz TA, Malenka DJ. 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. Data sources for the all-payer update No data collection instrument provided Attachment NQF_2876_Claims-Only_Stroke_Mortality_S2b_Mortality_Data_Dictionary_v1	AHRQ QI software will no longer support prediction of POA status using an embedded prediction module. Users are expected to provide POA data. Available at measure-specific web page URL identified in S.1 Attachment PSI_02_Death_Rate_in_Low-Mortality_Diagnosis_Related_Groups_-DRGs-_-_Editable.xlsx	

	3502 Hybrid Hospital-Wide (All-Condition, All-Procedure) Risk-Standardized Mortality Measure	0230 Hospital 30-day, all-cause, risk-standardized mortality rate (RSMR) following acute myocardial infarction (AMI) hospitalization	0229 Hospital 30-day, all-cause, risk-standardized mortality rate (RSMR) following heart failure (HF) hospitalization	2876 Hospital 30-day, all-cause, risk-standardized mortality rate (RSMR) following acute ischemic stroke hospitalization with claims-based risk adjustment for stroke severity	0347 Death Rate in Low-Mortality Diagnosis Related Groups (PSI02)	0530 Mortality for Selected Conditions
	No data collection instrument provided Attachment Del18b2HOP5HWMHybridDataDictionary01072019.xlsx	Federal acute care hospitals. Records are linked by a unique patient identification number, allowing us to determine patient history from previous hospitalizations and to evaluate rates of both readmission and mortality (via linking with California vital statistics records). Using all-payer data from California as well as CMS Medicare FFS data for California hospitals, we performed analyses to determine whether the AMI mortality measure can be applied to all adult patients, including not only FFS Medicare patients aged 65+ but also non-FFS Medicare patients aged 65+ and younger patients aged 18-64 years at the time of admission. References: Fleming C, Fisher ES, Chang CH, Bubolz TA, Malenka DJ. 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_0230_AMI_Mortality_Data_Dictionary_Final-636973300643762106.xlsx	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 as well as CMS Medicare FFS data for California hospitals, we performed analyses to determine whether the HF mortality measure can be applied to all adult patients, including not only FFS Medicare patients aged 65+ but also non-FFS Medicare patients aged 18-64 years at the time of admission. Reference: Fleming C, Fisher ES, Chang CH, Bubolz TA, Malenka DJ. 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_0229_S2b_HF_Mortality_Data_Dictionary_v1.0_Final-636973301131111819.xlsx	.0-635884757617681755.xlsx		
Level	Facility	Facility	Facility	Facility	Facility	Facility/Agency
Setting	Inpatient/Hospital, Other Home-based primary care and home-based palliative care); Settings include: Home, Boarding home, Domiciliary, Assisted Living Facilities, Rest	Inpatient/Hospital	Inpatient/Hospital, Other Hospital & Hospital: Acute Care Facility	Hospital	Inpatient/Hospital	Hospital

	3502 Hybrid Hospital-Wide (All-Condition, All-Procedure) Risk-Standardized Mortality Measure	0230 Hospital 30-day, all-cause, risk-standardized mortality rate (RSMR) following acute myocardial infarction (AMI) hospitalization	0229 Hospital 30-day, all-cause, risk-standardized mortality rate (RSMR) following heart failure (HF) hospitalization	2876 Hospital 30-day, all-cause, risk-standardized mortality rate (RSMR) following acute ischemic stroke hospitalization with claims-based risk adjustment for stroke severity	0347 Death Rate in Low-Mortality Diagnosis Related Groups (PSI02)	0530 Mortality for Selected Conditions
	Home or Custodial Care Services					
Numerator Statement	The outcome for this measure is 30-day, all-cause mortality. Mortality is defined as death from any cause, either during or after admission, within 30 days of the index admission date.	The outcome for this measure is 30-day all-cause mortality. We define mortality as death from any cause within 30 days from the date of admission for patients discharged from the hospital with a principal diagnosis of AMI. Additional details are provided in S.5 Numerator Details.	The outcome for this measure is 30-day all-cause mortality. We define mortality as death from any cause within 30 days of the index admission date for patients 65 and older discharged from the hospital with a principal diagnosis of HF. Additional details are provided in S.5 Numerator Details.	The outcome for this measure is 30-day, all-cause mortality. We define mortality as death from any cause within 30 days of the index admission for patients with a principal discharge diagnosis of acute ischemic stroke.	Number of deaths (DISP=20) among cases meeting the inclusion and exclusion rules for the denominator.	Number of in-hospital deaths
Numerator Details	The measure outcome is death from any cause within 30 days of the admission date of the index admission. The numerator is a binary variable (1=yes/0=no) that indicates whether the patient died within 30 days of the index admission date.	Outcome definition This measure counts death from any cause within 30 days after the index admission date. Rationale: From a patient perspective, death is the most critical outcome regardless of cause. Outcomes occurring within 30 days of admission can be influenced by hospital care and early transition to the non-acute care setting. The 30-day time frame is a clinically meaningful period for hospitals to collaborate with their communities to reduce mortality. (Simoes et al., 2018; Dharmarajan et al., 2015). Identifying deaths in the Medicare FFS population As currently reported, we identify deaths for FFS Medicare patients 65 years and older in the Medicare Enrollment Database (EDB). Identifying deaths in the all-payer population For the purposes of development of an all-payer measure, deaths were identified using the California vital statistics data file. Nationally, post-discharge deaths can be identified using an external source of vital status, such as the Social Security Administration's Death Master File (DMF) or the Centers for Disease Control and Prevention's	Outcome Definition The measure counts deaths for any cause within 30 days of the date of admission of the index HF hospitalization. Rationale: From a patient perspective, death is a critical outcome regardless of cause. Outcomes occurring within 30 days of the start of the admission can be influenced by hospital care and early transition to the non-acute care setting. The 30-day time frame is a clinically meaningful period for hospitals to collaborate with their communities to reduce mortality (Simoes et al., 2017; Dharmarajan et al., 2015). Identifying deaths in the FFS measure As currently reported, we identify deaths for FFS Medicare patients 65 years and older in the Medicare Enrollment Database (EDB). Identifying deaths in the all-payer measure For the purposes of development of an all-payer measure, deaths were identified using the California vital statistics data file. Nationally, post-discharge deaths can be identified using an external source of vital status, such as the Social Security Administration's	The measure outcome is death from any cause within 30 days of the index admission date. As currently specified, we identify deaths for FFS Medicare patients, age 65 years and older, in the Medicare Enrollment Database (EDB).	Not applicable	Number of in-hospital deaths for CHF, stroke, hip fracture, pneumonia, acute myocardial infarction and GI hemorrhage (separately). See Inpatient Quality Indicators: Technical Specifications for additional details (http://www.qualityindicators.ahrq.gov/Modules/IQI_TechSpec.aspx).

	3502 Hybrid Hospital-Wide (All-Condition, All-Procedure) Risk-Standardized Mortality Measure	0230 Hospital 30-day, all-cause, risk-standardized mortality rate (RSMR) following acute myocardial infarction (AMI) hospitalization	0229 Hospital 30-day, all-cause, risk-standardized mortality rate (RSMR) following heart failure (HF) hospitalization	2876 Hospital 30-day, all-cause, risk-standardized mortality rate (RSMR) following acute ischemic stroke hospitalization with claims-based risk adjustment for stroke severity	0347 Death Rate in Low-Mortality Diagnosis Related Groups (PSI02)	0530 Mortality for Selected Conditions
		National Death Index (NDI). Reference: 1. Simoes J, Grady J, Purvis D, et al. 2018 Condition-Specific Measures Updates and Specifications Report Hospital-Level 30-Day Risk-Standardized Mortality Measures. http://www.qualitynet.org/dcs/ContentServer?c=Page&pagename=QnetPublic/Page/QnetTier3&cid=1163010421830. Accessed May 4, 2018.	Death Master File (DMF) or the Centers for Disease Control and Prevention's National Death Index (NDI). Reference: 1. Simoes J, Grady J, DeBuhr J, et al. 2017 Condition-Specific Measures Updates and Specifications Report Hospital-Level 30-Day Risk-Standardized Mortality Measures. http://www.qualitynet.org/dcs/ContentServer?c=Page&pagename=QnetPublic/Page/QnetTier3&cid=1163010421830. Accessed June 7, 2017. 2. Dharmarajan K, Hsieh AF, Kulkarni VT, et al. 2015 Trajectories of risk after hospitalization for heart failure, acute myocardial infarction, or pneumonia: retrospective cohort study. BMJ (Clinical researched);350:h411			
Denominator Statement	The cohort includes inpatient admissions for a wide variety of conditions for patients aged between 50 and 94 years old who were discharged from short-term acute care hospitals. If a patient has more than one admission during the measurement year, one admission is randomly selected for inclusion in the measure. Additional details are provided in S.7 Denominator Details. The age range for this measure differs from that of the claims-only measure due to the limited size of the dataset used for testing. The intent is to harmonize the age range of the hybrid measure with the age range of the claims-only measure, so that both will include admissions for patients age 65-94.	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 discharged from the hospital with a principal discharge diagnosis of AMI and with a complete claims history for the 12 months prior to admission. The measure is currently publicly reported by CMS for those patients 65 years and older who are either Medicare FFS beneficiaries admitted to non-federal hospitals or patients admitted to VA hospitals. Additional details are provided in S.7 Denominator Details.	This claims-based measure can be used in either of two patient cohorts: (1) patients aged 65 years or older or (2) patients aged 18 years or older. We have explicitly tested the measure in both age groups. The cohort for the publically reported measure includes admissions for patients aged 65 years and older discharged from the hospital with a principal discharge diagnosis of HF and with a complete claims history for the 12 months prior to admission. The measure is currently publicly reported by CMS for those patients 65 years and older who are either Medicare FFS beneficiaries admitted to non-federal hospitals or patients admitted to VA hospitals. Additional details are provided in S.7 Denominator Details.	The cohort includes inpatient admissions to all non-federal, short-term, acute care hospitals for Medicare FFS patients age 65 years and older with a principal discharge diagnosis of acute ischemic stroke. Additional details are provided in S.9 Denominator Details.	Discharges, for patients ages 18 years and older or MDC 14 (pregnancy, childbirth, and puerperium), with a low-mortality (less than 0.5% mortality) MS-DRG code (LOWMODR). If an MS-DRG is divided into "without/with (major) complications and comorbidities," both codes without complications/comorbidities and codes with (major) complications/comorbidities must have mortality rates below 0.5% in the reference population to qualify for inclusion.	Number of eligible discharges (all indicators are limited to the adult population)

	3502 Hybrid Hospital-Wide (All-Condition, All-Procedure) Risk-Standardized Mortality Measure	0230 Hospital 30-day, all-cause, risk-standardized mortality rate (RSMR) following acute myocardial infarction (AMI) hospitalization	0229 Hospital 30-day, all-cause, risk-standardized mortality rate (RSMR) following heart failure (HF) hospitalization	2876 Hospital 30-day, all-cause, risk-standardized mortality rate (RSMR) following acute ischemic stroke hospitalization with claims-based risk adjustment for stroke severity	0347 Death Rate in Low-Mortality Diagnosis Related Groups (PSI02)	0530 Mortality for Selected Conditions
Denominator Details	The index cohort includes all inpatient admissions for patients aged 50-94 years old. (Note: The intention is to fully harmonize the cohort definition with the claims-only measure so that both measures will capture admissions for patients age 65-94. We deviated from that definition during development and testing due to the limited dataset available that included the EHR data elements needed to calculate this measure. Note that the risk model already includes age in years, as a risk variable.) An index admission is the hospitalization to which the mortality outcome is attributed and includes admissions for patients: 1. Not transferred from another acute care facility Rationale: Admissions to an acute cate hospital within one day of discharge from another acute care hospital are considered transfers. Transferred patients are included in the measure cohort, but it is the initial hospitalization rather than any "transfer-in" hospitalization(s), that is included as the hospitalization to which the mortality outcome is attributed (the index admission). 2. Aged between 50 and 94 years The hybrid measure is intended for the Medicare FFS population but was tested in a limited dataset due to the EHR data elements included. The use of a small dataset	To be included in the measure cohort used in public reporting, patients must meet the following additional inclusion criteria: 1. Having a principal discharge diagnosis of AMI; 2. Enrolled in Medicare FFS Part A and Part B for the first 12 months prior to the date of admission, enrolled in Part A during the index admission, or those who are VA beneficiaries; 3. Aged 65 or over; and 4. Not transferred from another acute care facility. ICD-9 and ICD-10 cohort codes are included in the attached Data Dictionary.	To be included in the HF measure cohort used in public reporting, patients must meet the following additional inclusion criteria: 1. Have a principal discharge diagnosis of heart failure (HF); 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 Part A during the index admission, or those who are VA beneficiaries (in the cases of the AMI, HF, and pneumonia measures); 3. Aged 65 or over; and, 4. Not transferred from another acute care facility. VA beneficiaries are eligible for inclusion in the AMI, HF, and pneumonia measure cohorts regardless of Medicare FFS enrollment or whether they were hospitalized in a VA or non-VA short-term acute care hospital. This measure can also be used for an all-payer population aged 18 years and older. We have explicitly tested the measure in both patients aged 18+ years and those aged 65+ years. ICD-9 and ICD-10 cohort codes are included in the attached Data Dictionary.	The denominator includes all Medicare FFS beneficiaries, age 65 and over, with a principal discharge diagnosis of acute ischemic stroke. To be included in the measure cohort used in public reporting, patients must meet the following additional inclusion criteria: 1. Enrolled in Medicare fee-for-service (FFS) during the index admission; 2. Not transferred from another acute care facility; and 3. Enrolled in Part A and Part B Medicare for the 12 months prior to the date of index admission. ICD-9-CM codes that define the patient cohort: 433.01 Occlusion and stenosis of basilar artery with cerebral infarction 433.11 Occlusion and stenosis of carotid artery with cerebral infarction 433.21 Occlusion and stenosis of vertebral artery with cerebral infarction 433.31 Occlusion and stenosis of multiple and bilateral precerebral arteries with cerebral infarction 433.81 Occlusion and stenosis of other specified precerebral artery with cerebral infarction 433.91 Occlusion and stenosis of unspecified precerebral artery with cerebral infarction 434.01 Cerebral thrombosis with cerebral infarction 434.11 Cerebral embolism with cerebral infarction 434.91 Cerebral artery occlusion, unspecified with cerebral infarction 436 Acute, but ill-defined,	LOWMODR: Low-mortality (less than 0.5%) MS-DRG codes (See attached technical specifications for detailed list of codes.)	Number of eligible adult discharges for CHF, stroke, hip fracture, pneumonia, acute myocardial infarction and GI hemorrhage (separately). See Inpatient Quality Indicators: Technical Specifications for additional details (http://www.qualityindicators.ahrq.gov/Modules/IQI_TechSpec.aspx).

	3502 Hybrid Hospital-Wide (All-Condition, All-Procedure) Risk-Standardized Mortality Measure	0230 Hospital 30-day, all-cause, risk-standardized mortality rate (RSMR) following acute myocardial infarction (AMI) hospitalization	0229 Hospital 30-day, all-cause, risk-standardized mortality rate (RSMR) following heart failure (HF) hospitalization	2876 Hospital 30-day, all-cause, risk-standardized mortality rate (RSMR) following acute ischemic stroke hospitalization with claims-based risk adjustment for stroke severity	0347 Death Rate in Low-Mortality Diagnosis Related Groups (PSI02)	0530 Mortality for Selected Conditions
	required that we expand the sample by including admissions from patients ages 50 to 94 years. Note that the measure already adjusts for age. 3. Not admitted for primary psychiatric diagnoses Rationale: Patients admitted for psychiatric treatment are typically cared for in separate psychiatric facilities that are not comparable to short-term acute care hospitals (see data dictionary, HWM Non-Acute Care Inclusion tab). 4. Not admitted for rehabilitation Rationale: These admissions are not typically to a short-term acute care hospital and are not for acute care (see data dictionary, HWM Non-Acute Care Inclusion tab). 5. Not enrolled in hospice at the time of, or 12 months prior to, their index admission Rationale: Patients enrolled in hospice in the prior 12 months or at the time of admission are unlikely to have 30-day survival as a primary goal 6. Not enrolled in hospice within two days of admission Rationale: There is not a single, correct approach regarding patients enrolled in hospice during admission or upon discharge – mortality may or may not represent a quality signal for this group of patients and hospice enrollment is inadequate to differentiate this issue. However, for most patients and/or families who had the discussion and agreed to enroll in hospice within two days of admission, 30-day survival is not likely the			cerebrovascular disease ICD-10 codes that define the patient cohort: I63.22 Cerebral infarction due to unspecified occlusion or stenosis of basilar arteries I63.139 Cerebral infarction due to embolism of unspecified carotid artery I63.239 Cerebral infarction due to unspecified occlusion or stenosis of unspecified carotid arteries I63.019 Cerebral infarction due to thrombosis of unspecified vertebral artery I63.119 Cerebral infarction due to embolism of unspecified vertebral artery I63.219 Cerebral infarction due to unspecified occlusion or stenosis of unspecified vertebral arteries I63.59 Cerebral infarction due to unspecified occlusion or stenosis of other cerebral artery I63.20 Cerebral infarction due to unspecified occlusion or stenosis of unspecified precerebral arteries I63.30 Cerebral infarction due to thrombosis of unspecified cerebral artery I63.40 Cerebral infarction due to embolism of unspecified cerebral artery I63.50 Cerebral infarction due to unspecified occlusion or stenosis of unspecified cerebral artery I67.8 Other specified cerebrovascular diseases		

	3502 Hybrid Hospital-Wide (All-Condition, All-Procedure) Risk-Standardized Mortality Measure	0230 Hospital 30-day, all-cause, risk-standardized mortality rate (RSMR) following acute myocardial infarction (AMI) hospitalization	0229 Hospital 30-day, all-cause, risk-standardized mortality rate (RSMR) following heart failure (HF) hospitalization	2876 Hospital 30-day, all-cause, risk-standardized mortality rate (RSMR) following acute ischemic stroke hospitalization with claims-based risk adjustment for stroke severity	0347 Death Rate in Low-Mortality Diagnosis Related Groups (PSI02)	0530 Mortality for Selected Conditions
	primary goal due to their condition and not the quality of care received. 7. Not with a principal diagnosis of cancer and enrolled in hospice during their index admission Rationale: Patients admitted primarily for cancer who are enrolled in hospice during admission are unlikely to have 30-day survival as a primary goal of care. (see data dictionary, HWM Cancer Inclusion tab). 8. Without any diagnosis of metastatic cancer Rationale: Although some patients admitted with a diagnosis of metastatic cancer will have 30-day survival as a primary goal of care, for many such patients admitted to the hospital, death may be a clinically reasonable and patient-centered outcome. (see data dictionary, HWM Metastatic Cancer Inclusion tab). 9. Not with a principal discharge diagnosis, or a secondary diagnosis that is present on admission (POA) for a condition which hospitals have limited ability to influence survival Rationale: Hospitals have little ability to impact mortality for some conditions. This list of conditions (see data dictionary, HWM ICD-10 Inclusion tab) was determined through independent review, by several clinicians, of conditions associated with high mortality. The decisions were also reviewed with our Technical Expert Panel (TEP) and Technical Work			I67.89 Other cerebrovascular diseases An ICD-9 to ICD-10 crosswalk is attached in field S.2b. (Data Dictionary or Code Table).		

	3502 Hybrid Hospital-Wide (All-Condition, All-Procedure) Risk-Standardized Mortality Measure	0230 Hospital 30-day, all-cause, risk-standardized mortality rate (RSMR) following acute myocardial infarction (AMI) hospitalization	0229 Hospital 30-day, all-cause, risk-standardized mortality rate (RSMR) following heart failure (HF) hospitalization	2876 Hospital 30-day, all-cause, risk-standardized mortality rate (RSMR) following acute ischemic stroke hospitalization with claims-based risk adjustment for stroke severity	0347 Death Rate in Low-Mortality Diagnosis Related Groups (PSI02)	0530 Mortality for Selected Conditions
	Group. Admissions are not included in the cohort if the patient had a principal diagnosis code that is on this list, or a secondary code with POA that is on the list. In addition, for patients with multiple admissions, the measure selects only one admission, at random, for inclusion. There is no practical statistical modeling approach that can account or adjust for the complex relationship between the number of admissions and risk of mortality in the context of a hospital-wide mortality measure. Random selection ensures that providers are not penalized for a "last" admission during the measurement period; selecting the last admission would not be as accurate a reflection of the risk of death as random selection, as the last admission is inherently associated with a higher mortality risk. Random selection is also used in CMS's condition-specific mortality measures. Note that random selection reduces the number of admissions, but does not exclude any patients from the measure. The cohort is defined using ICD-10 Clinical Modification codes identified in Medicare Part A Inpatient claims data. The measure aggregates the ICD-10 principal diagnosis and all procedure codes of the index admission into clinically coherent groups of conditions and					

	3502 Hybrid Hospital-Wide (All-Condition, All-Procedure) Risk-Standardized Mortality Measure	0230 Hospital 30-day, all-cause, risk-standardized mortality rate (RSMR) following acute myocardial infarction (AMI) hospitalization	0229 Hospital 30-day, all-cause, risk-standardized mortality rate (RSMR) following heart failure (HF) hospitalization	2876 Hospital 30-day, all-cause, risk-standardized mortality rate (RSMR) following acute ischemic stroke hospitalization with claims-based risk adjustment for stroke severity	0347 Death Rate in Low-Mortality Diagnosis Related Groups (PSI02)	0530 Mortality for Selected Conditions
	procedures (condition categories or procedure categories) using the Agency for Healthcare Research and Quality (AHRQ) Clinical Classifications System (CCS). There is a total of 285 mutually exclusive AHRQ condition categories, most of which are single, homogenous diseases such as pneumonia or acute myocardial infarction. Some are aggregates of conditions, such as “other bacterial infections”. There is a total of 231 mutually exclusive procedure categories. Using the AHRQ CCS procedure and condition categories, the measure assigns each index hospitalization to one of 15 mutually exclusive divisions. The divisions were created based upon clinical coherence, consistency of mortality risk, adequate patient and hospital case volume for stable results reporting, and input from clinicians, patients, and patient caregivers on usability. The measure first assigns admissions with qualifying AHRQ procedure categories to one of six surgery divisions by identifying a defining surgical procedure. The defining surgical procedure is identified using the following algorithm: 1) if a patient only has one major surgical procedure then that procedure is the defining surgical procedure; 2) if a patient has more than one major surgical procedure, the first					

	3502 Hybrid Hospital-Wide (All-Condition, All-Procedure) Risk-Standardized Mortality Measure	0230 Hospital 30-day, all-cause, risk-standardized mortality rate (RSMR) following acute myocardial infarction (AMI) hospitalization	0229 Hospital 30-day, all-cause, risk-standardized mortality rate (RSMR) following heart failure (HF) hospitalization	2876 Hospital 30-day, all-cause, risk-standardized mortality rate (RSMR) following acute ischemic stroke hospitalization with claims-based risk adjustment for stroke severity	0347 Death Rate in Low-Mortality Diagnosis Related Groups (PSI02)	0530 Mortality for Selected Conditions
	dated procedure performed during the index admission is the defining surgical procedure; 3) if there is more than one major surgical procedure on that earliest date, the procedure with the highest mortality rate is the defining surgical procedure. These divisions include admissions likely cared for by surgical teams. The surgical divisions are: Surgical Cancer (see note below), Cardiothoracic Surgery, General Surgery, Neurosurgery, Orthopedic Surgery, and Other Surgical Procedures. For the Surgical Cancer division, any admission that includes a surgical procedure and a principal discharge diagnosis code of cancer is assigned to the Surgical Cancer division. This division and the logic behind it was implemented in response to feedback from our Technical Expert Panel. The measure then assigns the remaining admissions into one of the nine non-surgical divisions based on the AHRQ diagnostic CCS of the principal discharge diagnosis. The non-surgical divisions are: Cancer, Cardiac, Gastrointestinal, Infectious Disease, Neurology, Orthopedic, Pulmonary, Renal, Other Conditions. The full list of the specific diagnosis and procedure AHRQ CCS categories used to define the divisions are attached in the Data Dictionary.					
Exclusions	The measure excludes index	The mortality measure excludes index hospitalizations	The HF mortality measure excludes index	The measure excludes	Exclude cases: • with any listed ICD-10-CM	Indicator specific

	3502 Hybrid Hospital-Wide (All-Condition, All-Procedure) Risk-Standardized Mortality Measure	0230 Hospital 30-day, all-cause, risk-standardized mortality rate (RSMR) following acute myocardial infarction (AMI) hospitalization	0229 Hospital 30-day, all-cause, risk-standardized mortality rate (RSMR) following heart failure (HF) hospitalization	2876 Hospital 30-day, all-cause, risk-standardized mortality rate (RSMR) following acute ischemic stroke hospitalization with claims-based risk adjustment for stroke severity	0347 Death Rate in Low-Mortality Diagnosis Related Groups (PSI02)	0530 Mortality for Selected Conditions
	admissions for patients: 1. With inconsistent or unknown vital status (from claims data) or other unreliable claims data; 2. Discharged against medical advice (AMA); 3. With an admission for spinal cord injury (CCS 227), skull and face fractures (CCS 228), Intracranial Injury (CCS 233), Crushing injury or internal injury (CCS 234), Open wounds of head/neck/trunk (CCS 235), and burns (CCS 240); and 4. With a principal discharge diagnosis within a CCS with fewer than 100 admissions in that division within the measurement year.	that meet any of the following exclusion criteria: 1. Discharged alive on the day of admission or the following day who were not transferred to another acute care facility; 2. Inconsistent or unknown vital status or other unreliable demographic (age and gender) data; 3. Enrolled in the Medicare hospice program or used VA hospice services any time in the 12 months prior to the index admission, including the first day of the index admission, or 4. Discharged against medical advice (AMA). For patients with more than one admission for a given condition in a given year, only one index admission for that condition is randomly selected for inclusion in the cohort. Similarly, for the three-year combined data, when index admissions occur during the transition between measure reporting periods (June and July of each year) and both are randomly selected for inclusion in the measure, the measure includes only the June admission. The July admissions are excluded to avoid assigning a single death to two admissions.	hospitalizations that meet any of the following exclusion criteria: 1. With inconsistent or unknown vital status or other unreliable demographic (age and gender) data; 2. Enrolled in the Medicare hospice program or used VA hospice services any time in the 12 months prior to the index admission, including the first day of the index admission; or, 3. Discharged against medical advice. 4. Discharged alive on the day of admission or the following day who were not transferred to another acute care facility; or 5. With a procedure code for LVAD implantation or heart transplantation either during the index admission or in the 12 months prior to the index admission. For patients with more than one admission for a given condition in a given year, only one index admission for that condition is randomly selected for inclusion in the cohort.	admissions for patients: 1. With inconsistent or unknown vital status or other unreliable data; 2. Enrolled in the Medicare hospice program at any time in the 12 months prior to the index admission, including the first day of the index admission; and 3. Discharged against medical advice (AMA). For patients with more than one admission for stroke in a given year, only one index admission for that condition is randomly selected for inclusion in the cohort.	diagnosis codes for trauma (Appendix G: TRAUMID) • with any listed ICD-10-CM diagnosis codes for cancer (Appendix H: CANCEID) • with any listed ICD-10-CM diagnosis codes for immunocompromised state (Appendix I: IMMUNID) • with any listed ICD-10-PCS procedure codes for immunocompromised state (Appendix I: IMMUNIP) • transfer to an acute care facility (DISP=2) • with missing discharge disposition (DISP=missing), gender (SEX=missing), age (AGE=missing), quarter (DQTR=missing), year (YEAR=missing), or principal diagnosis (DX1=missing)	
Exclusion Details	1. With inconsistent or unknown vital status (from claims data) or other unreliable claims data. Rationale: The measure does not include stays for patients where the admission date is after the date of death, or where the date of death occurs before the date of discharge but the patient was discharged alive because these are	1. Discharged alive on the day of admission or the following day who were not transferred to another acute care facility. Discharges are identified using data from the claims. Rationale: It is unlikely that these patients had clinically significant AMI. 2. Inconsistent or unknown vital status or other unreliable demographic data Rationale: We do not include stays for patients where the age is greater than	1. Inconsistent or unknown vital status or other unreliable demographic data Inconsistent vital status or unreliable data are identified if any of the following conditions are met 1) the patient's age is greater than 115 years: 2) if the discharge date for a hospitalization is before the admission date; 3) if the patient has a sex other than 'male'	1. Inconsistent vital status or unreliable data: We do not include stays for patients where the age is greater than 115, where the gender is neither male nor female, where the admission date is after the date of death in the Medicare Enrollment Database, or where the date of death occurs before the date of discharge but the patient was discharged alive.	Appendix G: Trauma Diagnosis Codes Appendix H: Cancer Diagnosis Codes Appendix I: Immunocompromised State Diagnosis and Procedure Codes (See attached Appendix G, Appendix H, and Appendix I for detailed list of codes.)	See Inpatient Quality Indicators: Technical Specifications for additional details (available at http://www.qualityindicators.ahrq.gov/Modules/IQI_TechSpec.aspx).

	3502 Hybrid Hospital-Wide (All-Condition, All-Procedure) Risk-Standardized Mortality Measure	0230 Hospital 30-day, all-cause, risk-standardized mortality rate (RSMR) following acute myocardial infarction (AMI) hospitalization	0229 Hospital 30-day, all-cause, risk-standardized mortality rate (RSMR) following heart failure (HF) hospitalization	2876 Hospital 30-day, all-cause, risk-standardized mortality rate (RSMR) following acute ischemic stroke hospitalization with claims-based risk adjustment for stroke severity	0347 Death Rate in Low-Mortality Diagnosis Related Groups (PSI02)	0530 Mortality for Selected Conditions
	likely errors in the data. 2. Discharged against medical advice (AMA) Rationale: Providers did not have the opportunity to deliver full care and prepare the patient for discharge. 3. With an admission for spinal cord injury (CCS 227), skull and face fractures (CCS 228), Intracranial Injury (CCS 233), Crushing injury or internal injury (CCS 234), Open wounds of head/neck/trunk (CCS 235), and burns (CCS 240). Rationale: Even though a hospital likely can influence the outcome of some of these conditions, in many cases death events are not a signal of poor quality of care when patients present with these conditions. These conditions are also infrequent events that are unlikely to be uniformly distributed across hospitals. 4. With a principal discharge diagnosis within a CCS with fewer than 100 admissions in that division within the measurement year. Rationale: To calculate a stable and precise risk model, there are a minimum number of admissions that are needed. In addition, a minimum number of admissions and/or outcome events are required to inform grouping admissions into larger categories. These admissions present challenges to both accurate risk prediction and coherent risk grouping and are therefore excluded. Note: During measure development we analyzed different volume cut-offs	115, where the gender is neither male nor female, where the admission date is after the date of death in the Medicare Enrollment Database, or where the date of death occurs before the date of discharge but the patient was discharged alive. 3. Enrolled in the Medicare hospice program or used VA hospice services any time in the 12 months prior to the index admission, including the first day of the index admission. Enrollment to Medicare beneficiaries is determined using the Medicare Enrollment Database. Rationale: These patients are likely continuing to seek comfort measures only, so mortality is not necessarily an adverse outcome or signal of poor quality care. 4. Discharged against medical advice. Discharge status is identified using the claims Rationale: Providers did not have the opportunity to deliver full care and prepare the patient for discharge. After exclusions #1-4 are applied, the measure randomly selects one index admission per patient per year for inclusion in the cohort so that each episode of care is mutually independent with the same probability of the outcome. Additional admissions within that year are excluded. For each patient, the probability of death increases with each subsequent admission and therefore the episodes of care are not mutually independent. For the three-year combined data, when index admissions occur during the transition between	Rationale: We do not include stays for patients where the age is greater than 115, where the gender is neither male nor female, where the admission date is after the date of death in the Medicare Enrollment Database, or where the date of death occurs before the date of discharge but the patient was discharged alive. 2. Enrolled in the Medicare hospice program any time in the 12 months prior to the index admission, including the first day of the index admission Rationale: Hospice enrollment in the 12 months prior to or on the index admission is identified using hospice data and the Inpatient standard analytic file (SAF). This exclusion applies when the measure is used in Medicare FFS patients only. Rationale: These patients are likely continuing to seek comfort measures only; thus, mortality is not necessarily an adverse outcome or signal of poor quality care. 3. Discharged against medical advice Discharges against medical advice are identified using the discharge disposition indicator. Rationale: Providers did not have the opportunity to deliver full care and prepare the patient for discharge. 4. Discharged alive on the day of admission or the following day who were not transferred to another acute care facility. The discharge disposition indicator is used to identify patients alive at discharge. Transfers	2. Hospice enrollment in the 12 months prior to or on the index admission is identified using hospice data and the Inpatient Standard Analytic File (SAF). These patients are likely continuing to seek comfort measures only; thus, mortality is not necessarily an adverse outcome or signal of poor quality care for these patients. 3. Discharges against medical advice (AMA) are identified using the discharge disposition indicator. After all exclusions are applied, the measure randomly selects one index admission per patient per year for inclusion in the cohort so that each episode of care is mutually independent with the same probability of the outcome. For each patient, the probability of death increases with each subsequent admission, and therefore, the episodes of care are not mutually independent. Similarly, for the three year combined data, when index admissions occur during the transition between measure reporting periods (June and July of each year) and both are randomly selected for inclusion in the measure, the measure includes only the June admission. The July admissions are excluded to avoid assigning a single death to two admissions.		

	3502 Hybrid Hospital-Wide (All-Condition, All-Procedure) Risk-Standardized Mortality Measure	0230 Hospital 30-day, all-cause, risk-standardized mortality rate (RSMR) following acute myocardial infarction (AMI) hospitalization	0229 Hospital 30-day, all-cause, risk-standardized mortality rate (RSMR) following heart failure (HF) hospitalization	2876 Hospital 30-day, all-cause, risk-standardized mortality rate (RSMR) following acute ischemic stroke hospitalization with claims-based risk adjustment for stroke severity	0347 Death Rate in Low-Mortality Diagnosis Related Groups (PSI02)	0530 Mortality for Selected Conditions
	(25, 50 and 100). Using cut-off values below 100 resulted in too many CCS codes in some of the divisions (the CCS category codes are used in risk adjustment) which resulted in non-convergence of those division-level risk models. The total number of patients excluded is very small (13,597 or 0.21% of admissions for a cut off of 100). During measure development we also explored the option of pooling low-volume CCS codes (CCS<100 patients) into one group, however, the heterogeneity in mortality rates for the individual ICD-10 codes in those groups would preclude adequate risk adjustment. The TEP supported excluding these admissions.	measure reporting periods (June and July of each year) and both are randomly selected for inclusion in the measure, the measure includes only the June admission. July admissions are excluded to avoid assigning a single death to two admissions.	are identified in the claims when a patient with a qualifying admission is discharged from an acute care hospital and admitted to another acute care hospital on the same day or next day. Rationale: It is unlikely that these patients had clinically significant HF. 5. With a procedure code for LVAD implantation or heart transplantation either during the index admission or in the 12 months prior to the index admission Patients with LVAD implantation or heart transplantation during an index admission or in the previous 12 months are identified by the corresponding codes for these procedures included in claims data. Rationale: These patients represent a clinically distinct group (ICD-10-PCS code list). The data sources for these analyses are Medicare administrative claims and enrollment information for patients with hospitalizations between July 1, 2013 and June 30, 2016. After exclusions #1-5 are applied, the measure randomly selects one index admission per patient per year for inclusion in the cohort so that each episode of care is mutually independent with the same probability of the outcome. Additional admissions within that year are excluded. For each patient, the probability of death increases with each subsequent admission and therefore the			

	3502 Hybrid Hospital-Wide (All-Condition, All-Procedure) Risk-Standardized Mortality Measure	0230 Hospital 30-day, all-cause, risk-standardized mortality rate (RSMR) following acute myocardial infarction (AMI) hospitalization	0229 Hospital 30-day, all-cause, risk-standardized mortality rate (RSMR) following heart failure (HF) hospitalization	2876 Hospital 30-day, all-cause, risk-standardized mortality rate (RSMR) following acute ischemic stroke hospitalization with claims-based risk adjustment for stroke severity	0347 Death Rate in Low-Mortality Diagnosis Related Groups (PSI02)	0530 Mortality for Selected Conditions
			episodes of care are not mutually independent. For the three-year combined data, when index admissions occur during the transition between measure reporting periods (June and July of each year) and both are randomly selected for inclusion in the measure, the measure includes only the June admission. The July admissions are excluded to avoid assigning a single death to two admissions.			
Risk Adjustment	Statistical risk model	Statistical risk model	Statistical risk model	Statistical risk model	No risk adjustment or risk stratification	No risk adjustment or risk stratification
Stratification	N/A	N/A	N/A	N/A	Not applicable	
Type Score	Rate/proportion better quality = lower score	Rate/proportion better quality = lower score	Rate/proportion better quality = lower score	Rate/proportion better quality = lower score	Rate/proportion better quality = lower score	
Algorithm	The measure estimates hospital-level, risk-standardized mortality rates (RSMRs) within 30 days of hospital admission using hierarchical logistical regression models through a Bayesian Markov Chain Monte Carlo (MCMC) procedure. In brief, we used hierarchical logistic regression to model the log-odds of mortality for each of the 15 service-line divisions. Death within 30 days was modeled as a function of patient-level demographic and clinical characteristics and a random hospital-level intercept. This model specification accounts for within-hospital correlation of the observed outcomes and models the assumption that underlying differences in quality among the health care facilities being evaluated lead to systematic differences in	The measure estimates hospital-level 30-day all-cause RSMRs following hospitalization for AMI using hierarchical logistic regression models. In brief, the approach simultaneously models data at the patient and hospital levels to account for variance in patient outcomes within and between hospitals (Normand and Shahian, 2007). At the patient level, it models the log-odds of mortality within 30 days of discharge using age, sex, selected clinical covariates, and a hospital-specific intercept. At the hospital level, it models the hospital-specific intercepts as arising from a normal distribution. The hospital intercept represents the underlying risk of mortality at the hospital, after accounting for patient risk. The hospital-specific intercepts are given a distribution to account for the clustering (non-independence) of patients within the same hospital. If there were no	The measure estimates hospital-level 30-day all-cause RSMRs following hospitalization for HF using hierarchical logistic regression models. In brief, the approach simultaneously models data at the patient and hospital levels to account for variance in patient outcomes within and between hospitals (Normand and Shahian, 2007). At the patient level, it models the log-odds of mortality within 30 days of index admission using age, sex, selected clinical covariates, and a hospital-specific intercept. At the hospital level, it models the hospital-specific intercepts as arising from a normal distribution. The hospital intercept represents the underlying risk of a mortality at the hospital, after accounting for patient risk. The hospital-specific intercepts are given a distribution to account for the clustering (non-independence) of patients within the	The measure estimates hospital-level, 30-day, all-cause RSMRs following hospitalization for stroke using hierarchical logistic regression models. In brief, the approach simultaneously models data at the patient and hospital levels to account for variance in patient outcomes within and between hospitals (Normand and Shahian, 2007). At the patient level, it models the log-odds of mortality within 30 days of index admission using age, selected clinical covariates, and a hospital-specific intercept. At the hospital level, it models the hospital-specific intercepts as arising from a normal distribution. The hospital intercept represents the underlying risk of a mortality at the hospital, after accounting for patient risk. The hospital-specific intercepts are given a distribution to account for the	Risk adjustment is not currently included in the ICD-10-CM/PCS v2018 of the AHRQ QI specifications, due to the transition to ICD-10-CM/PCS (October 1, 2015). At least one full year of data coded in ICD-10-CM/PCS is needed in order to develop robust risk adjustment models. A full year of ICD-10-CM/PCS coded all-payer data will not be available until mid-2019. AHRQ will announce an anticipated date as soon as one is known.	

	3502 Hybrid Hospital-Wide (All-Condition, All-Procedure) Risk-Standardized Mortality Measure	0230 Hospital 30-day, all-cause, risk-standardized mortality rate (RSMR) following acute myocardial infarction (AMI) hospitalization	0229 Hospital 30-day, all-cause, risk-standardized mortality rate (RSMR) following heart failure (HF) hospitalization	2876 Hospital 30-day, all-cause, risk-standardized mortality rate (RSMR) following acute ischemic stroke hospitalization with claims-based risk adjustment for stroke severity	0347 Death Rate in Low-Mortality Diagnosis Related Groups (PSI02)	0530 Mortality for Selected Conditions
	outcomes. We estimated a separate hierarchical logistic regression model for each service-line division. In order to obtain the variance and interval estimates, we fit the hierarchical model under the Bayesian framework along with the Markov Chain Monte Carlo (MCMC) technique. Admissions are assigned to one of 15 mutually exclusive divisions (groups of discharge condition categories and procedure categories). For each division and each hospital with patients in that division, the standardized mortality ratio (SMR) is calculated as the ratio of the number of "predicted" deaths to the number of "expected" deaths at a given hospital. The predicted number of deaths is based on the hospital's performance with its observed case mix and service mix, and 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 for each cohort is added to the sum of the estimated regression coefficients multiplied by patient characteristics. The results are transformed via an inverse logit function and summed over all patients attributed to a hospital to get a predicted value. The expected number of deaths is based on the nation's performance with that hospital's case mix and service mix	differences among hospitals, then after adjusting for patient risk, the hospital intercepts should be identical across all hospitals. The RSMR is calculated as the ratio of the number of "predicted" to the number of "expected" deaths, multiplied by the national unadjusted mortality rate. For each hospital, the numerator of the ratio ("predicted") is the number of deaths within 30 days predicted on the basis of the hospital's performance with its observed case mix, and the denominator ("expected") is the number of deaths expected on the basis of the nation's performance with that hospital's case mix. This approach is analogous to a ratio of "observed" to "expected" used in other types of statistical analyses. It conceptually allows for a comparison of a particular hospital's performance given its case mix to an average hospital's performance with the same case mix. Thus, a lower ratio indicates lower-than-expected mortality or better quality and a higher ratio indicates higher-than-expected mortality 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 intercept 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	same hospital. If there were no differences among hospitals, then after adjusting for patient risk, the hospital intercepts should be identical across all hospitals. The RSMR is calculated as the ratio of the number of "predicted" 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 on the basis of 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 for a comparison of a particular hospital's performance given its case mix to an average hospital's performance with the same case mix. Thus, a lower ratio indicates lower-than-expected mortality rates or better quality, and 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 intercept 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	clustering (non-independence) of patients within the same hospital. If there were no differences among hospitals, then after adjusting for patient risk, the hospital intercepts should be identical across all hospitals. The RSMR is calculated as the ratio of the number of "predicted" 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 on the basis of 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 for a comparison of a particular hospital's performance given its case mix to an average hospital's performance with the same case mix. Thus, a lower ratio indicates lower-than-expected mortality rates or better quality, and 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 intercept on the risk of mortality. The estimated hospital-specific intercept is added to the sum of the estimated regression		

	3502 Hybrid Hospital-Wide (All-Condition, All-Procedure) Risk-Standardized Mortality Measure	0230 Hospital 30-day, all-cause, risk-standardized mortality rate (RSMR) following acute myocardial infarction (AMI) hospitalization	0229 Hospital 30-day, all-cause, risk-standardized mortality rate (RSMR) following heart failure (HF) hospitalization	2876 Hospital 30-day, all-cause, risk-standardized mortality rate (RSMR) following acute ischemic stroke hospitalization with claims-based risk adjustment for stroke severity	0347 Death Rate in Low-Mortality Diagnosis Related Groups (PSI02)	0530 Mortality for Selected Conditions
	and 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 transformed via an inverse logit function and summed over all patients in the hospital to get an expected value. This approach is analogous to a ratio of "observed" to "expected" used in other types of statistical analyses. It conceptually allows a particular hospital's performance, given its case mix and service mix, to be compared to an average hospital's performance with the same case mix and service mix. Thus, a lower ratio indicates lower-than-expected mortality rates or better quality, while a higher ratio indicates higher-than-expected mortality rates or worse quality. To assess hospital performance for each reporting period, the measure re-estimates the model coefficients using the data in that period. The division-level SMRs are then pooled for each hospital using an inverse variance-weighted geometric mean to create a hospital-wide composite SMR. (Note that in the case of the hybrid measure, we are presenting data from 9 of the total 15 divisions due to limitations in availability of electronic health records data). The hospital-wide SMR is then multiplied by the national observed mortality rate to produce the RSMR.	predicted value. The "expected" number of deaths (the denominator) is obtained in the same manner, but a common intercept using all hospitals in our sample is added in place of the hospital specific intercept. The results are 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 readmission rate. The hierarchical logistic regression models are described fully in the original methodology report (Krumholz et al., 2005). References: 1. Normand S-LT, Shahian DM. 2007. Statistical and Clinical Aspects of Hospital Outcomes Profiling. Stat Sci 22(2): 206-226. 2. Krumholz H, Normand S, Galusha D, et al. Risk-Adjustment Models for AMI and HF 30-Day Mortality Methodology. 2005.	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 intercept using all hospitals in our sample is added in place of the hospital-specific intercept. 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 (Krumholz et al., 2005). References: 1. Normand S-LT, Shahian DM. 2007. Statistical and Clinical Aspects of Hospital Outcomes Profiling. Stat Sci 22(2): 206-226. 2. Krumholz H, Normand S, Galusha D, et al. 2005. Risk-Adjustment Models for AMI and HF 30-Day Mortality Methodology.	coefficients multiplied by the patient characteristics. The results are transformed and summed over all patients attributed to a hospital to get a predicted value. The "expected" number of deaths (the denominator) is obtained in the same manner, but a common intercept using all hospitals in our sample is added in place of the hospital-specific intercept. The results are transformed and summed over all patients in the hospital to get an expected value. To assess hospital performance for each reporting period, we re-estimate the model coefficients using the years of data in that period. This calculation transforms the ratio of predicted over expected into a rate that is compared to the national observed mortality rate. The hierarchical logistic regression models are described fully in the original methodology report (Grosso et al., 2011). References: Normand S-LT, Shahian DM. 2007. Statistical and Clinical Aspects of Hospital Outcomes Profiling. Stat Sci 22(2): 206-226.		

	3502 Hybrid Hospital-Wide (All-Condition, All-Procedure) Risk-Standardized Mortality Measure	0230 Hospital 30-day, all-cause, risk-standardized mortality rate (RSMR) following acute myocardial infarction (AMI) hospitalization	0229 Hospital 30-day, all-cause, risk-standardized mortality rate (RSMR) following heart failure (HF) hospitalization	2876 Hospital 30-day, all-cause, risk-standardized mortality rate (RSMR) following acute ischemic stroke hospitalization with claims-based risk adjustment for stroke severity	0347 Death Rate in Low-Mortality Diagnosis Related Groups (PSI02)	0530 Mortality for Selected Conditions
Submission items	5.1 Identified measures: 5a.1 Are specs completely harmonized? Yes 5a.2 If not completely harmonized, identify difference, rationale, impact: This hybrid HWM measure incorporates patient-level clinical data from the EHR into the risk adjustment model, compared to the claims-only hospital-wide mortality measure. This hybrid HWM measure is intended to complement the existing CMS Hospital-Wide All-Cause Risk-Standardized Readmission Measure (NQF #1789) to allow assessment of trends in hospital performance for both readmission and mortality outcomes, similar to other complementary pairs of readmission and mortality measures for specific conditions and procedures. By measuring mortality outcomes across almost all hospitalized patients, this measure will provide an important additional performance assessment that will complement condition- and procedure-specific or other more narrowly defined mortality measures and allow a greater number of patients and hospitals to be evaluated. This HWM measure captures a similarly broad cohort to the CMS Hospital-Wide All-Cause Risk-Standardized Readmission Measure (NQF #1789), and a broader cohort than those of other CMS condition-	5.1 Identified measures: 2431 : Hospital-level, risk-standardized payment associated with a 30-day episode-of-care for Acute Myocardial Infarction (AMI) 1789 : Hospital-Wide All-Cause Unplanned Readmission Measure (HWR) 1891 : Hospital 30-day, all-cause, risk-standardized readmission rate (RSRR) following chronic obstructive pulmonary disease (COPD) hospitalization 1551 : Hospital-level 30-day risk-standardized readmission rate (RSRR) following elective primary total hip arthroplasty (THA) and/or total knee arthroplasty (TKA) 0506 : Hospital 30-day, all-cause, risk-standardized readmission rate (RSRR) following pneumonia hospitalization 0330 : Hospital 30-day, all-cause, risk-standardized readmission rate (RSRR) following heart failure (HF) hospitalization 0505 : Hospital 30-day all-cause risk-standardized readmission rate (RSRR) following acute myocardial infarction (AMI) hospitalization. 1893 : Hospital 30-Day, all-cause, risk-standardized mortality rate (RSMR) following chronic obstructive pulmonary disease (COPD) hospitalization 0468 : Hospital 30-day, all-cause, risk-standardized mortality rate (RSMR) following pneumonia hospitalization 0229 : Hospital 30-day, all-cause, risk-standardized mortality rate (RSMR) following heart failure (HF) hospitalization	5.1 Identified measures: 0358 : Heart Failure Mortality Rate (IQI 16) 1893 : Hospital 30-Day, all-cause, risk-standardized mortality rate (RSMR) following chronic obstructive pulmonary disease (COPD) hospitalization 0468 : Hospital 30-day, all-cause, risk-standardized mortality rate (RSMR) following pneumonia hospitalization 0230 : Hospital 30-day, all-cause, risk-standardized mortality rate (RSMR) following acute myocardial infarction (AMI) hospitalization 1891 : Hospital 30-day, all-cause, risk-standardized readmission rate (RSRR) following chronic obstructive pulmonary disease (COPD) hospitalization 1551 : Hospital-level 30-day risk-standardized readmission rate (RSRR) following elective primary total hip arthroplasty (THA) and/or total knee arthroplasty (TKA) 0506 : Hospital 30-day, all-cause, risk-standardized readmission rate (RSRR) following pneumonia hospitalization 0330 : Hospital 30-day, all-cause, risk-standardized readmission rate (RSRR) following heart failure (HF) hospitalization 0505 : Hospital 30-day all-cause risk-standardized readmission rate (RSRR) following acute myocardial infarction (AMI) hospitalization. 1789 : Hospital-Wide All-Cause Unplanned Readmission Measure (HWR) 5a.1 Are specs completely harmonized? Yes	5.1 Identified measures: 0467 : Acute Stroke Mortality Rate (IQI 17) 5a.1 Are specs completely harmonized? No 5a.2 If not completely harmonized, identify difference, rationale, impact: We did not include in our list of related measures any non-outcome (such as process) measures with the same target population as our measure. Because this is an outcome measure, clinical coherence of the cohort takes precedence over alignment with related non-outcome measures. Furthermore, non-outcome measures are limited due to broader patient exclusions. This is because they typically only include a specific subset of patients who are eligible for that measure (for example, patients who receive a specific medication or undergo a specific procedure). Additionally, this measure and the NQF endorsed Acute Stroke Mortality Rate (IQI 17) (AHRQ) Measure #0467 are complementary and related rather than competing measures. Although they both assess mortality for patients admitted to acute care hospitals with a principal discharge diagnosis of acute ischemic stroke, the specified outcomes are different. Our measure assesses 30-day mortality, while #0467 assesses inpatient mortality. The 30-day mortality and inpatient mortality outcomes each have distinct advantages and uses, which make them	5.1 Identified measures: 5a.1 Are specs completely harmonized? 5a.2 If not completely harmonized, identify difference, rationale, impact: not applicable 5b.1 If competing, why superior or rationale for additive value: Not applicable	5.1 Identified measures: 5a.1 Are specs completely harmonized? 5a.2 If not completely harmonized, identify difference, rationale, impact: 5b.1 If competing, why superior or rationale for additive value:

	3502 Hybrid Hospital-Wide (All-Condition, All-Procedure) Risk-Standardized Mortality Measure	0230 Hospital 30-day, all-cause, risk-standardized mortality rate (RSMR) following acute myocardial infarction (AMI) hospitalization	0229 Hospital 30-day, all-cause, risk-standardized mortality rate (RSMR) following heart failure (HF) hospitalization	2876 Hospital 30-day, all-cause, risk-standardized mortality rate (RSMR) following acute ischemic stroke hospitalization with claims-based risk adjustment for stroke severity	0347 Death Rate in Low-Mortality Diagnosis Related Groups (PSI02)	0530 Mortality for Selected Conditions
	specific measures. Because the mortality measure is focused on a different outcome, it differs from the existing CMS Hospital-Wide All-Cause Risk Standardized Readmission Measure (NQF #1789) in a couple of ways. First, this HWM measure includes patients with a principal discharge diagnosis of cancer, whereas those patients are not included in the readmission measure. Cancer patients are appropriate to include as many have survival as their primary goal, however due to cancer treatment plans, readmissions are frequently part of the plan and expected and therefore are not a reasonable signal of quality. Another difference between the two measures is the number of divisions or specialty cohorts the patients are divided into in order to more accurately risk adjust for case-mix and service-mix. The readmission measure divides patients into six categories, or "specialty cohorts", while the mortality measure uses 15. This is because the risk of mortality is much more closely related to patient factors than readmission is related to patient factors. PSI-02 (NQF #0357) is another complementary mortality measure, which captures a different patient population and a different outcome compared with the HWM measure submitted with this application. PSI-02 captures patients 18 years of age or older, or obstetric patients, whereas the HWM measure	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. Additionally, the measure, with the specified cohort, has been publicly reported since 2008. Because this is an outcome measure, clinical coherence of the cohort takes precedence over alignment with related non-outcome measures. Furthermore, non-outcome measures are limited due to broader patient exclusions. This is because they typically only include a specific subset of patients who are eligible for that measure (for example, patients who receive a specific medication or undergo a specific procedure). 5b.1 If competing, why superior or rationale for additive value: N/A	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. Additionally, the measure, with the specified cohort, has been publicly reported since 2008. Because this is an outcome measure, clinical coherence of the cohort takes precedence over alignment with related non-outcome measures. Furthermore, non-outcome measures are limited due to broader patient exclusions. This is because they typically only include a specific subset of patients who are eligible for that measure (for example, patients who receive a specific medication or undergo a specific procedure). 5b.1 If competing, why superior or rationale for additive value: N/A	complementary (and related) as opposed to competing. For example the 30-day period provides a broader perspective on hospital care and utilizes a standard time period to examine hospital performance to avoid bias by differences in length of stay among hospitals. However, in some settings it may not be feasible to capture post-discharge mortality, making the inpatient measure more useable. We have previously consulted with AHRQ to examine harmonization of the measures' cohort. As a result of that collaboration, we have found that the measures' cohorts are harmonized to the extent possible and that the small differences in cohort inclusion and exclusion criteria are appropriate because the measures assess different outcomes. 5b.1 If competing, why superior or rationale for additive value: This measure looks at a longer outcome time frame (30-days versus in-hospital) and incorporates stroke severity into the risk-model. The current publicly reported measure, Hospital 30-Day Mortality Following Acute Ischemic Stroke Hospitalization Measure, is a potentially competing measure. It is CMS intent to replace the current measure in any given program with this newly developed measure, which		

	3502 Hybrid Hospital-Wide (All-Condition, All-Procedure) Risk-Standardized Mortality Measure	0230 Hospital 30-day, all-cause, risk-standardized mortality rate (RSMR) following acute myocardial infarction (AMI) hospitalization	0229 Hospital 30-day, all-cause, risk-standardized mortality rate (RSMR) following heart failure (HF) hospitalization	2876 Hospital 30-day, all-cause, risk-standardized mortality rate (RSMR) following acute ischemic stroke hospitalization with claims-based risk adjustment for stroke severity	0347 Death Rate in Low-Mortality Diagnosis Related Groups (PSI02)	0530 Mortality for Selected Conditions
	captures patients between the ages of 65 and 94. PSI-02 captures DRGs with less than 0.5% mortality rate, whereas the HWM measure captures all patients within all CCSs, regardless of mortality rate. HWM captures mortality up to 30 days past admission, where AHRQ PSI-02 only captures in-hospital mortality. IQI 90 (NQF #0530) is another complimentary mortality measure, which is a composite measure of the number of in-hospital deaths for a narrow range of conditions (CHF, stroke, hip fracture, pneumonia, acute myocardial infarction and GI hemorrhage). The HWM measure presented in this application captures all deaths after 30 days of admission, for all conditions and procedures. 5b.1 If competing, why superior or rationale for additive value: There are no competing NQF-endorsed measures.			includes stroke severity in the risk model. The Hybrid Hospital 30-Day, All-Cause, Risk-Standardized Mortality Rate (RSMR) Following Acute Ischemic Stroke with Risk Adjustment for Stroke Severity measure is also being submitted to NQF for endorsement. This measure uses a combination of claims and electronic health records (EHR) data for risk adjustment but is otherwise harmonized with the new claims-only measure. It is CMS intent to implement only one of the new stroke mortality measures (this claims-only measure or the hybrid measure) in any given program.		

Comparison of NQF 3504, 1789, 1550, 0468, 1893, 2558, 0230, 0229, 2867, 0347 and 0530

	3504 Claims-Only Hospital-Wide (All-Condition, All-Procedure) Risk-Standardized Mortality Measure	1789 Hospital-Wide All-Cause Unplanned Readmission Measure (HWR)	1550 Hospital-level risk-standardized complication rate (RSCR) following elective primary total hip arthroplasty (THA) and/or total knee arthroplasty (TKA)	0468 Hospital 30-day, all-cause, risk-standardized mortality rate (RSMR) following pneumonia hospitalization	1893 Hospital 30-Day, all-cause, risk-standardized mortality rate (RSMR) following chronic obstructive pulmonary disease (COPD) hospitalization	2558 Hospital 30-Day, All-Cause, Risk-Standardized Mortality Rate (RSMR) Following Coronary Artery Bypass Graft (CABG) Surgery	0230 Hospital 30-day, all-cause, risk-standardized mortality rate (RSMR) following acute myocardial infarction (AMI) hospitalization
Steward	Centers for Medicare & Medicaid Services (CMS)	Centers for Medicare & Medicaid Services (CMS)	Centers for Medicare & Medicaid Services	Centers for Medicare & Medicaid Services (CMS)	Centers for Medicare & Medicaid Services	Centers for Medicare & Medicaid Services	Centers for Medicare & Medicaid Services (CMS)
Description	The measure estimates a hospital-level 30-day hospital-wide risk-standardized mortality rate (RSMR), defined as death from any cause within 30 days after the index admission date, for Medicare fee-for-service (FFS) patients who are between the ages of 65 and 94. Please note that in parallel with the claims-only HWM measure, we are submitting a hybrid HWM measure. Note that ultimately the claims and hybrid measures will be harmonized and use the same exact cohort specifications. The intent is that prior to implementation, the two measures will be exactly the same, with the exception of the additional risk adjustment added by the CCDE in the hybrid measure. This is analogous to the currently endorsed and implemented hybrid hospital-wide readmissions measure (NQF 1789 and NQF 2879e). Because of the homology between the claims and hybrid HWM measures, there is no reason to suspect that the results of analyses done	For the hospital-wide readmission (HWR) measure that was previously endorsed and is used in the Hospital Inpatient Quality Reporting Program (IQR), the measure estimates a hospital-level risk-standardized readmission rate (RSRR) of unplanned, all-cause readmission after admission for any eligible condition within 30 days of hospital discharge. The measure reports a single summary RSRR, derived from the volume-weighted results of five different models, one for each of the following specialty cohorts based on groups of discharge condition categories or procedure categories: surgery/gynecology; general medicine; cardiorespiratory; cardiovascular; and neurology, each of which will be described in greater detail below. The measure also indicates the hospital-level standardized risk ratios (SRR) for each of these five specialty cohorts. The outcome is defined as unplanned readmission for any cause within 30 days of the discharge date for the index admission (the admission included in the measure cohort). A specified set of planned readmissions do not count in the readmission outcome. CMS	The measure estimates a hospital-level risk-standardized complication rate (RSCR) associated with elective primary THA and TKA in Medicare Fee-For-Service beneficiaries who are 65 years and older. The outcome (complication) is defined as any one of the specified complications occurring from the date of index admission to 90 days post date of the index admission (the admission included in the measure cohort). The target population is patients 18 and over. CMS annually reports the measure for patients who are 65 years or older, are enrolled in fee-for-service (FFS) Medicare, and hospitalized in non-federal acute-care hospitals.	This measure estimates a hospital-level, 30-day risk-standardized mortality rate (RSMR) for patients discharged from the hospital with a principal discharge diagnosis of pneumonia, including aspiration pneumonia or a principal discharge diagnosis of sepsis (not severe sepsis) with a secondary discharge diagnosis of pneumonia (including aspiration pneumonia) coded as present on admission (POA). Mortality is defined as death from any cause within 30 days of the index admission date. The Centers for Medicare & Medicaid Services (CMS) annually reports the measure for patients who are 65 years or older and are either Medicare fee-for-service (FFS) beneficiaries and hospitalized in non-federal acute care hospitals.	This measure estimates a hospital-level, 30-day risk-standardized mortality rate (RSMR) for patients discharged from the hospital with a principal discharge diagnosis of COPD or a principal discharge diagnosis of respiratory failure with a secondary discharge diagnosis of acute exacerbation of COPD. Mortality is defined as death from any cause within 30 days of the index admission date. The Centers for Medicare & Medicaid Services (CMS) annually reports the measure for patients who are 65 years or older and are Medicare fee-for-service (FFS) beneficiaries hospitalized in non-federal acute care hospitals	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.	This measure estimates a hospital-level, 30-day risk-standardized mortality rate (RSMR) for patients discharged from the hospital with a principal diagnosis of acute myocardial infarction (AMI). Mortality is defined as death from any cause within 30 days after the index admission date. The Centers for Medicare & Medicaid Services (CMS) annually reports the measure for patients who are 65 years and older and are Medicare fee-for-service (FFS) beneficiaries hospitalized in non-federal hospitals or patients hospitalized in Veterans Health Administration (VA) facilities.

	3504 Claims-Only Hospital-Wide (All-Condition, All-Procedure) Risk-Standardized Mortality Measure	1789 Hospital-Wide All-Cause Unplanned Readmission Measure (HWR)	1550 Hospital-level risk-standardized complication rate (RSCR) following elective primary total hip arthroplasty (THA) and/or total knee arthroplasty (TKA)	0468 Hospital 30-day, all-cause, risk-standardized mortality rate (RSMR) following pneumonia hospitalization	1893 Hospital 30-Day, all-cause, risk-standardized mortality rate (RSMR) following chronic obstructive pulmonary disease (COPD) hospitalization	2558 Hospital 30-Day, All-Cause, Risk-Standardized Mortality Rate (RSMR) Following Coronary Artery Bypass Graft (CABG) Surgery	0230 Hospital 30-day, all-cause, risk-standardized mortality rate (RSMR) following acute myocardial infarction (AMI) hospitalization
	for the claims-only measure would differ in any significant way from results of analyses for a nationally representative hybrid measure. Below we highlight the differences between the two measures, including specifications, data used, and testing which reflect limitations of data availability, as well as actual intended differences in the measure (risk adjustment). Differences in the measure, data, and testing that reflect limitations in data availability 1. Dataset used for development, some testing (see below for differences), and measure results: a. The claims-only measure uses nation-wide Medicare FFS claims and the enrollment database. b. The hybrid measure uses an electronic health record (EHR) database from 21 hospitals in the Kaiser Permanente network which includes inpatient claims data information. 2. Age of patients in cohort: a. The claims-only measure includes Medicare FFS patients, age 65-94.	annually reports the measure for patients who are 65 years or older, are enrolled in fee-for-service (FFS) Medicare, and hospitalized in non-federal hospitals. For the All-Cause Readmission (ACR) measure version used in the Shared Savings Program (SSP), the measure estimates an Accountable Care Organization (ACO) facility-level RSRR of unplanned, all-cause readmission after admission for any eligible condition within 30 days of hospital discharge. The ACR measure is calculated using the same five specialty cohorts and estimates an ACO-level standardized risk ratio for each. CMS annually reports the measure for patients who are 65 years or older, are enrolled in FFS Medicare and are ACO assigned beneficiaries.						

	3504 Claims-Only Hospital-Wide (All-Condition, All-Procedure) Risk-Standardized Mortality Measure	1789 Hospital-Wide All-Cause Unplanned Readmission Measure (HWR)	1550 Hospital-level risk-standardized complication rate (RSCR) following elective primary total hip arthroplasty (THA) and/or total knee arthroplasty (TKA)	0468 Hospital 30-day, all-cause, risk-standardized mortality rate (RSMR) following pneumonia hospitalization	1893 Hospital 30-Day, all-cause, risk-standardized mortality rate (RSMR) following chronic obstructive pulmonary disease (COPD) hospitalization	2558 Hospital 30-Day, All-Cause, Risk-Standardized Mortality Rate (RSMR) Following Coronary Artery Bypass Graft (CABG) Surgery	0230 Hospital 30-day, all-cause, risk-standardized mortality rate (RSMR) following acute myocardial infarction (AMI) hospitalization
	b. The hybrid measure includes all patients age 50-94 (see later discussion for justification) 3. External empiric validity testing a. Not possible for the hybrid measure, due to limited data availability. We provide results from the claims-only measure within the hybrid testing form. 4. Socioeconomic risk factor analyses a. Not possible for the hybrid measure, due to limited data availability. We provide results from the claims-only measure within the hybrid testing form. 5. Exclusion analyses a. To be representative of what we expect the impact would be of the measures' exclusions in a nation-wide sample, we provide the results from the claims-only measure. 6. Meaningful differences a. To be representative of what we expect the range of performance would be in a nation-wide sample, we provide the distribution results from the claims-only measure. Difference between the two measures when fully harmonized,						

	3504 Claims-Only Hospital-Wide (All-Condition, All-Procedure) Risk-Standardized Mortality Measure	1789 Hospital-Wide All-Cause Unplanned Readmission Measure (HWR)	1550 Hospital-level risk-standardized complication rate (RSCR) following elective primary total hip arthroplasty (THA) and/or total knee arthroplasty (TKA)	0468 Hospital 30-day, all-cause, risk-standardized mortality rate (RSMR) following pneumonia hospitalization	1893 Hospital 30-Day, all-cause, risk-standardized mortality rate (RSMR) following chronic obstructive pulmonary disease (COPD) hospitalization	2558 Hospital 30-Day, All-Cause, Risk-Standardized Mortality Rate (RSMR) Following Coronary Artery Bypass Graft (CABG) Surgery	0230 Hospital 30-day, all-cause, risk-standardized mortality rate (RSMR) following acute myocardial infarction (AMI) hospitalization
	prior to implementation: 1. Risk adjustment: a. The claims-only measure uses administrative claims data only for risk adjustment b. The hybrid measure adds 10 clinical risk variables, derived from a set of core clinical data elements (CCDE) extracted from the EHR.						
Type	Outcome	Outcome	Outcome	Outcome	Outcome	Outcome	Outcome
Data Source	Claims, Enrollment Data, Other Data sources for the Medicare FFS measure: 1. Medicare Part A Inpatient: The index dataset contains administrative inpatient hospitalization data for Medicare FFS beneficiaries, aged 65-94 on admission, hospitalized from July 1, 2016-June 30, 2017. The history dataset includes administrative inpatient hospitalization data on each patient for the 12 months prior to the index admission. 2. Medicare Enrollment Database (EDB): This database contains Medicare beneficiary demographic, benefit/coverage, and vital status information. This data source was used to obtain information on several inclusion/exclusion indicators	Claims Data sources for the Medicare FFS measure: HWR 1. Medicare Part A claims data for calendar years 2007 and 2008 were combined and then randomly split into two equal subsets (development sample and validation sample). Risk variable selection was done using the development sample, the risk models for each of the five specialty cohorts in the measure were applied to the validation sample and the models' performance was compared. In addition we re-tested the models in Medicare Part A claims data from calendar year 2009 to look for temporal stability in the models' performance. The number of measured entities and index admissions are listed below by specialty cohort. 2. Medicare Enrollment Database (EDB): This database contains Medicare beneficiary	Claims, Other, Paper Medical Records Data sources: The currently publically reported measure is specified and has been tested using: 1. Medicare Part A inpatient and Part B outpatient claims: This data source contains claims data for FFS inpatient and outpatient services including: Medicare inpatient hospital care, outpatient hospital services, as well as inpatient and outpatient physician claims for the 12 months prior to an index admission. 2. Medicare Enrollment Database (EDB): This database contains Medicare beneficiary demographic, benefit/coverage, and vital status information. This data source was used to obtain information on several inclusion/exclusion indicators such as Medicare status on admission as well as vital status at discharge. These data have previously been shown to accurately reflect patient vital status (Fleming et al., 1992). During original measure	Claims, Other, Paper Medical Records Data sources for the Medicare FFS measure: 1. Medicare Part A inpatient and Part B outpatient claims: This data source contains claims data for FFS inpatient and outpatient services including: Medicare inpatient hospital care, outpatient hospital services, as well as inpatient and outpatient physician claims for the 12 months prior to an index admission. 2. Medicare Enrollment Database (EDB): This database contains Medicare beneficiary demographic, benefit/coverage, and vital status information. This data source was used to obtain information on several inclusion/exclusion indicators such as Medicare status on admission as well as vital status. These data have previously been	Claims, Other, Paper Medical Records Data sources for the Medicare FFS measure: 1. Medicare Part A inpatient and Part B outpatient claims: This data source contains claims data for FFS inpatient and outpatient services including: Medicare inpatient hospital care, outpatient hospital services, as well as inpatient and outpatient physician claims for the 12 months prior to an index admission. 2. Medicare Enrollment Database (EDB): This database contains Medicare beneficiary demographic, benefit/coverage, and vital status information. This data source was used to obtain information on several inclusion/exclusion indicators such as Medicare status on admission as well as vital status. These data have previously been shown to accurately reflect patient vital status (Fleming et al., 1992).	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	Claims, Other, Paper Medical Records Data sources for the Medicare FFS measure: 1. Medicare Part A inpatient and Part B outpatient claims: This data source contains claims data for fee-for service inpatient and outpatient services including: Medicare inpatient hospital care, outpatient hospital services, skilled nursing facility care, some home health agency services, as well as inpatient and outpatient physician claims for the 12 months prior to an index admission. 2. Medicare Enrollment Database (EDB): This database contains Medicare beneficiary demographic, benefit/coverage, and vital status information. This data source was used to obtain information on several inclusion/exclusion indicators such as Medicare status

	3504 Claims-Only Hospital-Wide (All-Condition, All-Procedure) Risk-Standardized Mortality Measure	1789 Hospital-Wide All-Cause Unplanned Readmission Measure (HWR)	1550 Hospital-level risk-standardized complication rate (RSCR) following elective primary total hip arthroplasty (THA) and/or total knee arthroplasty (TKA)	0468 Hospital 30-day, all-cause, risk-standardized mortality rate (RSMR) following pneumonia hospitalization	1893 Hospital 30-Day, all-cause, risk-standardized mortality rate (RSMR) following chronic obstructive pulmonary disease (COPD) hospitalization	2558 Hospital 30-Day, All-Cause, Risk-Standardized Mortality Rate (RSMR) Following Coronary Artery Bypass Graft (CABG) Surgery	0230 Hospital 30-day, all-cause, risk-standardized mortality rate (RSMR) following acute myocardial infarction (AMI) hospitalization
	such as Medicare status on admission as well as vital status. It was also used to determine hospice enrollment. No data collection instrument provided Attachment Del18b1HOP5HWMClaimsDataDictionary01072019.xlsx	demographic, benefit/coverage, and vital status information. This data source was used to obtain information on several inclusion/exclusion indicators such as Medicare status on admission and following discharge from index admission ACR 1. Medicare Part A claims data for calendar years 2013, 2014, and 2015. 2. Medicare Enrollment Database (EDB). 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. Available in attached appendix at A.1 Attachment NQF_1789_NQF_Data_Dictionary_05-26-17_v1.0.xlsx	development we validated the administrative claims-based definition of THA/TKA complication (original model specification) against a medical record data. 3. Data abstracted from medical records from eight participating hospitals (approximately 96 records per hospital; 644 total records) for Medicare beneficiaries over the age of 65 years who had a qualifying THA/TKA procedure between January 1 2007 and December 31, 2008. The measure was also specified and testing using an all-payer claims dataset although it is only publically reported using the data sources listed above 4. California Patient Discharge Data is a large, linked database of patient hospital admissions in the state of California. Using all-payer data from California, we performed analyses to determine whether the THA/TKA complication measure can be applied to all adult patients, including not only FFS Medicare patients aged 65 years or over, but also non-FFS Medicare patients aged 18-64 years at the time of admission. Additional Data source used for analysis of the impact of SES variables on the measure's risk model. Note, the variables derived from these data are not included in the measure as specified 5. The American Community Survey (2009-2013): The American Community Survey data is collected	shown to accurately reflect patient vital status (Fleming et al., 1992). 3. 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 SES composite index score. 4. Data sources for the all-payer update: For our analyses to examine use in all-payer data, we used all-payer data from California in addition to CMS data for Medicare FFS patients aged 65 years or over (65+) in California hospitals. California is a diverse state, and, with more than 37 million residents, California represents 12% of the US population. We used the California Patient Discharge Data, a large, linked database of patient hospital admissions. In 2009, there were 3,193,904 adult discharges from 446 non-Federal acute care hospitals. Records are linked by a unique patient identification number, allowing us to determine patient history from previous hospitalizations and to evaluate rates of both readmission and mortality (via linking with California vital statistics records).	3. 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 SES composite index score. 4. Data sources for the all-payer testing: For our analyses to examine use in all-payer data, we used all-payer data from California. California is a diverse state, and, with more than 37 million residents, California represents 12% of the US population. We used the California Patient Discharge Data, a large, linked database of patient hospital admissions. In 2006, there were approximately 3 million adult discharges from more than 450 non-Federal acute care hospitals. Records are linked by a unique patient identification number, allowing us to determine patient history from previous hospitalizations and to evaluate rates of both readmission and mortality (via linking with California vital statistics records). Using all-payer data from California, we performed analyses to determine whether the COPD mortality measure can be applied to all adult patients, including not only FFS Medicare patients aged 65 or over, but also non-FFS Medicare patients aged 18-	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	on admission as well as vital status. These data have previously been shown to accurately reflect patient vital status (Fleming et al., 1992). 3. Veterans Health Administration Data: This data source contains claims data for VA inpatient and outpatient services including: inpatient hospital care, outpatient hospital services, skilled nursing facility care, some home health agency services, as well as inpatient and outpatient physician claims for the 12 months prior to and including each index admission. Unlike Medicare FFS patients, VA patients are not required to have been enrolled in Part A and Part B Medicare for the 12 months prior to the date of admission. All-payer data sources: For our analyses to examine use in all-payer data, we used all-payer data from California in addition to CMS data for Medicare FFS 65+ patients in California hospitals. California is a diverse state, and, with more than 37 million residents, California represents 12% of the US population. We used the California Patient Discharge Data, a large, linked database of patient hospital admissions. In 2006, there

	3504 Claims-Only Hospital-Wide (All-Condition, All-Procedure) Risk-Standardized Mortality Measure	1789 Hospital-Wide All-Cause Unplanned Readmission Measure (HWR)	1550 Hospital-level risk-standardized complication rate (RSCR) following elective primary total hip arthroplasty (THA) and/or total knee arthroplasty (TKA)	0468 Hospital 30-day, all-cause, risk-standardized mortality rate (RSMR) following pneumonia hospitalization	1893 Hospital 30-Day, all-cause, risk-standardized mortality rate (RSMR) following chronic obstructive pulmonary disease (COPD) hospitalization	2558 Hospital 30-Day, All-Cause, Risk-Standardized Mortality Rate (RSMR) Following Coronary Artery Bypass Graft (CABG) Surgery	0230 Hospital 30-day, all-cause, risk-standardized mortality rate (RSMR) following acute myocardial infarction (AMI) hospitalization
			annually and an aggregated 5-years data was used to calculate the AHRQ socioeconomic status (SES) composite index score. Reference: Fleming C., Fisher ES, Chang CH, Bubolz D, Malenda J. Studying outcomes and hospital utilization in the elderly: The advantages of a merged data base for Medicare and Veterans Affairs Hospitals. Medical Care. 1992; 30(5): 377-91. Suter LG, Parzynski CS, Grady JN, et al. 2014 Procedure Specific Complication Measure Updates and Specifications Report: Elective Primary Total Hip Arthroplasty (THA) and/or Total Knee Arthroplasty (TKA) Risk-Standardized Complication Measure (Version 3.0). 2014 No data collection instrument provided Attachment NQF_1550_HipKnee_Complication_Data_Dictionary_v1.0.xlsx	Using all-payer data from California as well as CMS Medicare FFS data for California hospitals, we performed analyses to determine whether the pneumonia mortality measure can be applied to all adult patients, including not only FFS Medicare patients aged 65 or over, but also non-FFS Medicare patients aged 18-64 years at the time of admission. Reference: Fleming C., Fisher ES, Chang CH, Bubolz D, Malenda 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_0468_Pneumonia_Mortality_Data_Dictionary_09-26-17_v1.0.xls	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_1893_COPD_Mortality_NQF_Data_Dictionary_v1.0_091818_kl.xlsx	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	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 as well as CMS Medicare FFS data for California hospitals, we performed analyses to determine whether the AMI mortality measure can be applied to all adult patients, including not only FFS Medicare patients aged 65+ but also non-FFS Medicare patients aged 65+ and younger patients aged 18-64 years at the time of admission. References: Fleming C, Fisher ES, Chang CH, Bubolz TA, Malenka DJ. 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_0230_AMI

	3504 Claims-Only Hospital-Wide (All-Condition, All-Procedure) Risk-Standardized Mortality Measure	1789 Hospital-Wide All-Cause Unplanned Readmission Measure (HWR)	1550 Hospital-level risk-standardized complication rate (RSCR) following elective primary total hip arthroplasty (THA) and/or total knee arthroplasty (TKA)	0468 Hospital 30-day, all-cause, risk-standardized mortality rate (RSMR) following pneumonia hospitalization	1893 Hospital 30-Day, all-cause, risk-standardized mortality rate (RSMR) following chronic obstructive pulmonary disease (COPD) hospitalization	2558 Hospital 30-Day, All-Cause, Risk-Standardized Mortality Rate (RSMR) Following Coronary Artery Bypass Graft (CABG) Surgery	0230 Hospital 30-day, all-cause, risk-standardized mortality rate (RSMR) following acute myocardial infarction (AMI) hospitalization
							_Mortality_Data_Dictionary_Final-636973300643762106.xlsx
Level	Facility	Facility, Integrated Delivery System	Facility	Facility	Facility	Facility	Facility
Setting	Inpatient/Hospital	Inpatient/Hospital, Outpatient Services	Inpatient/Hospital	Inpatient/Hospital	Inpatient/Hospital	Inpatient/Hospital	Inpatient/Hospital
Numerator Statement	The outcome for this measure is 30-day, all-cause mortality. Mortality is defined as death from any cause, either during or after admission, within 30 days of the index admission date.	The outcome for the HWR measure is 30-day readmission. We define readmission as an inpatient admission for any cause, with the exception of certain planned readmissions, within 30 days from the date of discharge from an eligible index admission. If a patient has more than one unplanned admission (for any reason) within 30 days after discharge from the index admission, only one is counted as a readmission. The measure looks for a dichotomous yes or no outcome of whether each admitted patient has an unplanned readmission within 30 days. However, if the first readmission after discharge is considered planned, any subsequent unplanned readmission is not counted as an outcome for that index admission because the unplanned readmission could be related to care provided during the intervening planned readmission rather than during the index admission. The outcome for the ACR measure is also 30-day readmission. The outcome is defined identically to what is described	The outcome for this measure is any complication occurring during the index admission (not coded present on arrival) to 90 days post-date of the index admission. Complications are counted in the measure only if they occur during the index hospital admission or during a readmission. The complication outcome is a dichotomous (yes/no) outcome. If a patient experiences one or more of these complications in the applicable time period, the complication outcome for that patient is counted in the measure as a "yes".	The outcome for this measure is 30-day, all-cause mortality. We define mortality as death from any cause within 30 days of the index admission date for patients discharged from the hospital with a principal discharge diagnosis of pneumonia, including aspiration pneumonia, or a principal discharge diagnosis of sepsis (not including severe sepsis) with a secondary discharge diagnosis of pneumonia (including aspiration pneumonia) coded as POA and no secondary discharge diagnosis of severe sepsis. Additional details are provided in S.5 Numerator Details.	The outcome for this measure is 30-day, all-cause mortality. We define mortality as death from any cause within 30 days of the index admission date for patients discharged from the hospital with either a principal discharge diagnosis of COPD or a principal discharge diagnosis of respiratory failure with a secondary discharge diagnosis of acute exacerbation of COPD. Additional details are provided in S.5 Numerator Details.	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.	The outcome for this measure is 30-day all-cause mortality. We define mortality as death from any cause within 30 days from the date of admission for patients discharged from the hospital with a principal diagnosis of AMI. Additional details are provided in S.5 Numerator Details.

	3504 Claims-Only Hospital-Wide (All-Condition, All-Procedure) Risk-Standardized Mortality Measure	1789 Hospital-Wide All-Cause Unplanned Readmission Measure (HWR)	1550 Hospital-level risk-standardized complication rate (RSCR) following elective primary total hip arthroplasty (THA) and/or total knee arthroplasty (TKA)	0468 Hospital 30-day, all-cause, risk-standardized mortality rate (RSMR) following pneumonia hospitalization	1893 Hospital 30-Day, all-cause, risk-standardized mortality rate (RSMR) following chronic obstructive pulmonary disease (COPD) hospitalization	2558 Hospital 30-Day, All-Cause, Risk-Standardized Mortality Rate (RSMR) Following Coronary Artery Bypass Graft (CABG) Surgery	0230 Hospital 30-day, all-cause, risk-standardized mortality rate (RSMR) following acute myocardial infarction (AMI) hospitalization
		above for the HWR measure.					
Numerator Details	The measure outcome is death from any cause within 30 days of the admission date of the index admission, for Medicare FFS patients identified using the Medicare Enrollment Database (EDB). The numerator is a binary variable (1=yes/0=no) that indicates whether the patient died within 30 days of the index admission date.	The measure counts readmissions to any acute care hospital for any cause within 30 days of the date of discharge of the index admission, excluding planned readmissions as defined below. Planned Readmission Algorithm (Version 4.0) The Planned Readmission Algorithm is a set of criteria for classifying readmissions as planned among the general Medicare population using Medicare administrative claims data. The algorithm identifies admissions that are typically planned and may occur within 30 days of discharge from the hospital. The Planned Readmission Algorithm has three fundamental principles: 1. A few specific, limited types of care are always considered planned (obstetric delivery, transplant surgery, maintenance chemotherapy/immunotherapy, rehabilitation); 2. Otherwise, a planned readmission is defined as a non-acute readmission for a scheduled procedure; and 3. Admissions for acute illness or for complications of care are never planned. The algorithm was developed in 2011 as part of the Hospital-Wide Readmission measure. In 2013, CMS applied the	The composite complication is a dichotomous outcome (yes for any complication(s); no for no complications). Therefore, if a patient experiences one or more complications, the outcome variable will get coded as a "yes". Complications are counted in the measure only if they occur during the index hospital admission (and are not present on admission) or during a readmission. The complications captured in the numerator are identified during the index admission OR associated with a readmission up to 90 days post-date of index admission, depending on the complication. The follow-up period for complications from date of index admission is as follows: The follow-up period for AMI, pneumonia, and sepsis/septicemia/shock is seven days from the date of index admission because these conditions are more likely to be attributable to the procedure if they occur within the first week after the procedure. Additionally, analyses indicated a sharp decrease in the rate of these complications after seven days. Death, surgical site bleeding, and pulmonary embolism are followed for 30 days following admission because clinical experts agree these complications are still likely attributable to the hospital performing the procedure during this period and rates for these complications remained elevated	Outcome definition This measure counts death from any cause within 30 days of the index admission date. Rationale: From a patient perspective, death is the most critical outcome regardless of cause. Outcomes occurring within 30 days of admission can be influenced by hospital care and early transition to the non-acute care setting. The 30-day time frame is a clinically meaningful period for hospitals to collaborate with their communities to reduce mortality (Simoes et al., 2017; Dharmarajan et al., 2015). Identifying deaths in the Medicare FFS population As currently reported, we identify deaths for FFS Medicare patients 65 years and older in the Medicare Enrollment Database (EDB). Identifying deaths in the all-payer population For the purposes of development of an all-payer measure, deaths were identified using the California vital statistics data file. Nationally, post-discharge deaths can be identified using an external source of vital status, such as the Social Security Administration's Death Master File (DMF) or the Centers for Disease Control	Outcome definition This measure counts death from any cause within 30 days of the index admission date. Rationale: From a patient perspective, death is the most critical outcome regardless of cause. Outcomes occurring within 30 days of admission can be influenced by hospital care and appropriate transition to the non-acute care setting. The 30-day time frame is a clinically meaningful period for hospitals to collaborate with their communities to reduce mortality (Simoes et al., 2018; Dharmarajan et al., 2015). Identifying deaths in the Medicare FFS population As currently reported, we identify deaths for FFS Medicare patients 65 years and older in the Medicare Enrollment Database (EDB). Reference: 1. Simoes J, Grady J, Purvis D, et al. 2018 Condition-Specific Measures Updates and Specifications Report Hospital-Level 30-Day Risk-Standardized Mortality Measures. http://www.qualitynet.org/dcs/ContentServer?c=Page&pagename=QnetPublic/Page/QnetTier3&cid=1163010421830. Accessed June 6, 2018. 2. Dharmarajan K, Hsieh AF, Kulkarni VT, et al. 2015 Trajectories of risk after hospitalization for heart failure,	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 definition This measure counts death from any cause within 30 days after the index admission date. Rationale: From a patient perspective, death is the most critical outcome regardless of cause. Outcomes occurring within 30 days of admission can be influenced by hospital care and early transition to the non-acute care setting. The 30-day time frame is a clinically meaningful period for hospitals to collaborate with their communities to reduce mortality. (Simoes et al., 2018; Dharmarajan et al., 2015). Identifying deaths in the Medicare FFS population As currently reported, we identify deaths for FFS Medicare patients 65 years and older in the Medicare Enrollment Database (EDB). Identifying deaths in the all-payer population For the purposes of development of an all-payer measure, deaths were identified using the California vital statistics data file. Nationally, post-discharge deaths can be identified using an external source of vital status, such as the Social Security Administration's Death Master File (DMF) or the Centers for

	3504 Claims-Only Hospital-Wide (All-Condition, All-Procedure) Risk-Standardized Mortality Measure	1789 Hospital-Wide All-Cause Unplanned Readmission Measure (HWR)	1550 Hospital-level risk-standardized complication rate (RSCR) following elective primary total hip arthroplasty (THA) and/or total knee arthroplasty (TKA)	0468 Hospital 30-day, all-cause, risk-standardized mortality rate (RSMR) following pneumonia hospitalization	1893 Hospital 30-Day, all-cause, risk-standardized mortality rate (RSMR) following chronic obstructive pulmonary disease (COPD) hospitalization	2558 Hospital 30-Day, All-Cause, Risk-Standardized Mortality Rate (RSMR) Following Coronary Artery Bypass Graft (CABG) Surgery	0230 Hospital 30-day, all-cause, risk-standardized mortality rate (RSMR) following acute myocardial infarction (AMI) hospitalization
		algorithm to its other readmission measures. The Planned Readmission Algorithm and associated code tables are attached in data field S.2b (Data Dictionary or Code Table).	until roughly 30 days post admission. The measure follow-up period is 90 days after admission for mechanical complications and periprosthetic joint infection/wound infection. Experts agree that mechanical complications and periprosthetic joint infection/wound infections due to the index THA/TKA occur up to 90 days following THA/TKA. The measure counts all complications occurring during the index admission regardless of when they occur. For example, if a patient experiences an AMI on day 10 of the index admission, the measure will count the AMI as a complication, although the specified follow-up period for AMI is seven days. Clinical experts agree with this approach, as such complications likely represent the quality of care provided during the index admission. As of 2014 reporting, the measure does not count complications in the complications outcome that are coded as POA during the index admission; this prevents identifying a condition as a complication of care if it was present on admission for the THA/TKA procedure. For full list of ICD-9 and ICD-10 codes defining complications, see the Data Dictionary attached in field S.2b., sheet "Complication Codes ICD9-ICD10".	and Prevention's National Death Index (NDI). References: 1. Simoes J, Grady J, DeBuhr J, et al. 2017 Condition-Specific Measures Updates and Specifications Report Hospital-Level 30-Day Risk-Standardized Mortality Measures. http://www.qualitynet.org/dcs/ContentServer?c=Page&pagename=QnetPublic/Page/QnetTier3&cid=1163010421830. Accessed June 7, 2017. 2. Dharmarajan K, Hsieh AF, Kulkarni VT, et al. 2015 Trajectories of risk after hospitalization for heart failure, acute myocardial infarction, or pneumonia: retrospective cohort study. BMJ (Clinical research ed);350:h411	acute myocardial infarction, or pneumonia: retrospective cohort study. BMJ (Clinical researched);350: h411	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.	Disease Control and Prevention's National Death Index (NDI). Reference: 1. Simoes J, Grady J, Purvis D, et al. 2018 Condition-Specific Measures Updates and Specifications Report Hospital-Level 30-Day Risk-Standardized Mortality Measures. http://www.qualitynet.org/dcs/ContentServer?c=Page&pagename=QnetPublic/Page/QnetTier3&cid=1163010421830. Accessed May 4, 2018.
Denominator Statement	The cohort includes inpatient admissions for a wide variety of conditions for Medicare FFS patients aged between	The measure at the hospital level includes admissions for Medicare beneficiaries who are 65 years and older and are discharged from	The target population for the publically reported measure includes admissions for Medicare FFS beneficiaries who are at least 65 years of age undergoing	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	This claims-based measure can be used in either of two patient cohorts: (1) patients aged 65 years or older or (2) patients aged 40 years or older.	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	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

	3504 Claims-Only Hospital-Wide (All-Condition, All-Procedure) Risk-Standardized Mortality Measure	1789 Hospital-Wide All-Cause Unplanned Readmission Measure (HWR)	1550 Hospital-level risk-standardized complication rate (RSCR) following elective primary total hip arthroplasty (THA) and/or total knee arthroplasty (TKA)	0468 Hospital 30-day, all-cause, risk-standardized mortality rate (RSMR) following pneumonia hospitalization	1893 Hospital 30-Day, all-cause, risk-standardized mortality rate (RSMR) following chronic obstructive pulmonary disease (COPD) hospitalization	2558 Hospital 30-Day, All-Cause, Risk-Standardized Mortality Rate (RSMR) Following Coronary Artery Bypass Graft (CABG) Surgery	0230 Hospital 30-day, all-cause, risk-standardized mortality rate (RSMR) following acute myocardial infarction (AMI) hospitalization
	65 and 94 years old who were admitted to short-term acute care hospitals. If a patient has more than one admission during the measurement year, one admission is randomly selected for inclusion in the measure. Additional details are provided in S.7 Denominator Details.	all non-federal, acute care inpatient US hospitals (including territories) with a complete claims history for the 12 months prior to admission. The measure at the ACO level includes all relevant admissions for ACO assigned beneficiaries who are 65 and older and are discharged from all non-Federal short-stay acute care hospitals, including critical access hospitals. Additional details are provided in S.9 Denominator Details.	elective primary THA and/or TKA procedures. Additional details are provided in S.9 Denominator Details.	older. We have tested the measure in both age groups. The cohort includes admissions for patients aged 18 years and older discharged from the hospital with a principal discharge diagnosis of pneumonia (including aspiration pneumonia) or a principal discharge diagnosis of sepsis (not including severe sepsis) with a secondary diagnosis of pneumonia (including aspiration pneumonia) coded as POA and no secondary diagnosis of severe sepsis coded as POA, and with a complete claims history for the 12 months prior to admission. The measure is currently publicly reported by CMS for those patients 65 years and older who are Medicare FFS beneficiaries admitted to non-federal acute care hospitals. Additional details are provided in S.7 Denominator Details.	We have tested the measure in both age groups. The cohort includes admissions for patients discharged from the hospital with either a principal discharge diagnosis of COPD, or a principal discharge diagnosis of respiratory failure with a secondary diagnosis of acute exacerbation of COPD; and with a complete claims history for the 12 months prior to admission. The measure is currently publicly reported by CMS for those patients 65 years and older who are Medicare FFS beneficiaries admitted to non-federal hospitals Additional details are provided in S.7 Denominator Details.	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.	older. We have tested the measure in both age groups. The cohort includes admissions for patients discharged from the hospital with a principal discharge diagnosis of AMI and with a complete claims history for the 12 months prior to admission. The measure is currently publicly reported by CMS for those patients 65 years and older who are either Medicare FFS beneficiaries admitted to non-federal hospitals or patients admitted to VA hospitals. Additional details are provided in S.7 Denominator Details.
Denominator Details	An index admission is the hospitalization to which the mortality outcome is attributed and includes admissions for patients: 1. Enrolled in Medicare FFS Part A for at least 12 months prior to the date of admission and during the index admission	To be included in the hospital level measure, cohort patients must be: 1. Enrolled in Medicare fee-for-service (FFS) Part A for the 12 months prior to the date of admission and during the index admission; 2. Aged 65 or over; 3. Discharged alive from a non-federal short-term acute care hospital; and	To be included in the measure cohort used in public reporting, patients must meet the following additional inclusion criteria: 1. Enrolled in Medicare fee-for-service (FFS) Part A and Part B for the 12 months prior to the date of admission; and enrolled in Part A during the index admission; 2. Aged 65 or older 3. Having a qualifying elective primary THA/TKA	To be included in the measure cohort used in public reporting, patients must meet the following inclusion criteria: 1. Have a principal discharge diagnosis of pneumonia (including aspiration pneumonia) or sepsis (not including severe sepsis) with a secondary	To be included in the measure cohort used in public reporting, patients must meet the following inclusion criteria: 1. Have principal discharge diagnosis of COPD or principal discharge diagnosis of respiratory failure with a secondary diagnosis of COPD with exacerbation;	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	To be included in the measure cohort used in public reporting, patients must meet the following additional inclusion criteria: 1. Having a principal discharge diagnosis of AMI; 2. Enrolled in Medicare FFS Part A and Part B for the first 12 months prior to the date of

	3504 Claims-Only Hospital-Wide (All-Condition, All-Procedure) Risk-Standardized Mortality Measure	1789 Hospital-Wide All-Cause Unplanned Readmission Measure (HWR)	1550 Hospital-level risk-standardized complication rate (RSCR) following elective primary total hip arthroplasty (THA) and/or total knee arthroplasty (TKA)	0468 Hospital 30-day, all-cause, risk-standardized mortality rate (RSMR) following pneumonia hospitalization	1893 Hospital 30-Day, all-cause, risk-standardized mortality rate (RSMR) following chronic obstructive pulmonary disease (COPD) hospitalization	2558 Hospital 30-Day, All-Cause, Risk-Standardized Mortality Rate (RSMR) Following Coronary Artery Bypass Graft (CABG) Surgery	0230 Hospital 30-day, all-cause, risk-standardized mortality rate (RSMR) following acute myocardial infarction (AMI) hospitalization
	Rationale: Claims data are consistently available only for Medicare FFS beneficiaries. The 12-month prior enrollment criterion ensures a full year of administrative data is available for risk adjustment. 2. Not transferred from another acute care facility Rationale: Admissions to an acute cate hospital within one day of discharge from another acute care hospital are considered transfers. Transferred patients are included in the measure cohort, but it is the initial hospitalization rather than any "transfer-in" hospitalization(s), that is included as the hospitalization to which the mortality outcome is attributed (the index admission). 3. Aged between 65 and 94 years Rationale: Medicare patients younger than 65 are not included in the measure because they usually qualify for the program due to severe disability and are considered to be clinically distinct from Medicare patients 65 and over. Patients over age 94 are not included to avoid holding hospitals responsible for the survival of the very elderly patients, who	4. Not transferred to another acute care facility. The ACO version of this measure has the additional criterion that only hospitalizations for ACO-assigned beneficiaries that meet all of the other criteria listed above are included. The cohort definition is otherwise identical to that of the HWR described below. The measure aggregates the ICD-9 principal diagnosis and all procedure codes of the index admission into clinically coherent groups of conditions and procedures (condition categories or procedure categories) using the AHRQ CCS. There are a total of 285 mutually exclusive AHRQ condition categories, most of which are single, homogenous diseases such as pneumonia or acute myocardial infarction. Some are aggregates of conditions, such as "other bacterial infections." There are a total of 231 mutually exclusive procedure categories. Using the AHRQ CCS procedure and condition categories, the measure assigns each index hospitalization to one of five mutually exclusive specialty cohorts: surgery/gynecology, cardiorespiratory, cardiovascular, neurology, and medicine. The rationale behind this organization is that conditions typically cared for by the same team of clinicians are	procedure; elective primary THA/TKA procedures are defined as those procedures without any of the following: • Femur, hip, or pelvic fractures coded in the principal or secondary discharge diagnosis field of the index admission • Partial hip arthroplasty (PHA) procedures (with a concurrent THA/TKA); partial knee arthroplasty procedures are not distinguished by ICD9 codes and are currently captured by the THA/TKA measure • Revision procedures with a concurrent THA/TKA • Resurfacing procedures with a concurrent THA/TKA • Mechanical complication coded in the principal discharge • Malignant neoplasm of the pelvis, sacrum, coccyx, lower limbs, or bone/bone marrow or a disseminated malignant neoplasm coded in the principal discharge diagnosis field • Removal of implanted devises/prostheses • Transfer status from another acute care facility for the THA/TKA Patients are eligible for inclusion in the denominator if they had an elective primary THA and/or a TKA AND had continuous enrollment in Part A and Part B Medicare fee-for-service (FFS) 12 months prior to the date of index admission. This measure can also be used for an all-payer population aged 18 years and older. We have explicitly tested the measure in both patients aged 18+ years and those aged 65+ years (see	diagnosis of pneumonia (including aspiration pneumonia) coded as POA and no secondary diagnosis of severe sepsis coded as POA; 2. Enrolled in Medicare fee-for-service (FFS) Part A and Part B for the 12 months prior to the date of index admission, and enrolled in Part A during the index admission; 3. Aged 65 or over; and 4. Not transferred from another acute care facility ICD-9 and ICD-10 cohort codes are included in the attached Data Dictionary.	2. Enrolled in Medicare fee-for-service (FFS) Part A and Part B for the 12 months prior to the date of index admission, and enrolled in Part A during the index admission, beneficiaries; 3. Aged 65 or over; and 4. Not transferred from another acute care facility. ICD-9 and ICD-10 cohort codes are included in the attached Data Dictionary.	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.	admission, enrolled in Part A during the index admission, or those who are VA beneficiaries; 3. Aged 65 or over; and 4. Not transferred from another acute care facility. ICD-9 and ICD-10 cohort codes are included in the attached Data Dictionary.

	3504 Claims-Only Hospital-Wide (All-Condition, All-Procedure) Risk-Standardized Mortality Measure	1789 Hospital-Wide All-Cause Unplanned Readmission Measure (HWR)	1550 Hospital-level risk-standardized complication rate (RSCR) following elective primary total hip arthroplasty (THA) and/or total knee arthroplasty (TKA)	0468 Hospital 30-day, all-cause, risk-standardized mortality rate (RSMR) following pneumonia hospitalization	1893 Hospital 30-Day, all-cause, risk-standardized mortality rate (RSMR) following chronic obstructive pulmonary disease (COPD) hospitalization	2558 Hospital 30-Day, All-Cause, Risk-Standardized Mortality Rate (RSMR) Following Coronary Artery Bypass Graft (CABG) Surgery	0230 Hospital 30-day, all-cause, risk-standardized mortality rate (RSMR) following acute myocardial infarction (AMI) hospitalization
	may be less likely to have survival as a primary goal. Note that the hybrid measure (submitted for NQF endorsement in parallel with the claims-only measure) differs from the claims-only measure in terms of the age range of included admissions; the hybrid measure includes all inpatient admissions for patients aged 50-94 years old. The intention is to fully harmonize the cohort definitions for the two measures, so that both measures will capture admissions for patients age 65-94. We deviated from that definition during development and testing for the hybrid measure due to the limited dataset available that included the EHR data elements needed to calculate the hybrid measure. Note that the risk model already includes age in years, as a risk variable.) 4. Not admitted for primary psychiatric diagnoses Rationale: Patients admitted for psychiatric treatment are typically cared for in separate psychiatric facilities that are not comparable to short-term acute care hospitals (see data dictionary, HWM Non-	expected to experience similar added (or reduced) levels of readmission risk. The measure first assigns admissions with qualifying AHRQ procedure categories to the Surgery/Gynecology Cohort. This cohort includes admissions likely cared for by surgical or gynecological teams. The measure then sorts admissions into one of the four remaining specialty cohorts based on the AHRQ diagnosis category of the principal discharge diagnosis: The Cardiorespiratory Cohort includes several condition categories with very high readmission rates such as pneumonia, chronic obstructive pulmonary disease, and heart failure. These admissions are combined into a single cohort because they are often clinically indistinguishable and patients are often simultaneously treated for several of these diagnoses. The Cardiovascular Cohort includes condition categories such as acute myocardial infarction that in large hospitals might be cared for by a separate cardiac or cardiovascular team. The Neurology Cohort includes neurologic condition categories such as stroke that in large hospitals might be cared for by a separate neurology team.	Section 2b4.11 of the Testing Attachment for details, 2b4.11). International Classification of Diseases, 9th Revision, Clinical Modification (ICD-9-CM) codes used to define the cohort for each measure are: ICD-9-CM codes used to define a THA or TKA: 81.51 Total Hip Replacement 81.54 Total Knee Replacement ICD-10 Codes that define a THA or TKA: 0SR90J9 Replacement of Right Hip Joint with Synthetic Substitute, Cemented, Open Approach 0SR90JA Replacement of Right Hip Joint with Synthetic Substitute, Uncemented, Open Approach 0SR90JZ Replacement of Right Hip Joint with Synthetic Substitute, Open Approach 0SRB0J9 Replacement of Left Hip Joint with Synthetic Substitute, Cemented, Open Approach 0SRB0JA Replacement of Left Hip Joint with Synthetic Substitute, Uncemented, Open Approach 0SRB0JZReplacement of Left Hip Joint with Synthetic Substitute, Open Approach 0SRC07Z Replacement of Right Knee Joint with Autologous Tissue Substitute, Open Approach 0SRC0JZReplacement of Right Knee Joint with Synthetic Substitute, Open Approach 0SRC0KZ Replacement of Right Knee Joint with Nonautologous				

	3504 Claims-Only Hospital-Wide (All-Condition, All-Procedure) Risk-Standardized Mortality Measure	1789 Hospital-Wide All-Cause Unplanned Readmission Measure (HWR)	1550 Hospital-level risk-standardized complication rate (RSCR) following elective primary total hip arthroplasty (THA) and/or total knee arthroplasty (TKA)	0468 Hospital 30-day, all-cause, risk-standardized mortality rate (RSMR) following pneumonia hospitalization	1893 Hospital 30-Day, all-cause, risk-standardized mortality rate (RSMR) following chronic obstructive pulmonary disease (COPD) hospitalization	2558 Hospital 30-Day, All-Cause, Risk-Standardized Mortality Rate (RSMR) Following Coronary Artery Bypass Graft (CABG) Surgery	0230 Hospital 30-day, all-cause, risk-standardized mortality rate (RSMR) following acute myocardial infarction (AMI) hospitalization
	Acute Care Inclusion tab). 5. Not admitted for rehabilitation Rationale: These admissions are not typically to a short-term acute care hospital and are not for acute care (see data dictionary, HWM Non-Acute Care Inclusion tab). 6. Not enrolled in hospice at the time of, or 12 months prior to, their index admission Rationale: Patients enrolled in hospice in the prior 12 months or at the time of admission are unlikely to have 30-day survival as a primary goal. 7. Not enrolled in hospice within two days of admission Rationale: There is not a single, correct approach regarding patients enrolled in hospice during admission or upon discharge – mortality may or may not represent a quality signal for this group of patients and hospice enrollment is inadequate to differentiate this issue. However, for most patients and/or families who had the discussion and agreed to enroll in hospice within two days of admission, 30-day survival is not likely the primary goal due to their condition and not the quality of care received.	The Medicine Cohort includes all non-surgical patients who were not assigned to any of the other cohorts. The full list of the specific diagnosis and procedure AHRQ CCS categories used to define the specialty cohorts are attached in data field S.2b (Data Dictionary or Code Table).	Tissue Substitute, Open Approach 0SRD07Z Replacement of Left Knee Joint with Autologous Tissue Substitute, Open Approach 0SRD0JZ Replacement of Left Knee Joint with Synthetic Substitute, Open Approach 0SRD0KZReplacement of Left Knee Joint with Nonautologous Tissue Substitute, Open Approach 0SRT07Z Replacement of Right Knee Joint, Femoral Surface with Autologous Tissue Substitute, Open Approach 0SRT0JZ Replacement of Right Knee Joint, Femoral Surface with Synthetic Substitute, Open Approach 0SRT0KZ Replacement of Right Knee Joint, Femoral Surface with Nonautologous Tissue Substitute, Open Approach 0SRU07Z Replacement of Left Knee Joint, Femoral Surface with Autologous Tissue Substitute, Open Approach 0SRU0JZ Replacement of Left Knee Joint, Femoral Surface with Synthetic Substitute, Open Approach 0SRU0KZ Replacement of Left Knee Joint, Femoral Surface with Nonautologous Tissue Substitute, Open Approach 0SRV07Z Replacement of Right Knee Joint, Tibial Surface with Autologous Tissue Substitute, Open Approach 0SRV0JZ Replacement of Right Knee Joint, Tibial Surface with Synthetic Substitute, Open Approach 0SRV0KZ Replacement of Right Knee Joint, Tibial Surface with				

	3504 Claims-Only Hospital-Wide (All-Condition, All-Procedure) Risk-Standardized Mortality Measure	1789 Hospital-Wide All-Cause Unplanned Readmission Measure (HWR)	1550 Hospital-level risk-standardized complication rate (RSCR) following elective primary total hip arthroplasty (THA) and/or total knee arthroplasty (TKA)	0468 Hospital 30-day, all-cause, risk-standardized mortality rate (RSMR) following pneumonia hospitalization	1893 Hospital 30-Day, all-cause, risk-standardized mortality rate (RSMR) following chronic obstructive pulmonary disease (COPD) hospitalization	2558 Hospital 30-Day, All-Cause, Risk-Standardized Mortality Rate (RSMR) Following Coronary Artery Bypass Graft (CABG) Surgery	0230 Hospital 30-day, all-cause, risk-standardized mortality rate (RSMR) following acute myocardial infarction (AMI) hospitalization
	8. Not with a principal diagnosis of cancer and enrolled in hospice during their index admission Rationale: Patients admitted primarily for cancer who are enrolled in hospice during admission are unlikely to have 30-day survival as a primary goal of care. (see data dictionary, HWM Cancer Inclusion tab). 9. Without any diagnosis of metastatic cancer Rationale: Although some patients admitted with a diagnosis of metastatic cancer will have 30-day survival as a primary goal of care, for many such patients admitted to the hospital, death may be a clinically reasonable and patient-centered outcome. (see data dictionary, HWM Metastatic Cancer Inclusion tab). 10. Not with a principal discharge diagnosis, or a secondary diagnosis that is present on admission (POA) for a condition which hospitals have limited ability to influence survival Rationale: Hospitals have little ability to impact mortality for some conditions. This list of conditions (see data dictionary, HWM ICD-10 Inclusion tab) was		Nonautologous Tissue Substitute, Open Approach 0SRW07Z Replacement of Left Knee Joint, Tibial Surface with Autologous Tissue Substitute, Open Approach 0SRW0JZ Replacement of Left Knee Joint, Tibial Surface with Synthetic Substitute, Open Approach 0SRW0KZ Replacement of Left Knee Joint, Tibial Surface with Nonautologous Tissue Substitute, Open Approach An ICD-9 to ICD-10 crosswalk is attached in field S.2b. (Data Dictionary or Code Table). Elective primary THA/TKA procedures are defined as those procedures without any of the following: 1) Femur, hip, or pelvic fractures coded in principal or secondary discharge diagnosis fields of the index admission 2) Partial hip arthroplasty (PHA) procedures with a concurrent THA/TKA 3) Revision procedures with a concurrent THA/TKA 4) Resurfacing procedures with a concurrent THA/TKA 5) Mechanical complication coded in the principal discharge 6) Malignant neoplasm of the pelvis, sacrum, coccyx, lower limbs, or bone/bone marrow or a disseminated malignant neoplasm coded in the principal discharge diagnosis field 7) Removal of implanted devises/prostheses 8) Transfer status from another acute care facility for the THA/TKA				

	3504 Claims-Only Hospital-Wide (All-Condition, All-Procedure) Risk-Standardized Mortality Measure	1789 Hospital-Wide All-Cause Unplanned Readmission Measure (HWR)	1550 Hospital-level risk-standardized complication rate (RSCR) following elective primary total hip arthroplasty (THA) and/or total knee arthroplasty (TKA)	0468 Hospital 30-day, all-cause, risk-standardized mortality rate (RSMR) following pneumonia hospitalization	1893 Hospital 30-Day, all-cause, risk-standardized mortality rate (RSMR) following chronic obstructive pulmonary disease (COPD) hospitalization	2558 Hospital 30-Day, All-Cause, Risk-Standardized Mortality Rate (RSMR) Following Coronary Artery Bypass Graft (CABG) Surgery	0230 Hospital 30-day, all-cause, risk-standardized mortality rate (RSMR) following acute myocardial infarction (AMI) hospitalization
	determined through independent review, by several clinicians, of conditions associated with high mortality. The decisions were also reviewed with our Technical Expert Panel (TEP) and Technical Work Group. Admissions are not included in the cohort if the patient had a principal diagnosis code that is on this list, or a secondary code with POA that is on the list. In addition, for patients with multiple admissions, the measure selects only one admission, at random, for inclusion. There is no practical statistical modeling approach that can account or adjust for the complex relationship between the number of admissions and risk of mortality in the context of a hospital-wide mortality measure. Random selection ensures that providers are not penalized for a "last" admission during the measurement period; selecting the last admission would not be as accurate a reflection of the risk of death as random selection, as the last admission is inherently associated with a higher mortality risk. Random selection is also used in CMS's		For a full list of ICD-9 and ICD-10 codes defining the following see attached Data Dictionary, sheet "THA TKA Cohort Codes Part 2."				

	3504 Claims-Only Hospital-Wide (All-Condition, All-Procedure) Risk-Standardized Mortality Measure	1789 Hospital-Wide All-Cause Unplanned Readmission Measure (HWR)	1550 Hospital-level risk-standardized complication rate (RSCR) following elective primary total hip arthroplasty (THA) and/or total knee arthroplasty (TKA)	0468 Hospital 30-day, all-cause, risk-standardized mortality rate (RSMR) following pneumonia hospitalization	1893 Hospital 30-Day, all-cause, risk-standardized mortality rate (RSMR) following chronic obstructive pulmonary disease (COPD) hospitalization	2558 Hospital 30-Day, All-Cause, Risk-Standardized Mortality Rate (RSMR) Following Coronary Artery Bypass Graft (CABG) Surgery	0230 Hospital 30-day, all-cause, risk-standardized mortality rate (RSMR) following acute myocardial infarction (AMI) hospitalization
	condition-specific mortality measures. Note that random selection reduces the number of admissions, but does not exclude any patients from the measure. The cohort is defined using ICD-10 Clinical Modification codes identified in Medicare Part A Inpatient claims data. The measure aggregates the ICD-10 principal diagnosis and all procedure codes of the index admission into clinically coherent groups of conditions and procedures (condition categories or procedure categories) using the Agency for Healthcare Research and Quality (AHRQ) Clinical Classifications System (CCS). There is a total of 285 mutually exclusive AHRQ condition categories, most of which are single, homogenous diseases such as pneumonia or acute myocardial infarction. Some are aggregates of conditions, such as “other bacterial infections”. There is a total of 231 mutually exclusive procedure categories. Using the AHRQ CCS procedure and condition categories, the measure assigns each index hospitalization to one of 15 mutually exclusive						

	3504 Claims-Only Hospital-Wide (All-Condition, All-Procedure) Risk-Standardized Mortality Measure	1789 Hospital-Wide All-Cause Unplanned Readmission Measure (HWR)	1550 Hospital-level risk-standardized complication rate (RSCR) following elective primary total hip arthroplasty (THA) and/or total knee arthroplasty (TKA)	0468 Hospital 30-day, all-cause, risk-standardized mortality rate (RSMR) following pneumonia hospitalization	1893 Hospital 30-Day, all-cause, risk-standardized mortality rate (RSMR) following chronic obstructive pulmonary disease (COPD) hospitalization	2558 Hospital 30-Day, All-Cause, Risk-Standardized Mortality Rate (RSMR) Following Coronary Artery Bypass Graft (CABG) Surgery	0230 Hospital 30-day, all-cause, risk-standardized mortality rate (RSMR) following acute myocardial infarction (AMI) hospitalization
	divisions. The divisions were created based upon clinical coherence, consistency of mortality risk, adequate patient and hospital case volume for stable results reporting, and input from clinicians, patients, and patient caregivers on usability. The measure first assigns admissions with qualifying AHRQ procedure categories to one of six surgery divisions by identifying a defining surgical procedure. The defining surgical procedure is identified using the following algorithm: 1) if a patient only has one major surgical procedure then that procedure is the defining surgical procedure; 2) if a patient has more than one major surgical procedure, the first dated procedure performed during the index admission is the defining surgical procedure; 3) if there is more than one major surgical procedure on that earliest date, the procedure with the highest mortality rate is the defining surgical procedure. These divisions include admissions likely cared for by surgical teams. The surgical divisions are: Surgical Cancer						

	3504 Claims-Only Hospital-Wide (All-Condition, All-Procedure) Risk-Standardized Mortality Measure	1789 Hospital-Wide All-Cause Unplanned Readmission Measure (HWR)	1550 Hospital-level risk-standardized complication rate (RSCR) following elective primary total hip arthroplasty (THA) and/or total knee arthroplasty (TKA)	0468 Hospital 30-day, all-cause, risk-standardized mortality rate (RSMR) following pneumonia hospitalization	1893 Hospital 30-Day, all-cause, risk-standardized mortality rate (RSMR) following chronic obstructive pulmonary disease (COPD) hospitalization	2558 Hospital 30-Day, All-Cause, Risk-Standardized Mortality Rate (RSMR) Following Coronary Artery Bypass Graft (CABG) Surgery	0230 Hospital 30-day, all-cause, risk-standardized mortality rate (RSMR) following acute myocardial infarction (AMI) hospitalization
	(see note below), Cardiothoracic Surgery, General Surgery, Neurosurgery, Orthopedic Surgery, and Other Surgical Procedures. For the Surgical Cancer division, any admission that includes a surgical procedure and a principal discharge diagnosis code of cancer is assigned to the Surgical Cancer division. This division and the logic behind it was implemented in response to feedback from our Technical Expert Panel. The measure then assigns the remaining admissions into one of the nine non-surgical divisions based on the AHRQ diagnostic CCS of the principal discharge diagnosis. The non-surgical divisions are: Cancer, Cardiac, Gastrointestinal, Infectious Disease, Neurology, Orthopedic, Pulmonary, Renal, Other Conditions. The full list of the specific diagnosis and procedure AHRQ CCS categories used to define the divisions are attached in the Data Dictionary.						
Exclusions	The measure excludes index admissions for patients: 1. With inconsistent or unknown vital status (from claims data) or other unreliable claims data;	The measure excludes index admissions for patients: 1. Admitted to Prospective Payment System (PPS)-exempt cancer hospitals; 2. Without at least 30 days post-discharge	This measure excludes index admissions for patients: 1. Without at least 90 days post-discharge enrollment in FFS Medicare; 2. Who were discharged against medical advice (AMA); or,	This mortality measure excludes index admissions for patients: 1. Discharged alive on the day of admission or the following day who were not transferred to another acute care facility;	The mortality measure excludes index admissions for patients: 1. With inconsistent or unknown vital status or other unreliable demographic (age and gender) data; 2. Enrolled in the Medicare	The CABG surgery mortality measure excludes index admissions for patients: 1. With inconsistent or unknown vital status or other unreliable demographic	The mortality measure excludes index hospitalizations that meet any of the following exclusion criteria: 1. Discharged alive on the day of admission or the following day who were

	3504 Claims-Only Hospital-Wide (All-Condition, All-Procedure) Risk-Standardized Mortality Measure	1789 Hospital-Wide All-Cause Unplanned Readmission Measure (HWR)	1550 Hospital-level risk-standardized complication rate (RSCR) following elective primary total hip arthroplasty (THA) and/or total knee arthroplasty (TKA)	0468 Hospital 30-day, all-cause, risk-standardized mortality rate (RSMR) following pneumonia hospitalization	1893 Hospital 30-Day, all-cause, risk-standardized mortality rate (RSMR) following chronic obstructive pulmonary disease (COPD) hospitalization	2558 Hospital 30-Day, All-Cause, Risk-Standardized Mortality Rate (RSMR) Following Coronary Artery Bypass Graft (CABG) Surgery	0230 Hospital 30-day, all-cause, risk-standardized mortality rate (RSMR) following acute myocardial infarction (AMI) hospitalization
	2. Discharged against medical advice (AMA); 3. With an admission for spinal cord injury (CCS 227), skull and face fractures (CCS 228), Intracranial Injury (CCS 233), Crushing injury or internal injury (CCS 234), Open wounds of head/neck/trunk (CCS 235), and burns (CCS 240); and 4. With a principal discharge diagnosis within a CCS with fewer than 100 admissions within the measurement year.	enrollment in FFS Medicare; 3. Discharged against medical advice (AMA); 4. Admitted for primary psychiatric diagnoses; 5. Admitted for rehabilitation; or 6. Admitted for medical treatment of cancer.	3. Who had more than two THA/TKA procedure codes during the index hospitalization. After applying these exclusion criteria, we randomly select one index admission for patients with multiple index admissions in a calendar year. We therefore exclude the other eligible index admissions in that year.	2. With inconsistent or unknown vital status or other unreliable demographic (age and gender) data; 3. Enrolled in the Medicare hospice program any time in the 12 months prior to the index admission, including the first day of the index admission; or, 4. Discharged against medical advice. For patients with more than one admission for a given condition in a given year, only one index admission for that condition is randomly selected for inclusion in the cohort. Similarly, for the three-year combined data, when index admissions occur during the transition between measure reporting periods (June and July of each year) and both are randomly selected for inclusion in the measure, the measure includes only the June admission. The July admissions are excluded to avoid assigning a single death to two admissions.	hospice program any time in the 12 months prior to the index admission, including the first day of the index admission; or 3. Discharged against medical advice For patients with more than one admission for a given condition in a given year, only one index admission for that condition is randomly selected for inclusion in the cohort. Additional admissions within that year are excluded. Similarly, for the three-year combined data, when index admissions occur during the transition between measure reporting periods (June and July of each year) and both are randomly selected for inclusion in the measure, the measure includes only the June admission. The July admissions are excluded to avoid assigning a single death to two admissions.	(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.	not transferred to another acute care facility; 2. Inconsistent or unknown vital status or other unreliable demographic (age and gender) data; 3. Enrolled in the Medicare hospice program or used VA hospice services any time in the 12 months prior to the index admission, including the first day of the index admission, or 4. Discharged against medical advice (AMA). For patients with more than one admission for a given condition in a given year, only one index admission for that condition is randomly selected for inclusion in the cohort. Similarly, for the three-year combined data, when index admissions occur during the transition between measure reporting periods (June and July of each year) and both are randomly selected for inclusion in the measure, the measure includes only the June admission. The July admissions are excluded to avoid assigning a single death to two admissions.
Exclusion Details	1. With inconsistent or unknown vital status (from claims data) or other unreliable claims data Rationale: The measure does not include stays for patients where the admission date is after the date of death in	1. Admitted to a PPS-exempt cancer hospital, identified by the Medicare provider ID. 2. Admissions without at least 30 days post-discharge enrollment in FFS Medicare are determined using data captured in the Medicare	This measure excludes index admissions for patients: 1. Without at least 90 days post-discharge enrollment in FFS Medicare Rationale: The 90-day complication outcome cannot be assessed in this group since claims data are used to determine whether	1. Inconsistent vital status or unreliable data are identified if any of the following conditions are met 1) the patient's age is greater than 115 years; 2) if the discharge date for a hospitalization is before the admission date;	1. Inconsistent vital status or unreliable demographic data in the claims Rationale: We do not include stays for patients where the age is greater than 115, where the gender is neither male nor female, where the admission date is	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.	1. Discharged alive on the day of admission or the following day who were not transferred to another acute care facility. Discharges are identified using data from the claims. Rationale: It is unlikely that these patients

	3504 Claims-Only Hospital-Wide (All-Condition, All-Procedure) Risk-Standardized Mortality Measure	1789 Hospital-Wide All-Cause Unplanned Readmission Measure (HWR)	1550 Hospital-level risk-standardized complication rate (RSCR) following elective primary total hip arthroplasty (THA) and/or total knee arthroplasty (TKA)	0468 Hospital 30-day, all-cause, risk-standardized mortality rate (RSMR) following pneumonia hospitalization	1893 Hospital 30-Day, all-cause, risk-standardized mortality rate (RSMR) following chronic obstructive pulmonary disease (COPD) hospitalization	2558 Hospital 30-Day, All-Cause, Risk-Standardized Mortality Rate (RSMR) Following Coronary Artery Bypass Graft (CABG) Surgery	0230 Hospital 30-day, all-cause, risk-standardized mortality rate (RSMR) following acute myocardial infarction (AMI) hospitalization
	the Medicare Enrollment Database, or where the date of death occurs before the date of discharge but the patient was discharged alive because these are likely errors in the data. 2. Discharged against medical advice (AMA) Rationale: Providers did not have the opportunity to deliver full care and prepare the patient for discharge. 3. With an admission for spinal cord injury (CCS 227), skull and face fractures (CCS 228), Intracranial Injury (CCS 233), Crushing injury or internal injury (CCS 234), Open wounds of head/neck/trunk (CCS 235), and burns (CCS 240) Rationale: Even though a hospital likely can influence the outcome of some of these conditions, in many cases death events are not a signal of poor quality of care when patients present with these conditions. These conditions are also infrequent events that are unlikely to be uniformly distributed across hospitals. 4. With a principal discharge diagnosis within a CCS with fewer than 100 admissions in that division within the measurement year.	Enrollment Database (EDB). 3. Discharges against medical advice (AMA) are identified using the discharge disposition indicator in claims data. 4. Admitted for primary psychiatric disease, identified by a principal diagnosis in one of the specific AHRQ CCS categories listed in the attached data dictionary. 5. Admitted for rehabilitation care, identified by the specific ICD-9 diagnosis codes included in CCS 254 (Rehabilitation care; fitting of prostheses; and adjustment of devices). 6. Admitted for medical treatment of cancer, identified by the specific AHRQ CCS categories listed in the attached data dictionary.	a complication of care occurred. 2. Who were discharged against medical advice (AMA); or, Rationale: Providers did not have the opportunity to deliver full care and prepare the patient for discharge. 3. Who had more than two THA/TKA procedure codes during the index hospitalization Rationale: Although clinically possible, it is highly unlikely that patients would receive more than two elective THA/TKA procedures in one hospitalization, which may reflect a coding error.	3) if the patient has a sex other than 'male' or 'female'. 2. Hospice enrollment in the 12 months prior to or on the index admission is identified using hospice enrollment data. 3. Discharges against medical advice (AMA) are identified using the discharge disposition indicator. After exclusions #1-3 are applied, the measure randomly selects one index admission per patient per year for inclusion in the cohort so that each episode of care is mutually independent with the same probability of the outcome. Additional admissions within that year are excluded. For each patient, the probability of death increases with each subsequent admission and therefore the episodes of care are not mutually independent. For the three-year combined data, when index admissions occur during the transition between measure reporting periods (June and July of each year) and both are randomly selected for inclusion in the measure, the measure includes only the June admission. The July admissions are excluded to avoid assigning a single death to two admissions. Individual codes with descriptors can be found in	after the date of death in the Medicare Enrollment Database, or where the date of death occurs before the date of discharge but the patient was discharged alive. Enrolled in the Medicare hospice program any time in the 12 months prior to the index admission, including the first day of the index admission. Enrollment to Medicare beneficiaries is determined using the Medicare Enrollment Database. Rationale: These patients are likely continuing to seek comfort measures only, so mortality is not necessarily an adverse outcome or signal of poor quality care. 2. Discharges against medical advice (AMA) are identified using the discharge disposition indicator in the claim. Rationale: Providers did not have the opportunity to deliver full care and prepare the patient for discharge. Individual codes with descriptors can be found in the attached Data Dictionary.	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 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	had clinically significant AMI. 2. Inconsistent or unknown vital status or other unreliable demographic data Rationale: We do not include stays for patients where the age is greater than 115, where the gender is neither male nor female, where the admission date is after the date of death in the Medicare Enrollment Database, or where the date of death occurs before the date of discharge but the patient was discharged alive. 3. Enrolled in the Medicare hospice program or used VA hospice services any time in the 12 months prior to the index admission, including the first day of the index admission. Enrollment to Medicare beneficiaries is determined using the Medicare Enrollment Database. Rationale: These patients are likely continuing to seek comfort measures only, so mortality is not necessarily an adverse outcome or signal of poor quality care. 4. Discharged against medical advice. Discharge status is identified using the claims Rationale: Providers did not have the opportunity to deliver full care and prepare the patient for discharge. After exclusions #1-4 are applied, the measure randomly selects one index

	3504 Claims-Only Hospital-Wide (All-Condition, All-Procedure) Risk-Standardized Mortality Measure	1789 Hospital-Wide All-Cause Unplanned Readmission Measure (HWR)	1550 Hospital-level risk-standardized complication rate (RSCR) following elective primary total hip arthroplasty (THA) and/or total knee arthroplasty (TKA)	0468 Hospital 30-day, all-cause, risk-standardized mortality rate (RSMR) following pneumonia hospitalization	1893 Hospital 30-Day, all-cause, risk-standardized mortality rate (RSMR) following chronic obstructive pulmonary disease (COPD) hospitalization	2558 Hospital 30-Day, All-Cause, Risk-Standardized Mortality Rate (RSMR) Following Coronary Artery Bypass Graft (CABG) Surgery	0230 Hospital 30-day, all-cause, risk-standardized mortality rate (RSMR) following acute myocardial infarction (AMI) hospitalization
	Rationale: To calculate a stable and precise risk model, there are a minimum number of admissions that are needed. In addition, a minimum number of admissions and/or outcome events are required to inform grouping admissions into larger categories. These admissions present challenges to both accurate risk prediction and coherent risk grouping and are therefore excluded. Note: During measure development we analyzed different volume cut-offs (25, 50 and 100). Using cut-off values below 100 resulted in too many CCS codes in some of the divisions (the CCS category codes are used in risk adjustment) which resulted in non-convergence of those division-level risk models. The total number of patients excluded is very small (13,597 or 0.21% of admissions for a cut off of 100). During measure development we also explored the option of pooling low-volume CCS codes (CCS<100 patients) into one group, however, the heterogeneity in mortality rates for the individual ICD-10 codes in			the attached Data Dictionary.		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.	admission per patient per year for inclusion in the cohort so that each episode of care is mutually independent with the same probability of the outcome. Additional admissions within that year are excluded. For each patient, the probability of death increases with each subsequent admission and therefore the episodes of care are not mutually independent. For the three-year combined data, when index admissions occur during the transition between measure reporting periods (June and July of each year) and both are randomly selected for inclusion in the measure, the measure includes only the June admission. July admissions are excluded to avoid assigning a single death to two admissions.

	3504 Claims-Only Hospital-Wide (All-Condition, All-Procedure) Risk-Standardized Mortality Measure	1789 Hospital-Wide All-Cause Unplanned Readmission Measure (HWR)	1550 Hospital-level risk-standardized complication rate (RSCR) following elective primary total hip arthroplasty (THA) and/or total knee arthroplasty (TKA)	0468 Hospital 30-day, all-cause, risk-standardized mortality rate (RSMR) following pneumonia hospitalization	1893 Hospital 30-Day, all-cause, risk-standardized mortality rate (RSMR) following chronic obstructive pulmonary disease (COPD) hospitalization	2558 Hospital 30-Day, All-Cause, Risk-Standardized Mortality Rate (RSMR) Following Coronary Artery Bypass Graft (CABG) Surgery	0230 Hospital 30-day, all-cause, risk-standardized mortality rate (RSMR) following acute myocardial infarction (AMI) hospitalization
	those groups would preclude adequate risk adjustment. The TEP supported excluding these admissions.						
Risk Adjustment	Statistical risk model	Statistical risk model Our approach to risk adjustment is tailored to and appropriate for a publicly reported outcome measure, as articulated in the American Heart Association (AHA) Scientific Statement, "Standards for Statistical Models Used for Public Reporting of Health Outcomes" (Krumholz et al., 2006). The HWR measure employs a hierarchical logistic regression model to create a hospital-level 30-day RSRR. In brief, the approach simultaneously models data at the patient and hospital levels to account for the variance in patient outcomes within and between hospitals (Normand & Shahian, 2007). At the patient level, the model adjusts the log-odds of readmission within 30 days of discharge for age and selected clinical covariates. At the hospital level, the approach models the hospital-specific intercepts as arising from a normal distribution. The hospital intercept represents the underlying risk of readmission at the hospital, after accounting for patient risk. If there were no differences among hospitals, then after adjusting for	Statistical risk model	Statistical risk model	Statistical risk model	Statistical risk model	Statistical risk model

	3504 Claims-Only Hospital-Wide (All-Condition, All-Procedure) Risk-Standardized Mortality Measure	1789 Hospital-Wide All-Cause Unplanned Readmission Measure (HWR)	1550 Hospital-level risk-standardized complication rate (RSCR) following elective primary total hip arthroplasty (THA) and/or total knee arthroplasty (TKA)	0468 Hospital 30-day, all-cause, risk-standardized mortality rate (RSMR) following pneumonia hospitalization	1893 Hospital 30-Day, all-cause, risk-standardized mortality rate (RSMR) following chronic obstructive pulmonary disease (COPD) hospitalization	2558 Hospital 30-Day, All-Cause, Risk-Standardized Mortality Rate (RSMR) Following Coronary Artery Bypass Graft (CABG) Surgery	0230 Hospital 30-day, all-cause, risk-standardized mortality rate (RSMR) following acute myocardial infarction (AMI) hospitalization
		patient risk, the hospital intercepts should be identical across all hospitals. We use a fixed, common set of variables in all our models for simplicity and ease of data collection and analysis. However, we estimate a hierarchical logistic regression model for each specialty cohort separately, and the coefficients associated with each variable may vary across specialty cohorts. Candidate and Final Risk-adjustment Variables: Candidate variables were patient-level risk-adjustors that were expected to be predictive of readmission, based on empirical analysis, prior literature, and clinical judgment, including age and indicators of comorbidity and disease severity. For each patient, covariates are obtained from claims records extending 12 months prior to and including the index admission. For the measure currently implemented by CMS, these risk-adjusters are identified using inpatient Medicare FFS claims data. The model adjusts for case-mix differences based on the clinical status of patients at the time of admission. We use condition categories (CCs), which are clinically meaningful groupings of more than 15,000 ICD-9-CM diagnosis codes					

	3504 Claims-Only Hospital-Wide (All-Condition, All-Procedure) Risk-Standardized Mortality Measure	1789 Hospital-Wide All-Cause Unplanned Readmission Measure (HWR)	1550 Hospital-level risk-standardized complication rate (RSCR) following elective primary total hip arthroplasty (THA) and/or total knee arthroplasty (TKA)	0468 Hospital 30-day, all-cause, risk-standardized mortality rate (RSMR) following pneumonia hospitalization	1893 Hospital 30-Day, all-cause, risk-standardized mortality rate (RSMR) following chronic obstructive pulmonary disease (COPD) hospitalization	2558 Hospital 30-Day, All-Cause, Risk-Standardized Mortality Rate (RSMR) Following Coronary Artery Bypass Graft (CABG) Surgery	0230 Hospital 30-day, all-cause, risk-standardized mortality rate (RSMR) following acute myocardial infarction (AMI) hospitalization
		(Pope et al., 2000). A file that contains a list of the ICD-9-CM codes and their groupings into CCs is attached in data field S.2b (Data Dictionary or Code Table). In addition, only comorbidities that convey information about the patient at admission or in the 12 months prior, and not complications that arise during the course of the index hospitalization, are included in the risk adjustment. Hence, we do not risk adjust for CCs that may represent adverse events of care when they are only recorded in the index admission. The models also include a condition-specific indicator for all AHRQ CCS categories with sufficient volume (defined as those with more than 1,000 admissions nationally each year for Medicare FFS data) as well as a single indicator for conditions with insufficient volume in each model. The final set of risk adjustment variables are listed in the attached Data Dictionary. Demographics Age-65 (years, continuous) for patients aged 65 or over cohorts; or Age (years, continuous) for patients aged 18 and over cohorts Comorbidities Metastatic cancer or acute leukemia (CC 7) Severe cancer (CC 8-9) Other cancers (CC 10-12)					

	3504 Claims-Only Hospital-Wide (All-Condition, All-Procedure) Risk-Standardized Mortality Measure	1789 Hospital-Wide All-Cause Unplanned Readmission Measure (HWR)	1550 Hospital-level risk-standardized complication rate (RSCR) following elective primary total hip arthroplasty (THA) and/or total knee arthroplasty (TKA)	0468 Hospital 30-day, all-cause, risk-standardized mortality rate (RSMR) following pneumonia hospitalization	1893 Hospital 30-Day, all-cause, risk-standardized mortality rate (RSMR) following chronic obstructive pulmonary disease (COPD) hospitalization	2558 Hospital 30-Day, All-Cause, Risk-Standardized Mortality Rate (RSMR) Following Coronary Artery Bypass Graft (CABG) Surgery	0230 Hospital 30-day, all-cause, risk-standardized mortality rate (RSMR) following acute myocardial infarction (AMI) hospitalization
		Severe hematological disorders (CC 44) Coagulation defects and other specified hematological disorders (CC 46) Iron deficiency or other unspecified anemias and blood disease (CC 47) End-stage liver disease (CC 25-26) Pancreatic disease (CC 32) Dialysis status (CC 130) Renal failure (CC 131) Transplants (CC 128, 174) Severe infection (CC 1, 3-5) Other infectious diseases and pneumonias (CC 6, 111-113) Septicemia/shock (CC 2) Congestive heart failure (CC 80) Coronary atherosclerosis or angina, cerebrovascular disease (CC 81-84, 89, 98-99, 103-106) Specified arrhythmias and other heart rhythm disorders (CC 92-93) Cardio-respiratory failure or shock (CC 79) Chronic obstructive pulmonary disease (COPD) (CC 108) Fibrosis of lung or other chronic lung disorders (CC 109) Protein-calorie malnutrition (CC 21) Disorders of fluid/electrolyte/ acid-base (CC 22-23) Rheumatoid arthritis and inflammatory connective tissue disease (CC 38) Diabetes mellitus (DM) or DM complications (CC 15-20, 119-120) Decubitus ulcer or chronic skin					

	3504 Claims-Only Hospital-Wide (All-Condition, All-Procedure) Risk-Standardized Mortality Measure	1789 Hospital-Wide All-Cause Unplanned Readmission Measure (HWR)	1550 Hospital-level risk-standardized complication rate (RSCR) following elective primary total hip arthroplasty (THA) and/or total knee arthroplasty (TKA)	0468 Hospital 30-day, all-cause, risk-standardized mortality rate (RSMR) following pneumonia hospitalization	1893 Hospital 30-Day, all-cause, risk-standardized mortality rate (RSMR) following chronic obstructive pulmonary disease (COPD) hospitalization	2558 Hospital 30-Day, All-Cause, Risk-Standardized Mortality Rate (RSMR) Following Coronary Artery Bypass Graft (CABG) Surgery	0230 Hospital 30-day, all-cause, risk-standardized mortality rate (RSMR) following acute myocardial infarction (AMI) hospitalization
		ulcer (CC 148-149) Hemiplegia, paraplegia, paralysis, functional disability (CC 67-69, 100-102, 177-178) Seizure disorders and convulsions (CC 74) Respirator dependence/tracheostomy status (CC 77) Drug/alcohol psychosis or dependence (CC 51-52) Psychiatric comorbidity (CC 54-56, 58, 60) Hip fracture/dislocation (CC 158) Principal Diagnoses Refer to the 2015 Measure Updates and Specifications: Hospital-Wide All-Cause Unplanned Readmission - Version 4.0 referenced here for the full lists of principal diagnosis AHRQ CCS categories included in each specialty cohort risk adjustment model. The ACR measure employs the same risk adjustment methodology and uses the same risk variables. References: Krumholz HM, Brindis RG, Brush JE, et al. 2006. Standards for Statistical Models Used for Public Reporting of Health Outcomes: An American Heart Association Scientific Statement From the Quality of Care and Outcomes Research Interdisciplinary Writing Group: Cosponsored by the Council on Epidemiology and Prevention and the Stroke Council Endorsed by the American College of Cardiology					

	3504 Claims-Only Hospital-Wide (All-Condition, All-Procedure) Risk-Standardized Mortality Measure	1789 Hospital-Wide All-Cause Unplanned Readmission Measure (HWR)	1550 Hospital-level risk-standardized complication rate (RSCR) following elective primary total hip arthroplasty (THA) and/or total knee arthroplasty (TKA)	0468 Hospital 30-day, all-cause, risk-standardized mortality rate (RSMR) following pneumonia hospitalization	1893 Hospital 30-Day, all-cause, risk-standardized mortality rate (RSMR) following chronic obstructive pulmonary disease (COPD) hospitalization	2558 Hospital 30-Day, All-Cause, Risk-Standardized Mortality Rate (RSMR) Following Coronary Artery Bypass Graft (CABG) Surgery	0230 Hospital 30-day, all-cause, risk-standardized mortality rate (RSMR) following acute myocardial infarction (AMI) hospitalization
		Foundation. Circulation 113: 456-462. Normand S-LT, Shahian DM. 2007. Statistical and Clinical Aspects of Hospital Outcomes Profiling. Stat Sci 22 (2): 206-226. Pope GC, et al. 2000. Principal Inpatient Diagnostic Cost Group Models for Medicare Risk Adjustment. Health Care Financing Review 21(3): 93-118. Available in attached Excel or csv file at S.2b					
Stratification	N/A	N/A	N/A	N/A	N/A	N/A	N/A
Type Score	Rate/proportion better quality = lower score	Rate/proportion better quality = lower score	Rate/proportion better quality = lower score	Rate/proportion better quality = lower score	Rate/proportion better quality = lower score	Rate/proportion better quality = lower score	Rate/proportion better quality = lower score
Algorithm	The measure estimates hospital-level, risk-standardized mortality rates (RSMRs) within 30 days of hospital admission using hierarchical logistical regression models through a Bayesian Markov Chain Monte Carlo (MCMC) procedure. In brief, we used hierarchical logistic regression to model the log-odds of mortality for each of the 15 service-line divisions. Death within 30 days was modeled as a function of patient-level demographic and clinical characteristics and a random hospital-level intercept. This model specification accounts for within-hospital correlation of the observed outcomes and models the assumption that underlying	This measure estimates a hospital-level 30-day all-cause RSRR using hierarchical logistic regression models. In brief, the approach simultaneously models data at the patient, and hospital levels to account for variance in patient outcomes within and between hospitals (Normand et al., 2007). At the patient level, it models the log-odds of readmission within 30 days of discharge using age, selected clinical covariates, and a hospital -specific effect. At the hospital level, the approach models the hospital-specific effects as arising from a normal distribution. The hospital effect represents the underlying risk of a readmission, after accounting for patient risk. The hospital-specific effects are given a distribution to	The measure estimates hospital-level RSCRs following elective primary THA/TKA using hierarchical logistic regression models. In brief, the approach simultaneously models data at the patient and hospital levels to account for variance in patient outcomes within and between hospitals (Normand and Shahian, 2007). At the patient level, it models the log-odds of a complication occurring within 90 days of the index admission using age, sex, selected clinical covariates, and a hospital-specific intercept. At the hospital level, it models the hospital-specific intercepts as arising from a normal distribution. The hospital intercept represents the underlying risk of a complication at the hospital, after accounting for patient risk. The hospital-specific intercepts are given a distribution to account for the clustering (non-independence) of patients within the	The measure estimates hospital-level 30-day all-cause RSMRs following hospitalization for pneumonia using hierarchical logistic regression models. In brief, the approach simultaneously models data at the patient and hospital levels to account for variance in patient outcomes within and between hospitals (Normand and Shahian, 2007). At the patient level, it models the log-odds of mortality within 30 days of index admission using age, sex, selected clinical covariates, and a hospital-specific intercept. At the hospital level, it models the hospital-specific intercepts as arising from a normal distribution. The hospital intercept represents the underlying risk of a mortality at the hospital,	The measure estimates hospital-level 30-day all-cause RSMRs following hospitalization for COPD using hierarchical logistic regression models. In brief, the approach simultaneously models data at the patient and hospital levels to account for variance in patient outcomes within and between hospitals (Normand and Shahian, 2007). At the patient level, it models the log-odds of mortality within 30 days of index admission using age, sex, selected clinical covariates, and a hospital-specific intercept. At the hospital level, it models the hospital-specific intercepts as arising from a normal distribution. The hospital intercept represents the underlying risk of a mortality at the hospital, after accounting for patient risk. The hospital-specific	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-	The measure estimates hospital-level 30-day all-cause RSMRs following hospitalization for AMI using hierarchical logistic regression models. In brief, the approach simultaneously models data at the patient and hospital levels to account for variance in patient outcomes within and between hospitals (Normand and Shahian, 2007). At the patient level, it models the log-odds of mortality within 30 days of discharge using age, sex, selected clinical covariates, and a hospital-specific intercept. At the hospital level, it models the hospital-specific intercepts as arising from a normal distribution. The hospital intercept represents the underlying risk of mortality at the hospital, after accounting

	3504 Claims-Only Hospital-Wide (All-Condition, All-Procedure) Risk-Standardized Mortality Measure	1789 Hospital-Wide All-Cause Unplanned Readmission Measure (HWR)	1550 Hospital-level risk-standardized complication rate (RSCR) following elective primary total hip arthroplasty (THA) and/or total knee arthroplasty (TKA)	0468 Hospital 30-day, all-cause, risk-standardized mortality rate (RSMR) following pneumonia hospitalization	1893 Hospital 30-Day, all-cause, risk-standardized mortality rate (RSMR) following chronic obstructive pulmonary disease (COPD) hospitalization	2558 Hospital 30-Day, All-Cause, Risk-Standardized Mortality Rate (RSMR) Following Coronary Artery Bypass Graft (CABG) Surgery	0230 Hospital 30-day, all-cause, risk-standardized mortality rate (RSMR) following acute myocardial infarction (AMI) hospitalization
	differences in quality among the health care facilities being evaluated lead to systematic differences in outcomes. We estimated a separate hierarchical logistic regression model for each service-line division. In order to obtain the variance and interval estimates, we fit the hierarchical model under the Bayesian framework along with the Markov Chain Monte Carlo (MCMC) technique. Admissions are assigned to one of 15 mutually exclusive divisions (groups of discharge condition categories and procedure categories). For each division and each hospital with patients in that division, the standardized mortality ratio (SMR) is calculated as the ratio of the number of "predicted" deaths to the number of "expected" deaths at a given hospital. The predicted number of deaths is based on the hospital's performance with its observed case mix and service mix, and is calculated by using the coefficients estimated by regressing the risk factors and the hospital-specific effect	account for the clustering (non-independence) of patients within the same hospital (Normand et al., 2007). If there were no differences among hospitals, then after adjusting for patient risk, the hospital effects should be identical across all hospitals. Admissions are assigned to one of five mutually exclusive specialty cohort groups consisting of related conditions or procedures. For each specialty cohort group, the standardized readmission ratio (SRR) is calculated as the ratio of the number of "predicted" readmissions to the number of "expected" readmissions at a given hospital. For each hospital, the numerator of the ratio is the number of readmissions within 30 days predicted based on the hospital's performance with its observed case mix and service mix, and the denominator is the number of readmissions expected based on the nation's performance with that hospital's case mix and service mix. This approach is analogous to a ratio of "observed" to "expected" used in other types of statistical analyses. It conceptually allows a particular hospital's performance, given its case mix and service mix, to be compared to an average hospital's performance with the same case mix and service	same hospital. If there were no differences among hospitals, then after adjusting for patient risk, the hospital intercepts should be identical across all hospitals. The RSCR is calculated as the ratio of the number of "predicted" to the number of "expected" admissions with a complication at a given hospital, multiplied by the national observed complication rate. For each hospital, the numerator of the ratio is the number of complications within 90 days predicted on the basis of the hospital's performance with its observed case mix, and the denominator is the number of complications expected based on the nation's performance with that hospital's case mix. This approach is analogous to a ratio of "observed" to "expected" used in other types of statistical analyses. It conceptually allows for a comparison of a particular hospital's performance given its case mix to an average hospital's performance with the same case mix. Thus, a lower ratio indicates lower-than-expected complication rates or better quality, and a higher ratio indicates higher-than-expected complication rates or worse quality. The "predicted" number of admissions with a complication (the numerator) is calculated by using the coefficients estimated by regressing the risk factors and the hospital-specific intercept on the risk of having an admission with a complication. The estimated hospital-	after accounting for patient risk. The hospital-specific intercepts are given a distribution to account for the clustering (non-independence) of patients within the same hospital. If there were no differences among hospitals, then after adjusting for patient risk, the hospital intercepts should be identical across all hospitals. The RSMR is calculated as the ratio of the number of "predicted" 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 on the basis of 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 for a comparison of a particular hospital's performance given its case mix to an average hospital's performance with the same case mix. Thus, a lower ratio	intercepts are given a distribution to account for the clustering (non-independence) of patients within the same hospital. If there were no differences among hospitals, then after adjusting for patient risk, the hospital intercepts should be identical across all hospitals. The RSMR is calculated as the ratio of the number of "predicted" 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 on the basis of 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 for a comparison of a particular hospital's performance given its case mix to an average hospital's performance with the same case mix. Thus, a lower ratio indicates lower-than-expected mortality rates or better quality, and a higher ratio indicates higher-than-expected mortality rates or worse quality.	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	for patient risk. The hospital-specific intercepts are given a distribution to account for the clustering (non-independence) of patients within the same hospital. If there were no differences among hospitals, then after adjusting for patient risk, the hospital intercepts should be identical across all hospitals. The RSMR is calculated as the ratio of the number of "predicted" to the number of "expected" deaths, multiplied by the national unadjusted mortality rate. For each hospital, the numerator of the ratio ("predicted") is the number of deaths within 30 days predicted on the basis of the hospital's performance with its observed case mix, and the denominator ("expected") is the number of deaths expected on the basis of the nation's performance with that hospital's case mix. This approach is analogous to a ratio of "observed" to "expected" used in other types of statistical analyses. It conceptually allows for a comparison of a particular hospital's performance given its case mix to an average hospital's performance with the same case mix. Thus, a lower ratio

	3504 Claims-Only Hospital-Wide (All-Condition, All-Procedure) Risk-Standardized Mortality Measure	1789 Hospital-Wide All-Cause Unplanned Readmission Measure (HWR)	1550 Hospital-level risk-standardized complication rate (RSCR) following elective primary total hip arthroplasty (THA) and/or total knee arthroplasty (TKA)	0468 Hospital 30-day, all-cause, risk-standardized mortality rate (RSMR) following pneumonia hospitalization	1893 Hospital 30-Day, all-cause, risk-standardized mortality rate (RSMR) following chronic obstructive pulmonary disease (COPD) hospitalization	2558 Hospital 30-Day, All-Cause, Risk-Standardized Mortality Rate (RSMR) Following Coronary Artery Bypass Graft (CABG) Surgery	0230 Hospital 30-day, all-cause, risk-standardized mortality rate (RSMR) following acute myocardial infarction (AMI) hospitalization
	for each cohort is added to the sum of the estimated regression coefficients multiplied by patient characteristics. The results are transformed via an inverse logit function and summed over all patients attributed to a hospital to get a predicted value. The expected number of deaths is based on the nation's performance with that hospital's case mix and service mix and 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 transformed via an inverse logit function and summed over all patients in the hospital to get an expected value. This approach is analogous to a ratio of "observed" to "expected" used in other types of statistical analyses. It conceptually allows a particular hospital's performance, given its case mix and service mix, to be compared to an average hospital's performance with the same case mix and service mix. Thus, a lower ratio indicates lower-than-expected mortality rates or better quality, while a higher ratio indicates higher-than-expected	mix. Thus, a lower ratio indicates lower-than-expected readmission rates or better quality, while a higher ratio indicates higher-than-expected readmission rates or worse quality. For each specialty cohort, the "predicted" number of readmissions (the numerator) is calculated by using the coefficients estimated by regressing the risk factors (found in Table D.9) and the hospital-specific effect on the risk of readmission. The estimated hospital-specific effect for each cohort is added to the sum of the estimated regression coefficients multiplied by patient characteristics. The results are log transformed and summed over all patients attributed to a hospital to get a predicted value. The "expected" number of readmissions (the denominator) is obtained in the same manner, but a common effect using all hospitals in our sample is added in place of the hospital-specific effect. The results are log transformed and summed over all patients in the hospital to get an expected value. To assess hospital performance for each reporting period, we re-estimate the model coefficients using the data in that period. The specialty cohort SRRs are then pooled for each hospital using a volume-weighted	specific intercept is added to the sum of the estimated regression coefficients multiplied by the patient characteristics. The results are log transformed and summed over all patients attributed to a hospital to get a predicted value. The "expected" number of admissions with a complication (the denominator) is obtained in the same manner, but a common intercept using all hospitals in our sample is added in place of the hospital-specific effect. The results are log transformed and summed over all patients in the hospital to get an expected value. To assess hospital performance for each reporting period, we re-estimate the model coefficients using the years of data in that period. This calculation transforms the ratio of predicted over expected into a rate that is compared to the national observed complication rate. The hierarchical logistic regression models are described fully in the original methodology report (Grosso et al., 2012). References: Grosso L, Curtis J, Geary L, et al. Hospital-level Risk-Standardized Complication Rate Following Elective Primary Total Hip Arthroplasty (THA) And/Or Total Knee Arthroplasty (TKA) Measure Methodology Report. 2012. Normand S-LT, Shahian DM. 2007. Statistical and Clinical Aspects of Hospital Outcomes Profiling. Stat Sci 22(2): 206-226.	indicates lower-than-expected mortality rates or better quality, and 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 intercept 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 intercept using all hospitals in our sample is added in place of the hospital-specific intercept. 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	The "predicted" number of deaths (the numerator) is calculated by using the coefficients estimated by regressing the risk factors and the hospital-specific intercept 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 intercept using all hospitals in our sample is added in place of the hospital-specific intercept. 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 readmission rate. The hierarchical logistic regression models are described fully in the original methodology report (Krumholz et al., 2005). References: 1. Normand S-LT, Shahian DM. 2007. Statistical and Clinical Aspects of	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	indicates lower-than-expected mortality or better quality and a higher ratio indicates higher-than-expected mortality 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 intercept 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 intercept using all hospitals in our sample is added in place of the hospital specific intercept. 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

	3504 Claims-Only Hospital-Wide (All-Condition, All-Procedure) Risk-Standardized Mortality Measure	1789 Hospital-Wide All-Cause Unplanned Readmission Measure (HWR)	1550 Hospital-level risk-standardized complication rate (RSCR) following elective primary total hip arthroplasty (THA) and/or total knee arthroplasty (TKA)	0468 Hospital 30-day, all-cause, risk-standardized mortality rate (RSMR) following pneumonia hospitalization	1893 Hospital 30-Day, all-cause, risk-standardized mortality rate (RSMR) following chronic obstructive pulmonary disease (COPD) hospitalization	2558 Hospital 30-Day, All-Cause, Risk-Standardized Mortality Rate (RSMR) Following Coronary Artery Bypass Graft (CABG) Surgery	0230 Hospital 30-day, all-cause, risk-standardized mortality rate (RSMR) following acute myocardial infarction (AMI) hospitalization
	mortality rates or worse quality. To assess hospital performance for each reporting period, the measure re-estimates the model coefficients using the data in that period. The division-level SMRs are then pooled for each hospital using an inverse variance-weighted geometric mean to create a hospital-wide composite SMR. The hospital-wide SMR is then multiplied by the national observed mortality rate to produce the RSMR.	geometric mean to create a hospital-wide composite SRR. The composite SRR is multiplied by the national observed readmission rate to produce the RSRR. The statistical modeling approach is described fully in Appendix A and in the original methodology report (Horwitz et al., 2012). The ACR quality measure was adapted from the HWR quality measure. The unit of analysis was changed from the hospital to the ACO. This was possible because both the HWR and ACR measures assess readmission performance for a population that clusters patients together (either in hospitals or in ACOs). The goal is to isolate the effects of beneficiary characteristics on the probability that a patient will be readmitted from the effects of being in a specific hospital or ACO. In addition, planned readmissions are excluded for the ACR quality measure in the same way that they are excluded for the HWR measure. The ACR measure is calculated identically to what is described above for the HWR measure. References: Horwitz L, Partovian C, Lin Z, et al. Hospital-Wide All-Cause Unplanned Readmission Measure: Final Technical Report. 2012; http://www.qualitynet.org/dcs/BlobServer?blobkey=id&blobnocache=		readmission rate. The hierarchical logistic regression models are described fully in the original methodology report (Krumholz et al., 2005). References: 1. Normand S-LT, Shahian DM. 2007. Statistical and Clinical Aspects of Hospital Outcomes Profiling. Stat Sci 22(2): 206-226. 2. Krumholz H, Normand S, Galusha D, et al. 2005. Risk-Adjustment Models for AMI and HF 30-Day Mortality Methodology.	Hospital Outcomes Profiling. Stat Sci 22(2): 206-226. 2. Krumholz H, Normand S, Galusha D, et al. 2005. Risk-Adjustment Models for AMI and HF 30-Day Mortality Methodology.	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	readmission rate. The hierarchical logistic regression models are described fully in the original methodology report (Krumholz et al., 2005). References: 1. Normand S-LT, Shahian DM. 2007. Statistical and Clinical Aspects of Hospital Outcomes Profiling. Stat Sci 22(2): 206-226. 2. Krumholz H, Normand S, Galusha D, et al. Risk-Adjustment Models for AMI and HF 30-Day Mortality Methodology. 2005.

	3504 Claims-Only Hospital-Wide (All-Condition, All-Procedure) Risk-Standardized Mortality Measure	1789 Hospital-Wide All-Cause Unplanned Readmission Measure (HWR)	1550 Hospital-level risk-standardized complication rate (RSCR) following elective primary total hip arthroplasty (THA) and/or total knee arthroplasty (TKA)	0468 Hospital 30-day, all-cause, risk-standardized mortality rate (RSMR) following pneumonia hospitalization	1893 Hospital 30-Day, all-cause, risk-standardized mortality rate (RSMR) following chronic obstructive pulmonary disease (COPD) hospitalization	2558 Hospital 30-Day, All-Cause, Risk-Standardized Mortality Rate (RSMR) Following Coronary Artery Bypass Graft (CABG) Surgery	0230 Hospital 30-day, all-cause, risk-standardized mortality rate (RSMR) following acute myocardial infarction (AMI) hospitalization
		true&blobwhere=1228889825199&blobheader=multipart%2Foctet-stream&blobheadername1=Content-Disposition&blobheadervalue1=attachment%3Bfilename%3DDryRun_HWR_TechReport_081012.pdf&blobcol=urldata&blobtable=MungoBlobs. Accessed 30 April, 2014. Normand S-LT, Shahian DM. 2007. Statistical and Clinical Aspects of Hospital Outcomes Profiling. Stat Sci 22(2): 206-226. Available in attached appendix at A.1					
Submission items	5.1 Identified measures: 5a.1 Are specs completely harmonized? Yes 5a.2 If not completely harmonized, identify difference, rationale, impact: This claims-only hospital-wide mortality (HWM) measure is intended to complement the existing CMS Hospital-Wide All-Cause Risk-Standardized Readmission Measure (NQF #1789) to allow assessment of trends in hospital performance for both readmission and mortality outcomes, similar to other complementary pairs of readmission and mortality measures for specific conditions and procedures. By measuring mortality outcomes across almost all hospitalized patients, this	5.1 Identified measures: 1768 : Plan All-Cause Readmissions (PCR) 1891 : Hospital 30-day, all-cause, risk-standardized readmission rate (RSRR) following chronic obstructive pulmonary disease (COPD) hospitalization 1551 : Hospital-level 30-day risk-standardized readmission rate (RSRR) following elective primary total hip arthroplasty (THA) and/or total knee arthroplasty (TKA) 0695 : Hospital 30-Day Risk-Standardized Readmission Rates following Percutaneous Coronary Intervention (PCI) 0329 : Risk-Adjusted 30-Day All-Cause Readmission Rate 0330 : Hospital 30-day, all-cause, risk-standardized readmission rate (RSRR) following heart failure (HF) hospitalization 0505 : Hospital 30-day all-cause risk-standardized readmission rate (RSRR) following	5.1 Identified measures: 0534 : Hospital specific risk-adjusted measure of mortality or one or more major complications within 30 days of a lower extremity bypass (LEB). 0564 : Cataracts: Complications within 30 Days Following Cataract Surgery Requiring Additional Surgical Procedures 1551 : Hospital-level 30-day risk-standardized readmission rate (RSRR) following elective primary total hip arthroplasty (THA) and/or total knee arthroplasty (TKA) 2052 : Reduction of Complications through the use of Cystoscopy during Surgery for Stress Urinary Incontinence 5a.1 Are specs completely harmonized? Yes 5a.2 If not completely harmonized, identify difference, rationale, impact: We did not include in our list of related measures any non-outcome measures (for example, process measures) with the same	5.1 Identified measures: 0708 : Proportion of Patients with Pneumonia that have a Potentially Avoidable Complication (during the episode time window) 0231 : Pneumonia Mortality Rate (IQI #20) 0506 : Hospital 30-day, all-cause, risk-standardized readmission rate (RSRR) following pneumonia hospitalization 0279 : Community Acquired Pneumonia Admission Rate (PQI 11) 2579 : Hospital-level, risk-standardized payment associated with a 30-day episode of care for pneumonia (PN) 5a.1 Are specs completely harmonized? No 5a.2 If not completely harmonized, identify difference, rationale, impact: The pneumonia mortality	5.1 Identified measures: 0701 : Functional Capacity in COPD patients before and after Pulmonary Rehabilitation 0700 : Health-related Quality of Life in COPD patients before and after Pulmonary Rehabilitation 0275 : Chronic Obstructive Pulmonary Disease (COPD) or Asthma in Older Adults Admission Rate (PQI 05) 1891 : Hospital 30-day, all-cause, risk-standardized readmission rate (RSRR) following chronic obstructive pulmonary disease (COPD) hospitalization 5a.1 Are specs completely harmonized? Yes 5a.2 If not completely harmonized, identify difference, rationale, impact: We did not include in our list of related measures any non-outcome (for example, process) measures with the same target population as our	5.1 Identified measures: 0114 : Risk-Adjusted Postoperative Renal Failure 0115 : Risk-Adjusted Surgical Re-exploration 0119 : Risk-Adjusted Operative Mortality for CABG 0122 : Risk-Adjusted Operative Mortality for Mitral Valve (MV) Replacement + CABG Surgery 0123 : Risk-Adjusted Operative Mortality for Aortic Valve Replacement (AVR) + CABG Surgery 0129 : Risk-Adjusted Postoperative Prolonged Intubation (Ventilation) 0130 : Risk-Adjusted Deep Sternal Wound Infection 0131 : Risk-Adjusted Stroke/Cerebrovascular Accident 0229 : Hospital 30-day, all-cause, risk-standardized mortality rate (RSMR)	5.1 Identified measures: 2431 : Hospital-level, risk-standardized payment associated with a 30-day episode-of-care for Acute Myocardial Infarction (AMI) 1789 : Hospital-Wide All-Cause Unplanned Readmission Measure (HWR) 1891 : Hospital 30-day, all-cause, risk-standardized readmission rate (RSRR) following chronic obstructive pulmonary disease (COPD) hospitalization 1551 : Hospital-level 30-day risk-standardized readmission rate (RSRR) following elective primary total hip arthroplasty (THA) and/or total knee arthroplasty (TKA) 0506 : Hospital 30-day, all-cause, risk-standardized readmission rate (RSRR) following pneumonia hospitalization 0330 : Hospital 30-day, all-

	3504 Claims-Only Hospital-Wide (All-Condition, All-Procedure) Risk-Standardized Mortality Measure	1789 Hospital-Wide All-Cause Unplanned Readmission Measure (HWR)	1550 Hospital-level risk-standardized complication rate (RSCR) following elective primary total hip arthroplasty (THA) and/or total knee arthroplasty (TKA)	0468 Hospital 30-day, all-cause, risk-standardized mortality rate (RSMR) following pneumonia hospitalization	1893 Hospital 30-Day, all-cause, risk-standardized mortality rate (RSMR) following chronic obstructive pulmonary disease (COPD) hospitalization	2558 Hospital 30-Day, All-Cause, Risk-Standardized Mortality Rate (RSMR) Following Coronary Artery Bypass Graft (CABG) Surgery	0230 Hospital 30-day, all-cause, risk-standardized mortality rate (RSMR) following acute myocardial infarction (AMI) hospitalization
	measure will provide an important additional performance assessment that will complement condition- and procedure-specific or other more narrowly defined mortality measures and allow a greater number of patients and hospitals to be evaluated. This HWM measure captures a similarly broad cohort to the CMS Hospital-Wide All-Cause Risk-Standardized Readmission Measure (NQF #1789), and a broader cohort than those of other CMS condition-specific measures. Because the mortality measure is focused on a different outcome, it differs from the existing CMS Hospital-Wide All-Cause Risk Standardized Readmission Measure (NQF #1789) in a couple of ways. First, this HWM measure includes patients with a principal discharge diagnosis of cancer (with some exceptions), whereas those patients are not included in the readmission measure. Cancer patients are appropriate to include in the HWM measure as many have survival as their primary goal; however due to cancer treatment plans, readmissions	acute myocardial infarction (AMI) hospitalization. 0506 : Hospital 30-day, all-cause, risk-standardized readmission rate (RSRR) following pneumonia hospitalization 5a.1 Are specs completely harmonized? No 5a.2 If not completely harmonized, identify difference, rationale, impact: This measure and the National Committee for Quality Assurance (NCQA) Plan All-Cause Readmissions (PCR) Measure #1768 are related measures, but are not competing because they don't have the same measure focus and same target population. In addition, both have been previously harmonized to the extent possible under the guidance of the National Quality Forum Steering Committee in 2011. Each of these measures has different specifications. NCQA's Measure #1768 counts the number of inpatient stays for patients aged 18 and older during a measurement year that were followed by an acute readmission for any diagnosis to any hospital within 30 days. It contrasts this count with a calculation of the predicted probability of an acute readmission. NCQA's measure is intended for quality monitoring and accountability at the health plan level. This measure estimates the	target population as our measure. Because this is an outcome measure, clinical coherence of the cohort takes precedence over alignment with related non-outcome measures. Furthermore, non-outcome measures are limited due to broader patient exclusions. This is because they typically only include a specific subset of patients who are eligible for that measure (for example, patients who receive a specific medication or undergo a specific procedure). 5b.1 If competing, why superior or rationale for additive value: N/A	measure cohort, version 9.0, is harmonized with the hospital-level, risk-standardized payment associated with a 30-day episode of care for pneumonia cohort. Version 9.2 of the pneumonia mortality measure cohort is, however, not harmonized with the pneumonia payment measure cohort. There is intention to harmonize the pneumonia mortality and payment measure cohorts in the future. We did not include in our list of related measures any non-outcome (for example, process) measures with the same target population as our measure. Because this is an outcome measure, clinical coherence of the cohort takes precedence over alignment with related non-outcome measures. Furthermore, non-outcome measures are limited due to broader patient 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). Lastly, this measure and the NQF Inpatient Pneumonia Mortality (AHRQ) Measure #0231 are complementary rather than competing measures.	measure. Our measure cohort was heavily vetted by clinical experts, a technical expert panel, and a public comment period. Additionally, the measure, with the specified cohort, has been publicly reported since December 2014. Because this is an outcome measure, clinical coherence of the cohort takes precedence over alignment with related non-outcome measures. Furthermore, non-outcome measures are limited due to broader patient exclusions. This is because they typically only include a specific subset of patients who are eligible for that measure (for example, patients who receive a specific medication or undergo a specific procedure). 5b.1 If competing, why superior or rationale for additive value: N/A	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 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 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,	cause, risk-standardized readmission rate (RSRR) following heart failure (HF) hospitalization 0505 : Hospital 30-day all-cause risk-standardized readmission rate (RSRR) following acute myocardial infarction (AMI) hospitalization. 1893 : Hospital 30-Day, all-cause, risk-standardized mortality rate (RSMR) following chronic obstructive pulmonary disease (COPD) hospitalization 0468 : Hospital 30-day, all-cause, risk-standardized mortality rate (RSMR) following pneumonia hospitalization 0229 : Hospital 30-day, all-cause, risk-standardized mortality rate (RSMR) following heart failure (HF) hospitalization 5a.1 Are specs completely harmonized? Yes 5a.2 If not completely harmonized, identify difference, rationale, impact: We did not include in our list of related measures any non-outcome (e.g., process) measures with the same target population as our measure. Our measure cohort was heavily vetted by clinical experts. Additionally, the measure, with the specified cohort, has been publicly reported since 2008. Because this is an outcome measure, clinical

	3504 Claims-Only Hospital-Wide (All-Condition, All-Procedure) Risk-Standardized Mortality Measure	1789 Hospital-Wide All-Cause Unplanned Readmission Measure (HWR)	1550 Hospital-level risk-standardized complication rate (RSCR) following elective primary total hip arthroplasty (THA) and/or total knee arthroplasty (TKA)	0468 Hospital 30-day, all-cause, risk-standardized mortality rate (RSMR) following pneumonia hospitalization	1893 Hospital 30-Day, all-cause, risk-standardized mortality rate (RSMR) following chronic obstructive pulmonary disease (COPD) hospitalization	2558 Hospital 30-Day, All-Cause, Risk-Standardized Mortality Rate (RSMR) Following Coronary Artery Bypass Graft (CABG) Surgery	0230 Hospital 30-day, all-cause, risk-standardized mortality rate (RSMR) following acute myocardial infarction (AMI) hospitalization
	are frequently part of the plan and expected and therefore, are not a reasonable signal of quality. Another difference between the two measures is the number of divisions or specialty cohorts the patients are divided into, to more accurately risk adjust for case-mix and service-mix. The readmission measure divides patients into five categories, or "specialty cohorts", while the mortality measure uses 15. This is because the risk of mortality is much more closely related to patient factors than readmission is related to patient factors. PSI-02 (NQF #0357) is another complementary mortality measure, which captures a different patient population and a different outcome compared with the HWM measure submitted with this application. PSI-02 captures patients 18 years of age or older, or obstetric patients, whereas the HWM measure captures patients between the ages of 65 and 94. PSI-02 captures DRGs with less than 0.5% mortality rate, whereas the HWM measure captures all patients within	risk-standardized rate of unplanned, all-cause readmissions to a hospital or ACO for any eligible condition within 30 days of hospital discharge for patients aged 18 and older. The measure will result in a single summary risk-adjusted readmission rate for conditions or procedures that fall under five specialties: surgery/gynecology, general medicine, cardiorespiratory, cardiovascular, and neurology. This measure is specified for evaluating hospital or ACO performance. However, despite these differences in cohort specifications, both measures under NQF guidance have been harmonized to the extent possible through modifications such as exclusion of planned readmissions. We did not include in our list of related measures any non-outcome (e.g., process) measures with the same target population as our measure. Because this is an outcome measure, clinical coherence of the cohort takes precedence over alignment with related non-outcome measures. Furthermore, non-outcome measures are limited due to broader patient exclusions. This is because they typically only include a specific subset of patients who are eligible for that measure (for example, patients who receive a specific medication or		Although they both assess mortality for patients admitted to acute care hospitals with a principal discharge diagnosis of pneumonia, the specified outcomes are different. This measure assesses 30-day mortality while #0231 assesses inpatient mortality. Assessment of 30-day and inpatient mortality outcomes have distinct advantages and uses which make them complementary as opposed to competing. For example the 30-day period provides a broader perspective on hospital care and utilizes standard time period to examine hospital performance to avoid bias by differences in length of stay among hospitals. However, in some settings it may not be feasible to capture post-discharge mortality making the inpatient measure more useable. We have previously consulted with AHRQ to examine harmonization of complementary measures of mortality for patients with AMI and stroke. We have found that the measures are harmonized to the extent possible given that small differences in cohort inclusion and exclusion criteria are warranted on the basis of the		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).	coherence of the cohort takes precedence over alignment with related non-outcome measures. Furthermore, non-outcome measures are limited due to broader patient exclusions. This is because they typically only include a specific subset of patients who are eligible for that measure (for example, patients who receive a specific medication or undergo a specific procedure). 5b.1 If competing, why superior or rationale for additive value: N/A

	3504 Claims-Only Hospital-Wide (All-Condition, All-Procedure) Risk-Standardized Mortality Measure	1789 Hospital-Wide All-Cause Unplanned Readmission Measure (HWR)	1550 Hospital-level risk-standardized complication rate (RSCR) following elective primary total hip arthroplasty (THA) and/or total knee arthroplasty (TKA)	0468 Hospital 30-day, all-cause, risk-standardized mortality rate (RSMR) following pneumonia hospitalization	1893 Hospital 30-Day, all-cause, risk-standardized mortality rate (RSMR) following chronic obstructive pulmonary disease (COPD) hospitalization	2558 Hospital 30-Day, All-Cause, Risk-Standardized Mortality Rate (RSMR) Following Coronary Artery Bypass Graft (CABG) Surgery	0230 Hospital 30-day, all-cause, risk-standardized mortality rate (RSMR) following acute myocardial infarction (AMI) hospitalization
	all CCSs, regardless of mortality rate. Hospital-wide mortality captures mortality up to 30 days past admission, where AHRQ PSI-02 only captures in-hospital mortality. IQI 90 (NQF #0530) is another complimentary mortality measure, which is a composite measure of the number of in-hospital deaths for a narrow range of conditions (CHF, stroke, hip fracture, pneumonia, acute myocardial infarction and GI hemorrhage). The HWM measure presented in this application captures all deaths after 30 days of admission, for all conditions and procedures. 5b.1 If competing, why superior or rationale for additive value: There are no competing NQF-endorsed measures.	undergo a specific procedure). 5b.1 If competing, why superior or rationale for additive value: N/A		use of different outcomes. However, this current measure has been modified from the last endorsed version to include patients with a principal discharge diagnosis of sepsis and a secondary discharge diagnosis of pneumonia that is present on admission. The cohort was also expanded to include patients with a principal discharge diagnosis of aspiration pneumonia. Thus the current measure cohort is no longer harmonized with measure #0231. 5b.1 If competing, why superior or rationale for additive value: N/A		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	

	3504 Claims-Only Hospital-Wide (All-Condition, All-Procedure) Risk-Standardized Mortality Measure	1789 Hospital-Wide All-Cause Unplanned Readmission Measure (HWR)	1550 Hospital-level risk-standardized complication rate (RSCR) following elective primary total hip arthroplasty (THA) and/or total knee arthroplasty (TKA)	0468 Hospital 30-day, all-cause, risk-standardized mortality rate (RSMR) following pneumonia hospitalization	1893 Hospital 30-Day, all-cause, risk-standardized mortality rate (RSMR) following chronic obstructive pulmonary disease (COPD) hospitalization	2558 Hospital 30-Day, All-Cause, Risk-Standardized Mortality Rate (RSMR) Following Coronary Artery Bypass Graft (CABG) Surgery	0230 Hospital 30-day, all-cause, risk-standardized mortality rate (RSMR) following acute myocardial infarction (AMI) hospitalization
						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.	

Comparison of NQF 3504, 1789, 1550, 0468, 1893, 2558, 0230, 0229, 2876, 0347 and 0530 continued…

	3504 Claims-Only Hospital-Wide (All-Condition, All-Procedure) Risk-Standardized Mortality Measure	0229 Hospital 30-day, all-cause, risk-standardized mortality rate (RSMR) following heart failure (HF) hospitalization	2876 Hospital 30-day, all-cause, risk-standardized mortality rate (RSMR) following acute ischemic stroke hospitalization with claims-based risk adjustment for stroke severity	0347 Death Rate in Low-Mortality Diagnosis Related Groups (PSI02)	0530 Mortality for Selected Conditions
Steward	Centers for Medicare & Medicaid Services (CMS)	Centers for Medicare & Medicaid Services	Centers for Medicare & Medicaid Services (CMS)	Agency for Healthcare Research and Quality	Agency for Healthcare Research and Quality
Description	The measure estimates a hospital-level 30-day hospital-wide risk-standardized mortality rate (RSMR), defined as death from any cause within 30 days after the index admission date, for Medicare fee-for-service (FFS) patients who are between the ages of 65 and 94. Please note that in parallel with the claims-only HWM measure, we are submitting a hybrid HWM measure. Note that ultimately the claims and hybrid measures will be harmonized and use the same exact cohort specifications. The intent is that prior to implementation, the two measures will be exactly the same, with the exception of the additional risk adjustment added by the CCDE in the hybrid measure. This is analogous to the currently endorsed and implemented hybrid hospital-wide readmissions measure (NQF 1789 and NQF 2879e). Because of the homology between the claims and hybrid HWM measures, there is no reason to suspect that the results of analyses done for the claims-only measure would differ in any significant way from results of analyses for a nationally representative hybrid measure. Below we highlight the differences between the two measures, including specifications, data used, and testing which reflect limitations of data availability, as well as actual intended differences in the measure (risk adjustment). Differences in the measure, data, and testing that reflect limitations in data availability 1. Dataset used for development, some testing (see below for differences), and measure results: a. The claims-only measure uses nation-wide Medicare FFS claims and the enrollment database. b. The hybrid measure uses an electronic health record	The measure estimates a hospital-level 30-day risk-standardized mortality rate (RSMR). Mortality is defined as death for any cause within 30 days after the admission date for the index admission, for patients 18 and older discharged from the hospital with a principal diagnosis of heart failure (HF). The Centers for Medicare & Medicaid Services (CMS) annually reports the measure for patients who are 65 years or older and are either Medicare fee-for-service (FFS) beneficiaries and hospitalized in non-federal hospitals or patients hospitalized in Veterans Health Administration (VA) facilities.	This stroke mortality measure estimates the hospital-level, risk-standardized mortality rate (RSMR) for patients discharged from the hospital with a principal discharge diagnosis of acute ischemic stroke. The outcome is all-cause 30-day mortality, defined as death from any cause within 30 days of the index admission date, including in-hospital death, for stroke patients. This is a newly developed measure with a cohort and outcome that is harmonized with the CMS's current publicly reported claims-based stroke mortality measure and includes the National Institutes of Health (NIH) Stroke Scale as an assessment of stroke severity in the risk-adjustment model. This measure uses Medicare fee-for-service (FFS) administrative claims for the cohort derivation, outcome, and risk adjustment.	In-hospital deaths per 1,000 discharges for low mortality (< 0.5%) Diagnosis Related Groups (DRGs) among patients ages 18 years and older or obstetric patients. Excludes cases with trauma, cases with cancer, cases with an immunocompromised state, and transfers to an acute care facility. [NOTE: The software provides the rate per hospital discharge. However, common practice reports the measure as per 1,000 discharges. The user must multiply the rate obtained from the software by 1,000 to report in-hospital deaths per 1,000 hospital discharges.]	A composite measure of in-hospital mortality indicators for selected conditions.

	3504 Claims-Only Hospital-Wide (All-Condition, All-Procedure) Risk-Standardized Mortality Measure	0229 Hospital 30-day, all-cause, risk-standardized mortality rate (RSMR) following heart failure (HF) hospitalization	2876 Hospital 30-day, all-cause, risk-standardized mortality rate (RSMR) following acute ischemic stroke hospitalization with claims-based risk adjustment for stroke severity	0347 Death Rate in Low-Mortality Diagnosis Related Groups (PSI02)	0530 Mortality for Selected Conditions
	(EHR) database from 21 hospitals in the Kaiser Permanente network which includes inpatient claims data information. 2. Age of patients in cohort: a. The claims-only measure includes Medicare FFS patients, age 65-94. b. The hybrid measure includes all patients age 50-94 (see later discussion for justification) 3. External empiric validity testing a. Not possible for the hybrid measure, due to limited data availability. We provide results from the claims-only measure within the hybrid testing form. 4. Socioeconomic risk factor analyses a. Not possible for the hybrid measure, due to limited data availability. We provide results from the claims-only measure within the hybrid testing form. 5. Exclusion analyses a. To be representative of what we expect the impact would be of the measures' exclusions in a nation-wide sample, we provide the results from the claims-only measure. 6. Meaningful differences a. To be representative of what we expect the range of performance would be in a nation-wide sample, we provide the distribution results from the claims-only measure. Difference between the two measures when fully harmonized, prior to implementation: 1. Risk adjustment: a. The claims-only measure uses administrative claims data only for risk adjustment b. The hybrid measure adds 10 clinical risk variables, derived from a set of core clinical data elements (CCDE) extracted from the EHR.				
Type	Outcome	Outcome	Outcome	Outcome	Composite
Data Source	Claims, Enrollment Data, Other Data sources for the Medicare FFS measure: 1. Medicare Part A Inpatient: The index dataset contains administrative inpatient hospitalization data for Medicare FFS	Claims, Other, Paper Medical Records Data sources for the Medicare FFS measure: 1. Medicare Part A inpatient and Part B outpatient claims: This data source contains claims data for FFS inpatient and outpatient	Claims (Only), Other, Registry For measure implementation the data sources will be: 1. Medicare Part A inpatient and Part B outpatient claims: This data source contains claims data for fee-for service inpatient and	Claims While the measure is tested and specified using data from the Healthcare Cost and Utilization Project (HCUP) (see section 1.1 and 1.2 of the measure testing form), the measure specifications and software are specified to be used with any ICD-9-	Electronic administrative data/claims

	3504 Claims-Only Hospital-Wide (All-Condition, All-Procedure) Risk-Standardized Mortality Measure	0229 Hospital 30-day, all-cause, risk-standardized mortality rate (RSMR) following heart failure (HF) hospitalization	2876 Hospital 30-day, all-cause, risk-standardized mortality rate (RSMR) following acute ischemic stroke hospitalization with claims-based risk adjustment for stroke severity	0347 Death Rate in Low-Mortality Diagnosis Related Groups (PSI02)	0530 Mortality for Selected Conditions
	beneficiaries, aged 65-94 on admission, hospitalized from July 1, 2016-June 30, 2017. The history dataset includes administrative inpatient hospitalization data on each patient for the 12 months prior to the index admission. 2. Medicare Enrollment Database (EDB): This database contains Medicare beneficiary demographic, benefit/coverage, and vital status information. This data source was used to obtain information on several inclusion/exclusion indicators such as Medicare status on admission as well as vital status. It was also used to determine hospice enrollment. No data collection instrument provided Attachment Del18b1HOP5HWMClaimsDataDictionary01072019.xlsx	services including: Medicare inpatient hospital care, outpatient hospital services, skilled nursing facility care, some home health agency services, as well as inpatient and outpatient physician claims for the 12 months prior to an index admission. 2. Medicare Enrollment Database (EDB): This database contains Medicare beneficiary demographic, benefit/coverage, and vital status information. This data source was used to obtain information on several inclusion/exclusion indicators such as Medicare status on admission as well as vital status. These data have previously been shown to accurately reflect patient vital status (Fleming et al., 1992). 3. Veterans Health Administration (VA) Data: This data source contains claims data for VA inpatient and outpatient services including: inpatient hospital care, outpatient hospital services, skilled nursing facility care, some home health agency services, as well as inpatient and outpatient physician claims for the 12 months prior to and including each index admission. Unlike Medicare FFS patients, VA patients are not required to have been enrolled in Part A and Part B Medicare for the 12 months prior to the date of admission. All-payer data sources: For our analyses to examine use in all-payer data, we used all-payer data from California in addition to CMS data for Medicare FFS 65+ patients in California hospitals. California is a diverse state, and, with more than 37 million residents, California represents 12% of the US population. We used the California Patient Discharge Data, a large, linked database of patient hospital admissions. 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	outpatient services including: Medicare inpatient hospital care, outpatient hospital services, skilled nursing facility care, some home health agency services, as well as inpatient and outpatient physician claims for the 12 months prior to an index admission. 2. Medicare Enrollment Database (EDB): This database contains Medicare beneficiary demographic, benefit/coverage, and vital status information. This data source was used to obtain information on several inclusion/exclusion indicators such as Medicare status on admission, as well as vital status. These data have previously been shown to accurately reflect patient vital status (Fleming et al., 1992). 3. For measure development purposes only, we linked the data sources above with data from the AHA/ASA GWTG-Stroke Registry. The registry data were used to obtain the National Institutes of Health (NIH) Stroke Scale scores and clinical risk variables. When this measure is implemented NIH Stroke Scale scores will be derived from ICD-10 codes in Medicare claims. Reference: Fleming C, Fisher ES, Chang CH, Bubolz TA, Malenka DJ. 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. Data sources for the all-payer update No data collection instrument provided Attachment NQF_2876_Claims-Only_Stroke_Mortality_S2b_Mortality_Data_Dictionary_v1.0-635884757617681755.xlsx	CM-coded administrative billing/claims/discharge dataset with Present on Admission (POA) information. Note that in Version 5.0 (April 2015), the AHRQ QI software will no longer support prediction of POA status using an embedded prediction module. Users are expected to provide POA data. Available at measure-specific web page URL identified in S.1 Attachment PSI_02_Death_Rate_in_Low-Mortality_Diagnosis_Related_Groups_-DRGs-_-_Editable.xlsx	

	3504 Claims-Only Hospital-Wide (All-Condition, All-Procedure) Risk-Standardized Mortality Measure	0229 Hospital 30-day, all-cause, risk-standardized mortality rate (RSMR) following heart failure (HF) hospitalization	2876 Hospital 30-day, all-cause, risk-standardized mortality rate (RSMR) following acute ischemic stroke hospitalization with claims-based risk adjustment for stroke severity	0347 Death Rate in Low-Mortality Diagnosis Related Groups (PSI02)	0530 Mortality for Selected Conditions
		California vital statistics records). Using all-payer data from California as well as CMS Medicare FFS data for California hospitals, we performed analyses to determine whether the HF mortality measure can be applied to all adult patients, including not only FFS Medicare patients aged 65+ but also non-FFS Medicare patients aged 18-64 years at the time of admission. Reference: Fleming C, Fisher ES, Chang CH, Bubolz TA, Malenka DJ. 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_0229_S2b_HF_Mortality_Data_Dictionary_v1.0_Final-636973301131111819.xlsx			
Level	Facility	Facility	Facility	Facility	Facility/Agency
Setting	Inpatient/Hospital	Inpatient/Hospital, Other Hospital & Hospital: Acute Care Facility	Hospital	Inpatient/Hospital	Hospital
Numerator Statement	The outcome for this measure is 30-day, all-cause mortality. Mortality is defined as death from any cause, either during or after admission, within 30 days of the index admission date.	The outcome for this measure is 30-day all-cause mortality. We define mortality as death from any cause within 30 days of the index admission date for patients 65 and older discharged from the hospital with a principal diagnosis of HF. Additional details are provided in S.5 Numerator Details.	The outcome for this measure is 30-day, all-cause mortality. We define mortality as death from any cause within 30 days of the index admission for patients with a principal discharge diagnosis of acute ischemic stroke.	Number of deaths (DISP=20) among cases meeting the inclusion and exclusion rules for the denominator.	Number of in-hospital deaths
Numerator Details	The measure outcome is death from any cause within 30 days of the admission date of the index admission, for Medicare FFS patients identified using the Medicare Enrollment Database (EDB). The numerator is a binary variable (1=yes/0=no) that indicates whether the patient died within 30 days of the index admission date.	Outcome Definition The measure counts deaths for any cause within 30 days of the date of admission of the index HF hospitalization. Rationale: From a patient perspective, death is a critical outcome regardless of cause. Outcomes occurring within 30 days of the start of the admission can be influenced by hospital care and early transition to the non-acute care setting. The 30-day time frame is a clinically meaningful period for hospitals to collaborate with their communities to reduce mortality (Simoes et al., 2017; Dharmarajan et al., 2015). Identifying deaths in the FFS measure As currently reported, we identify deaths for FFS Medicare patients 65 years and older in the Medicare	The measure outcome is death from any cause within 30 days of the index admission date. As currently specified, we identify deaths for FFS Medicare patients, age 65 years and older, in the Medicare Enrollment Database (EDB).	Not applicable	Number of in-hospital deaths for CHF, stroke, hip fracture, pneumonia, acute myocardial infarction and GI hemorrhage (separately). See Inpatient Quality Indicators: Technical Specifications for additional details (http://www.qualityindicators.ahrq.gov/Modules/IQI_TechSpec.aspx).

	3504 Claims-Only Hospital-Wide (All-Condition, All-Procedure) Risk-Standardized Mortality Measure	0229 Hospital 30-day, all-cause, risk-standardized mortality rate (RSMR) following heart failure (HF) hospitalization	2876 Hospital 30-day, all-cause, risk-standardized mortality rate (RSMR) following acute ischemic stroke hospitalization with claims-based risk adjustment for stroke severity	0347 Death Rate in Low-Mortality Diagnosis Related Groups (PSI02)	0530 Mortality for Selected Conditions
		Enrollment Database (EDB). Identifying deaths in the all-payer measure For the purposes of development of an all-payer measure, deaths were identified using the California vital statistics data file. Nationally, post-discharge deaths can be identified using an external source of vital status, such as the Social Security Administration's Death Master File (DMF) or the Centers for Disease Control and Prevention's National Death Index (NDI). Reference: 1. Simoes J, Grady J, DeBuhr J, et al. 2017 Condition-Specific Measures Updates and Specifications Report Hospital-Level 30-Day Risk-Standardized Mortality Measures. http://www.qualitynet.org/dcs/ContentServer?c=Page&pagename=QnetPublic/Page/QnetTier3&cid=1163010421830. Accessed June 7, 2017. 2. Dharmarajan K, Hsieh AF, Kulkarni VT, et al. 2015 Trajectories of risk after hospitalization for heart failure, acute myocardial infarction, or pneumonia: retrospective cohort study. BMJ (Clinical researched);350:h411			
Denominator Statement	The cohort includes inpatient admissions for a wide variety of conditions for Medicare FFS patients aged between 65 and 94 years old who were admitted to short-term acute care hospitals. If a patient has more than one admission during the measurement year, one admission is randomly selected for inclusion in the measure. Additional details are provided in S.7 Denominator Details.	This claims-based measure can be used in either of two patient cohorts: (1) patients aged 65 years or older or (2) patients aged 18 years or older. We have explicitly tested the measure in both age groups. The cohort for the publically reported measure includes admissions for patients aged 65 years and older discharged from the hospital with a principal discharge diagnosis of HF and with a complete claims history for the 12 months prior to admission. The measure is currently publicly reported by CMS for those patients 65 years and older who are either Medicare FFS beneficiaries admitted to non-federal hospitals or patients admitted to VA hospitals. Additional details are provided in S.7 Denominator Details.	The cohort includes inpatient admissions to all non-federal, short-term, acute care hospitals for Medicare FFS patients age 65 years and older with a principal discharge diagnosis of acute ischemic stroke. Additional details are provided in S.9 Denominator Details.	Discharges, for patients ages 18 years and older or MDC 14 (pregnancy, childbirth, and puerperium), with a low-mortality (less than 0.5% mortality) MS-DRG code (LOWMODR). If an MS-DRG is divided into "without/with (major) complications and comorbidities," both codes without complications/comorbidities and codes with (major) complications/comorbidities must have mortality rates below 0.5% in the reference population to qualify for inclusion.	Number of eligible discharges (all indicators are limited to the adult population)
Denominator Details	An index admission is the hospitalization to which the mortality outcome is attributed and includes admissions for patients: 1. Enrolled in Medicare FFS Part A for at least 12	To be included in the HF measure cohort used in public reporting, patients must meet the following additional inclusion criteria:	The denominator includes all Medicare FFS beneficiaries, age 65 and over, with a principal discharge diagnosis of acute ischemic stroke. To be included in the measure	LOWMODR: Low-mortality (less than 0.5%) MS-DRG codes (See attached technical specifications for detailed list of codes.)	Number of eligible adult discharges for CHF, stroke, hip fracture, pneumonia, acute myocardial infarction and GI hemorrhage (separately).

	3504 Claims-Only Hospital-Wide (All-Condition, All-Procedure) Risk-Standardized Mortality Measure	0229 Hospital 30-day, all-cause, risk-standardized mortality rate (RSMR) following heart failure (HF) hospitalization	2876 Hospital 30-day, all-cause, risk-standardized mortality rate (RSMR) following acute ischemic stroke hospitalization with claims-based risk adjustment for stroke severity	0347 Death Rate in Low-Mortality Diagnosis Related Groups (PSI02)	0530 Mortality for Selected Conditions
	months prior to the date of admission and during the index admission Rationale: Claims data are consistently available only for Medicare FFS beneficiaries. The 12-month prior enrollment criterion ensures a full year of administrative data is available for risk adjustment. 2. Not transferred from another acute care facility Rationale: Admissions to an acute cate hospital within one day of discharge from another acute care hospital are considered transfers. Transferred patients are included in the measure cohort, but it is the initial hospitalization rather than any "transfer-in" hospitalization(s), that is included as the hospitalization to which the mortality outcome is attributed (the index admission). 3. Aged between 65 and 94 years Rationale: Medicare patients younger than 65 are not included in the measure because they usually qualify for the program due to severe disability and are considered to be clinically distinct from Medicare patients 65 and over. Patients over age 94 are not included to avoid holding hospitals responsible for the survival of the very elderly patients, who may be less likely to have survival as a primary goal. Note that the hybrid measure (submitted for NQF endorsement in parallel with the claims-only measure) differs from the claims-only measure in terms of the age range of included admissions; the hybrid measure includes all inpatient admissions for patients aged 50-94 years old. The intention is to fully harmonize the cohort definitions for the two measures, so that both measures will capture admissions for patients age 65-94. We deviated from that definition during development and testing for the hybrid measure due to the limited dataset available that included the EHR data elements needed to calculate the hybrid measure. Note that the risk model already includes age in years, as a risk variable.)	1. Have a principal discharge diagnosis of heart failure (HF); 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 Part A during the index admission, or those who are VA beneficiaries (in the cases of the AMI, HF, and pneumonia measures); 3. Aged 65 or over; and, 4. Not transferred from another acute care facility. VA beneficiaries are eligible for inclusion in the AMI, HF, and pneumonia measure cohorts regardless of Medicare FFS enrollment or whether they were hospitalized in a VA or non-VA short-term acute care hospital. This measure can also be used for an all-payer population aged 18 years and older. We have explicitly tested the measure in both patients aged 18+ years and those aged 65+ years. ICD-9 and ICD-10 cohort codes are included in the attached Data Dictionary.	cohort used in public reporting, patients must meet the following additional inclusion criteria: 1. Enrolled in Medicare fee-for-service (FFS) during the index admission; 2. Not transferred from another acute care facility; and 3. Enrolled in Part A and Part B Medicare for the 12 months prior to the date of index admission. ICD-9-CM codes that define the patient cohort: 433.01 Occlusion and stenosis of basilar artery with cerebral infarction 433.11 Occlusion and stenosis of carotid artery with cerebral infarction 433.21 Occlusion and stenosis of vertebral artery with cerebral infarction 433.31 Occlusion and stenosis of multiple and bilateral precerebral arteries with cerebral infarction 433.81 Occlusion and stenosis of other specified precerebral artery with cerebral infarction 433.91 Occlusion and stenosis of unspecified precerebral artery with cerebral infarction 434.01 Cerebral thrombosis with cerebral infarction 434.11 Cerebral embolism with cerebral infarction 434.91 Cerebral artery occlusion, unspecified with cerebral infarction 436 Acute, but ill-defined, cerebrovascular disease ICD-10 codes that define the patient cohort: I63.22 Cerebral infarction due to unspecified occlusion or stenosis of basilar arteries I63.139 Cerebral infarction due to embolism of unspecified carotid artery I63.239 Cerebral infarction due to unspecified occlusion or stenosis of unspecified carotid arteries I63.019 Cerebral infarction due to thrombosis of unspecified vertebral artery I63.119 Cerebral infarction due to embolism of unspecified vertebral artery I63.219 Cerebral infarction due to unspecified occlusion or stenosis of unspecified vertebral arteries		See Inpatient Quality Indicators: Technical Specifications for additional details (http://www.qualityindicators.ahrq.gov/Modules/IQI_TechSpec.aspx).

	3504 Claims-Only Hospital-Wide (All-Condition, All-Procedure) Risk-Standardized Mortality Measure	0229 Hospital 30-day, all-cause, risk-standardized mortality rate (RSMR) following heart failure (HF) hospitalization	2876 Hospital 30-day, all-cause, risk-standardized mortality rate (RSMR) following acute ischemic stroke hospitalization with claims-based risk adjustment for stroke severity	0347 Death Rate in Low-Mortality Diagnosis Related Groups (PSI02)	0530 Mortality for Selected Conditions
	4. Not admitted for primary psychiatric diagnoses Rationale: Patients admitted for psychiatric treatment are typically cared for in separate psychiatric facilities that are not comparable to short-term acute care hospitals (see data dictionary, HWM Non-Acute Care Inclusion tab). 5. Not admitted for rehabilitation Rationale: These admissions are not typically to a short-term acute care hospital and are not for acute care (see data dictionary, HWM Non-Acute Care Inclusion tab). 6. Not enrolled in hospice at the time of, or 12 months prior to, their index admission Rationale: Patients enrolled in hospice in the prior 12 months or at the time of admission are unlikely to have 30-day survival as a primary goal. 7. Not enrolled in hospice within two days of admission Rationale: There is not a single, correct approach regarding patients enrolled in hospice during admission or upon discharge – mortality may or may not represent a quality signal for this group of patients and hospice enrollment is inadequate to differentiate this issue. However, for most patients and/or families who had the discussion and agreed to enroll in hospice within two days of admission, 30-day survival is not likely the primary goal due to their condition and not the quality of care received. 8. Not with a principal diagnosis of cancer and enrolled in hospice during their index admission Rationale: Patients admitted primarily for cancer who are enrolled in hospice during admission are unlikely to have 30-day survival as a primary goal of care. (see data dictionary, HWM Cancer Inclusion tab). 9. Without any diagnosis of metastatic cancer Rationale: Although some patients admitted with a diagnosis of metastatic cancer will have 30-day survival as a primary goal of care, for many such patients admitted to the hospital, death may be a		I63.59 Cerebral infarction due to unspecified occlusion or stenosis of other cerebral artery I63.20 Cerebral infarction due to unspecified occlusion or stenosis of unspecified precerebral arteries I63.30 Cerebral infarction due to thrombosis of unspecified cerebral artery I63.40 Cerebral infarction due to embolism of unspecified cerebral artery I63.50 Cerebral infarction due to unspecified occlusion or stenosis of unspecified cerebral artery I67.8 Other specified cerebrovascular diseases I67.89 Other cerebrovascular diseases An ICD-9 to ICD-10 crosswalk is attached in field S.2b. (Data Dictionary or Code Table).		

	3504 Claims-Only Hospital-Wide (All-Condition, All-Procedure) Risk-Standardized Mortality Measure	0229 Hospital 30-day, all-cause, risk-standardized mortality rate (RSMR) following heart failure (HF) hospitalization	2876 Hospital 30-day, all-cause, risk-standardized mortality rate (RSMR) following acute ischemic stroke hospitalization with claims-based risk adjustment for stroke severity	0347 Death Rate in Low-Mortality Diagnosis Related Groups (PSI02)	0530 Mortality for Selected Conditions
	clinically reasonable and patient-centered outcome. (see data dictionary, HWM Metastatic Cancer Inclusion tab). 10. Not with a principal discharge diagnosis, or a secondary diagnosis that is present on admission (POA) for a condition which hospitals have limited ability to influence survival Rationale: Hospitals have little ability to impact mortality for some conditions. This list of conditions (see data dictionary, HWM ICD-10 Inclusion tab) was determined through independent review, by several clinicians, of conditions associated with high mortality. The decisions were also reviewed with our Technical Expert Panel (TEP) and Technical Work Group. Admissions are not included in the cohort if the patient had a principal diagnosis code that is on this list, or a secondary code with POA that is on the list. In addition, for patients with multiple admissions, the measure selects only one admission, at random, for inclusion. There is no practical statistical modeling approach that can account or adjust for the complex relationship between the number of admissions and risk of mortality in the context of a hospital-wide mortality measure. Random selection ensures that providers are not penalized for a “last” admission during the measurement period; selecting the last admission would not be as accurate a reflection of the risk of death as random selection, as the last admission is inherently associated with a higher mortality risk. Random selection is also used in CMS’s condition-specific mortality measures. Note that random selection reduces the number of admissions, but does not exclude any patients from the measure. The cohort is defined using ICD-10 Clinical Modification codes identified in Medicare Part A Inpatient claims data. The measure aggregates the ICD-10 principal diagnosis and all				

	3504 Claims-Only Hospital-Wide (All-Condition, All-Procedure) Risk-Standardized Mortality Measure	0229 Hospital 30-day, all-cause, risk-standardized mortality rate (RSMR) following heart failure (HF) hospitalization	2876 Hospital 30-day, all-cause, risk-standardized mortality rate (RSMR) following acute ischemic stroke hospitalization with claims-based risk adjustment for stroke severity	0347 Death Rate in Low-Mortality Diagnosis Related Groups (PSI02)	0530 Mortality for Selected Conditions
	procedure codes of the index admission into clinically coherent groups of conditions and procedures (condition categories or procedure categories) using the Agency for Healthcare Research and Quality (AHRQ) Clinical Classifications System (CCS). There is a total of 285 mutually exclusive AHRQ condition categories, most of which are single, homogenous diseases such as pneumonia or acute myocardial infarction. Some are aggregates of conditions, such as “other bacterial infections”. There is a total of 231 mutually exclusive procedure categories. Using the AHRQ CCS procedure and condition categories, the measure assigns each index hospitalization to one of 15 mutually exclusive divisions. The divisions were created based upon clinical coherence, consistency of mortality risk, adequate patient and hospital case volume for stable results reporting, and input from clinicians, patients, and patient caregivers on usability. The measure first assigns admissions with qualifying AHRQ procedure categories to one of six surgery divisions by identifying a defining surgical procedure. The defining surgical procedure is identified using the following algorithm: 1) if a patient only has one major surgical procedure then that procedure is the defining surgical procedure; 2) if a patient has more than one major surgical procedure, the first dated procedure performed during the index admission is the defining surgical procedure; 3) if there is more than one major surgical procedure on that earliest date, the procedure with the highest mortality rate is the defining surgical procedure. These divisions include admissions likely cared for by surgical teams. The surgical divisions are: Surgical Cancer (see note below), Cardiothoracic Surgery, General Surgery, Neurosurgery, Orthopedic Surgery, and Other Surgical Procedures.				

	3504 Claims-Only Hospital-Wide (All-Condition, All-Procedure) Risk-Standardized Mortality Measure	0229 Hospital 30-day, all-cause, risk-standardized mortality rate (RSMR) following heart failure (HF) hospitalization	2876 Hospital 30-day, all-cause, risk-standardized mortality rate (RSMR) following acute ischemic stroke hospitalization with claims-based risk adjustment for stroke severity	0347 Death Rate in Low-Mortality Diagnosis Related Groups (PSI02)	0530 Mortality for Selected Conditions
	For the Surgical Cancer division, any admission that includes a surgical procedure and a principal discharge diagnosis code of cancer is assigned to the Surgical Cancer division. This division and the logic behind it was implemented in response to feedback from our Technical Expert Panel. The measure then assigns the remaining admissions into one of the nine non-surgical divisions based on the AHRQ diagnostic CCS of the principal discharge diagnosis. The non-surgical divisions are: Cancer, Cardiac, Gastrointestinal, Infectious Disease, Neurology, Orthopedic, Pulmonary, Renal, Other Conditions. The full list of the specific diagnosis and procedure AHRQ CCS categories used to define the divisions are attached in the Data Dictionary.				
Exclusions	The measure excludes index admissions for patients: 1. With inconsistent or unknown vital status (from claims data) or other unreliable claims data; 2. Discharged against medical advice (AMA); 3. With an admission for spinal cord injury (CCS 227), skull and face fractures (CCS 228), Intracranial Injury (CCS 233), Crushing injury or internal injury (CCS 234), Open wounds of head/neck/trunk (CCS 235), and burns (CCS 240); and 4. With a principal discharge diagnosis within a CCS with fewer than 100 admissions within the measurement year.	The HF mortality measure excludes index hospitalizations that meet any of the following exclusion criteria: 1. With inconsistent or unknown vital status or other unreliable demographic (age and gender) data; 2. Enrolled in the Medicare hospice program or used VA hospice services any time in the 12 months prior to the index admission, including the first day of the index admission; or, 3. Discharged against medical advice. 4. Discharged alive on the day of admission or the following day who were not transferred to another acute care facility; or 5. With a procedure code for LVAD implantation or heart transplantation either during the index admission or in the 12 months prior to the index admission. For patients with more than one admission for a given condition in a given year, only one index admission for that condition is randomly selected for inclusion in the cohort.	The measure excludes admissions for patients: 1. With inconsistent or unknown vital status or other unreliable data; 2. Enrolled in the Medicare hospice program at any time in the 12 months prior to the index admission, including the first day of the index admission; and 3. Discharged against medical advice (AMA). For patients with more than one admission for stroke in a given year, only one index admission for that condition is randomly selected for inclusion in the cohort.	Exclude cases: • with any listed ICD-10-CM diagnosis codes for trauma (Appendix G: TRAUMID) • with any listed ICD-10-CM diagnosis codes for cancer (Appendix H: CANCEID) • with any listed ICD-10-CM diagnosis codes for immunocompromised state (Appendix I: IMMUNID) • with any listed ICD-10-PCS procedure codes for immunocompromised state (Appendix I: IMMUNIP) • transfer to an acute care facility (DISP=2) • with missing discharge disposition (DISP=missing), gender (SEX=missing), age (AGE=missing), quarter (DQTR=missing), year (YEAR=missing), or principal diagnosis (DX1=missing)	Indicator specific
Exclusion Details	1. With inconsistent or unknown vital status (from claims data) or other unreliable claims data Rationale: The measure does not include stays for patients where the	1. Inconsistent or unknown vital status or other unreliable demographic data Inconsistent vital status or unreliable data are identified if any of the following conditions are	1. Inconsistent vital status or unreliable data: We do not include stays for patients where the age is greater than 115, where the gender is neither male nor female, where the admission date is after the	Appendix G: Trauma Diagnosis Codes Appendix H: Cancer Diagnosis Codes Appendix I: Immunocompromised	See Inpatient Quality Indicators: Technical Specifications for additional details (available at

	3504 Claims-Only Hospital-Wide (All-Condition, All-Procedure) Risk-Standardized Mortality Measure	0229 Hospital 30-day, all-cause, risk-standardized mortality rate (RSMR) following heart failure (HF) hospitalization	2876 Hospital 30-day, all-cause, risk-standardized mortality rate (RSMR) following acute ischemic stroke hospitalization with claims-based risk adjustment for stroke severity	0347 Death Rate in Low-Mortality Diagnosis Related Groups (PSI02)	0530 Mortality for Selected Conditions
	admission date is after the date of death in the Medicare Enrollment Database, or where the date of death occurs before the date of discharge but the patient was discharged alive because these are likely errors in the data. 2. Discharged against medical advice (AMA) Rationale: Providers did not have the opportunity to deliver full care and prepare the patient for discharge. 3. With an admission for spinal cord injury (CCS 227), skull and face fractures (CCS 228), Intracranial Injury (CCS 233), Crushing injury or internal injury (CCS 234), Open wounds of head/neck/trunk (CCS 235), and burns (CCS 240) Rationale: Even though a hospital likely can influence the outcome of some of these conditions, in many cases death events are not a signal of poor quality of care when patients present with these conditions. These conditions are also infrequent events that are unlikely to be uniformly distributed across hospitals. 4. With a principal discharge diagnosis within a CCS with fewer than 100 admissions in that division within the measurement year. Rationale: To calculate a stable and precise risk model, there are a minimum number of admissions that are needed. In addition, a minimum number of admissions and/or outcome events are required to inform grouping admissions into larger categories. These admissions present challenges to both accurate risk prediction and coherent risk grouping and are therefore excluded. Note: During measure development we analyzed different volume cut-offs (25, 50 and 100). Using cut-off values below 100 resulted in too many CCS codes in some of the divisions (the CCS category codes are used in risk adjustment) which resulted in non-convergence of those division-level risk models. The total number of patients excluded is very small (13,597 or 0.21% of admissions for a cut off of	met 1) the patient's age is greater than 115 years: 2) if the discharge date for a hospitalization is before the admission date; 3) if the patient has a sex other than 'male' Rationale: We do not include stays for patients where the age is greater than 115, where the gender is neither male nor female, where the admission date is after the date of death in the Medicare Enrollment Database, or where the date of death occurs before the date of discharge but the patient was discharged alive. 2. Enrolled in the Medicare hospice program any time in the 12 months prior to the index admission, including the first day of the index admission Rationale: Hospice enrollment in the 12 months prior to or on the index admission is identified using hospice data and the Inpatient standard analytic file (SAF). This exclusion applies when the measure is used in Medicare FFS patients only. Rationale: These patients are likely continuing to seek comfort measures only; thus, mortality is not necessarily an adverse outcome or signal of poor quality care. 3. Discharged against medical advice Discharges against medical advice are identified using the discharge disposition indicator. Rationale: Providers did not have the opportunity to deliver full care and prepare the patient for discharge. 4. Discharged alive on the day of admission or the following day who were not transferred to another acute care facility. The discharge disposition indicator is used to identify patients alive at discharge. Transfers are identified in the claims when a patient with a qualifying admission is discharged from an acute care hospital and admitted to another acute care hospital on the same day or next day. Rationale: It is unlikely that these patients had clinically significant HF. 5. With a procedure code for LVAD implantation or heart transplantation either during the index admission	date of death in the Medicare Enrollment Database, or where the date of death occurs before the date of discharge but the patient was discharged alive. 2. Hospice enrollment in the 12 months prior to or on the index admission is identified using hospice data and the Inpatient Standard Analytic File (SAF). These patients are likely continuing to seek comfort measures only; thus, mortality is not necessarily an adverse outcome or signal of poor quality care for these patients. 3. Discharges against medical advice (AMA) are identified using the discharge disposition indicator. After all exclusions are applied, the measure randomly selects one index admission per patient per year for inclusion in the cohort so that each episode of care is mutually independent with the same probability of the outcome. For each patient, the probability of death increases with each subsequent admission, and therefore, the episodes of care are not mutually independent. Similarly, for the three year combined data, when index admissions occur during the transition between measure reporting periods (June and July of each year) and both are randomly selected for inclusion in the measure, the measure includes only the June admission. The July admissions are excluded to avoid assigning a single death to two admissions.	State Diagnosis and Procedure Codes (See attached Appendix G, Appendix H, and Appendix I for detailed list of codes.)	http://www.qualityindicators.ahrq.gov/Modules/IQI_TechSpec.aspx).

	3504 Claims-Only Hospital-Wide (All-Condition, All-Procedure) Risk-Standardized Mortality Measure	0229 Hospital 30-day, all-cause, risk-standardized mortality rate (RSMR) following heart failure (HF) hospitalization	2876 Hospital 30-day, all-cause, risk-standardized mortality rate (RSMR) following acute ischemic stroke hospitalization with claims-based risk adjustment for stroke severity	0347 Death Rate in Low-Mortality Diagnosis Related Groups (PSI02)	0530 Mortality for Selected Conditions
	100). During measure development we also explored the option of pooling low-volume CCS codes (CCS<100 patients) into one group, however, the heterogeneity in mortality rates for the individual ICD-10 codes in those groups would preclude adequate risk adjustment. The TEP supported excluding these admissions.	or in the 12 months prior to the index admission Patients with LVAD implantation or heart transplantation during an index admission or in the previous 12 months are identified by the corresponding codes for these procedures included in claims data. Rationale: These patients represent a clinically distinct group (ICD-10-PCS code list). The data sources for these analyses are Medicare administrative claims and enrollment information for patients with hospitalizations between July 1, 2013 and June 30, 2016. After exclusions #1-5 are applied, the measure randomly selects one index admission per patient per year for inclusion in the cohort so that each episode of care is mutually independent with the same probability of the outcome. Additional admissions within that year are excluded. For each patient, the probability of death increases with each subsequent admission and therefore the episodes of care are not mutually independent. For the three-year combined data, when index admissions occur during the transition between measure reporting periods (June and July of each year) and both are randomly selected for inclusion in the measure, the measure includes only the June admission. The July admissions are excluded to avoid assigning a single death to two admissions.			
Risk Adjustment	Statistical risk model	Statistical risk model	Statistical risk model	No risk adjustment or risk stratification	No risk adjustment or risk stratification
Stratification	N/A	N/A	N/A	Not applicable	
Type Score	Rate/proportion better quality = lower score	Rate/proportion better quality = lower score	Rate/proportion better quality = lower score	Rate/proportion better quality = lower score	
Algorithm	The measure estimates hospital-level, risk-standardized mortality rates (RSMRs) within 30 days of hospital admission using hierarchical logistical regression models through a Bayesian Markov Chain Monte Carlo (MCMC) procedure. In brief, we used hierarchical logistic regression to model the log-odds of mortality for each of the 15 service-line divisions. Death within 30 days was modeled as a function of patient-level	The measure estimates hospital-level 30-day all-cause RSMRs following hospitalization for HF using hierarchical logistic regression models. In brief, the approach simultaneously models data at the patient and hospital levels to account for variance in patient outcomes within and between hospitals (Normand and Shahian, 2007). At the patient level, it models the log-odds of mortality within 30 days of index admission using age, sex, selected clinical	The measure estimates hospital-level, 30-day, all-cause RSMRs following hospitalization for stroke using hierarchical logistic regression models. In brief, the approach simultaneously models data at the patient and hospital levels to account for variance in patient outcomes within and between hospitals (Normand and Shahian, 2007). At the patient level, it models the log-odds of mortality within 30 days of index admission using age, selected clinical covariates,	Risk adjustment is not currently included in the ICD-10-CM/PCS v2018 of the AHRQ QI specifications, due to the transition to ICD-10-CM/PCS (October 1, 2015). At least one full year of data coded in ICD-10-CM/PCS is needed in order to develop robust risk adjustment models. A full year of ICD-10-CM/PCS coded all-payer data will not be available until mid-2019. AHRQ will announce an anticipated date as soon as one is known.	

	3504 Claims-Only Hospital-Wide (All-Condition, All-Procedure) Risk-Standardized Mortality Measure	0229 Hospital 30-day, all-cause, risk-standardized mortality rate (RSMR) following heart failure (HF) hospitalization	2876 Hospital 30-day, all-cause, risk-standardized mortality rate (RSMR) following acute ischemic stroke hospitalization with claims-based risk adjustment for stroke severity	0347 Death Rate in Low-Mortality Diagnosis Related Groups (PSI02)	0530 Mortality for Selected Conditions
	demographic and clinical characteristics and a random hospital-level intercept. This model specification accounts for within-hospital correlation of the observed outcomes and models the assumption that underlying differences in quality among the health care facilities being evaluated lead to systematic differences in outcomes. We estimated a separate hierarchical logistic regression model for each service-line division. In order to obtain the variance and interval estimates, we fit the hierarchical model under the Bayesian framework along with the Markov Chain Monte Carlo (MCMC) technique. Admissions are assigned to one of 15 mutually exclusive divisions (groups of discharge condition categories and procedure categories). For each division and each hospital with patients in that division, the standardized mortality ratio (SMR) is calculated as the ratio of the number of "predicted" deaths to the number of "expected" deaths at a given hospital. The predicted number of deaths is based on the hospital's performance with its observed case mix and service mix, and 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 for each cohort is added to the sum of the estimated regression coefficients multiplied by patient characteristics. The results are transformed via an inverse logit function and summed over all patients attributed to a hospital to get a predicted value. The expected number of deaths is based on the nation's performance with that hospital's case mix and service mix and 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 transformed via an inverse logit function and summed over all patients in the hospital to get an expected value. This approach is analogous to	covariates, and a hospital-specific intercept. At the hospital level, it models the hospital-specific intercepts as arising from a normal distribution. The hospital intercept represents the underlying risk of a mortality at the hospital, after accounting for patient risk. The hospital-specific intercepts are given a distribution to account for the clustering (non-independence) of patients within the same hospital. If there were no differences among hospitals, then after adjusting for patient risk, the hospital intercepts should be identical across all hospitals. The RSMR is calculated as the ratio of the number of "predicted" 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 on the basis of 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 for a comparison of a particular hospital's performance given its case mix to an average hospital's performance with the same case mix. Thus, a lower ratio indicates lower-than-expected mortality rates or better quality, and 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 intercept 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 intercept using all hospitals in our sample is added in	and a hospital-specific intercept. At the hospital level, it models the hospital-specific intercepts as arising from a normal distribution. The hospital intercept represents the underlying risk of a mortality at the hospital, after accounting for patient risk. The hospital-specific intercepts are given a distribution to account for the clustering (non-independence) of patients within the same hospital. If there were no differences among hospitals, then after adjusting for patient risk, the hospital intercepts should be identical across all hospitals. The RSMR is calculated as the ratio of the number of "predicted" 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 on the basis of 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 for a comparison of a particular hospital's performance given its case mix to an average hospital's performance with the same case mix. Thus, a lower ratio indicates lower-than-expected mortality rates or better quality, and 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 intercept on the risk of mortality. The estimated hospital-specific intercept is added to the sum of the estimated regression coefficients multiplied by the patient characteristics. The results are transformed and summed over all patients attributed to a hospital to get a predicted value. The "expected" number of deaths (the denominator) is obtained in the same manner, but a common intercept using all hospitals in our sample is added in		

	3504 Claims-Only Hospital-Wide (All-Condition, All-Procedure) Risk-Standardized Mortality Measure	0229 Hospital 30-day, all-cause, risk-standardized mortality rate (RSMR) following heart failure (HF) hospitalization	2876 Hospital 30-day, all-cause, risk-standardized mortality rate (RSMR) following acute ischemic stroke hospitalization with claims-based risk adjustment for stroke severity	0347 Death Rate in Low-Mortality Diagnosis Related Groups (PSI02)	0530 Mortality for Selected Conditions
	a ratio of "observed" to "expected" used in other types of statistical analyses. It conceptually allows a particular hospital's performance, given its case mix and service mix, to be compared to an average hospital's performance with the same case mix and service mix. Thus, a lower ratio indicates lower-than-expected mortality rates or better quality, while a higher ratio indicates higher-than-expected mortality rates or worse quality. To assess hospital performance for each reporting period, the measure re-estimates the model coefficients using the data in that period. The division-level SMRs are then pooled for each hospital using an inverse variance-weighted geometric mean to create a hospital-wide composite SMR. The hospital-wide SMR is then multiplied by the national observed mortality rate to produce the RSMR.	place of the hospital-specific intercept. 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 (Krumholz et al., 2005). References: 1. Normand S-LT, Shahian DM. 2007. Statistical and Clinical Aspects of Hospital Outcomes Profiling. Stat Sci 22(2): 206-226. 2. Krumholz H, Normand S, Galusha D, et al. 2005. Risk-Adjustment Models for AMI and HF 30-Day Mortality Methodology.	place of the hospital-specific intercept. The results are transformed and summed over all patients in the hospital to get an expected value. To assess hospital performance for each reporting period, we re-estimate the model coefficients using the years of data in that period. This calculation transforms the ratio of predicted over expected into a rate that is compared to the national observed mortality rate. The hierarchical logistic regression models are described fully in the original methodology report (Grosso et al., 2011). References: Normand S-LT, Shahian DM. 2007. Statistical and Clinical Aspects of Hospital Outcomes Profiling. Stat Sci 22(2): 206-226.		
Submission items	5.1 Identified measures: 5a.1 Are specs completely harmonized? Yes 5a.2 If not completely harmonized, identify difference, rationale, impact: This claims-only hospital-wide mortality (HWM) measure is intended to complement the existing CMS Hospital-Wide All-Cause Risk-Standardized Readmission Measure (NQF #1789) to allow assessment of trends in hospital performance for both readmission and mortality outcomes, similar to other complementary pairs of readmission and mortality measures for specific conditions and procedures. By measuring mortality outcomes across almost all hospitalized patients, this measure will provide an important additional performance assessment that will complement condition- and procedure-specific or other more narrowly defined mortality measures and allow a greater number of patients and hospitals to be evaluated. This HWM measure captures a similarly broad cohort to the CMS Hospital-Wide All-Cause Risk-Standardized Readmission Measure (NQF #1789), and a broader cohort than those of other CMS	5.1 Identified measures: 0358 : Heart Failure Mortality Rate (IQI 16) 1893 : Hospital 30-Day, all-cause, risk-standardized mortality rate (RSMR) following chronic obstructive pulmonary disease (COPD) hospitalization 0468 : Hospital 30-day, all-cause, risk-standardized mortality rate (RSMR) following pneumonia hospitalization 0230 : Hospital 30-day, all-cause, risk-standardized mortality rate (RSMR) following acute myocardial infarction (AMI) hospitalization 1891 : Hospital 30-day, all-cause, risk-standardized readmission rate (RSRR) following chronic obstructive pulmonary disease (COPD) hospitalization 1551 : Hospital-level 30-day risk-standardized readmission rate (RSRR) following elective primary total hip arthroplasty (THA) and/or total knee arthroplasty (TKA) 0506 : Hospital 30-day, all-cause, risk-standardized readmission rate (RSRR) following pneumonia hospitalization 0330 : Hospital 30-day, all-cause, risk-standardized readmission rate (RSRR) following heart failure (HF) hospitalization	5.1 Identified measures: 0467 : Acute Stroke Mortality Rate (IQI 17) 5a.1 Are specs completely harmonized? No 5a.2 If not completely harmonized, identify difference, rationale, impact: We did not include in our list of related measures any non-outcome (such as process) measures with the same target population as our measure. Because this is an outcome measure, clinical coherence of the cohort takes precedence over alignment with related non-outcome measures. Furthermore, non-outcome measures are limited due to broader patient exclusions. This is because they typically only include a specific subset of patients who are eligible for that measure (for example, patients who receive a specific medication or undergo a specific procedure). Additionally, this measure and the NQF endorsed Acute Stroke Mortality Rate (IQI 17) (AHRQ) Measure #0467 are complementary and related rather than competing measures. Although they both assess mortality for patients admitted to acute care hospitals with a principal discharge diagnosis of acute ischemic stroke, the	5.1 Identified measures: 5a.1 Are specs completely harmonized? 5a.2 If not completely harmonized, identify difference, rationale, impact: not applicable 5b.1 If competing, why superior or rationale for additive value: Not applicable	5.1 Identified measures: 5a.1 Are specs completely harmonized? 5a.2 If not completely harmonized, identify difference, rationale, impact: 5b.1 If competing, why superior or rationale for additive value:

	3504 Claims-Only Hospital-Wide (All-Condition, All-Procedure) Risk-Standardized Mortality Measure	0229 Hospital 30-day, all-cause, risk-standardized mortality rate (RSMR) following heart failure (HF) hospitalization	2876 Hospital 30-day, all-cause, risk-standardized mortality rate (RSMR) following acute ischemic stroke hospitalization with claims-based risk adjustment for stroke severity	0347 Death Rate in Low-Mortality Diagnosis Related Groups (PSI02)	0530 Mortality for Selected Conditions
	condition-specific measures. Because the mortality measure is focused on a different outcome, it differs from the existing CMS Hospital-Wide All-Cause Risk Standardized Readmission Measure (NQF #1789) in a couple of ways. First, this HWM measure includes patients with a principal discharge diagnosis of cancer (with some exceptions), whereas those patients are not included in the readmission measure. Cancer patients are appropriate to include in the HWM measure as many have survival as their primary goal; however due to cancer treatment plans, readmissions are frequently part of the plan and expected and therefore, are not a reasonable signal of quality. Another difference between the two measures is the number of divisions or specialty cohorts the patients are divided into, to more accurately risk adjust for case-mix and service-mix. The readmission measure divides patients into five categories, or "specialty cohorts", while the mortality measure uses 15. This is because the risk of mortality is much more closely related to patient factors than readmission is related to patient factors. PSI-02 (NQF #0357) is another complementary mortality measure, which captures a different patient population and a different outcome compared with the HWM measure submitted with this application. PSI-02 captures patients 18 years of age or older, or obstetric patients, whereas the HWM measure captures patients between the ages of 65 and 94. PSI-02 captures DRGs with less than 0.5% mortality rate, whereas the HWM measure captures all patients within all CCSs, regardless of mortality rate. Hospital-wide mortality captures mortality up to 30 days past admission, where AHRQ PSI-02 only captures in-hospital mortality. IQI 90 (NQF #0530) is another complimentary mortality measure, which is a composite measure of the	0505 : Hospital 30-day all-cause risk-standardized readmission rate (RSRR) following acute myocardial infarction (AMI) hospitalization. 1789 : Hospital-Wide All-Cause Unplanned Readmission Measure (HWR) 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. Additionally, the measure, with the specified cohort, has been publicly reported since 2008. Because this is an outcome measure, clinical coherence of the cohort takes precedence over alignment with related non-outcome measures. Furthermore, non-outcome measures are limited due to broader patient exclusions. This is because they typically only include a specific subset of patients who are eligible for that measure (for example, patients who receive a specific medication or undergo a specific procedure). 5b.1 If competing, why superior or rationale for additive value: N/A	specified outcomes are different. Our measure assesses 30-day mortality, while #0467 assesses inpatient mortality. The 30-day mortality and inpatient mortality outcomes each have distinct advantages and uses, which make them complementary (and related) as opposed to competing. For example the 30-day period provides a broader perspective on hospital care and utilizes a standard time period to examine hospital performance to avoid bias by differences in length of stay among hospitals. However, in some settings it may not be feasible to capture post-discharge mortality, making the inpatient measure more useable. We have previously consulted with AHRQ to examine harmonization of the measures' cohort. As a result of that collaboration, we have found that the measures' cohorts are harmonized to the extent possible and that the small differences in cohort inclusion and exclusion criteria are appropriate because the measures assess different outcomes. 5b.1 If competing, why superior or rationale for additive value: This measure looks at a longer outcome time frame (30-days versus in-hospital) and incorporates stroke severity into the risk-model. The current publicly reported measure, Hospital 30-Day Mortality Following Acute Ischemic Stroke Hospitalization Measure, is a potentially competing measure. It is CMS intent to replace the current measure in any given program with this newly developed measure, which includes stroke severity in the risk model. The Hybrid Hospital 30-Day, All-Cause, Risk-Standardized Mortality Rate (RSMR) Following Acute Ischemic Stroke with Risk Adjustment for Stroke Severity measure is also being submitted to NQF for endorsement. This measure uses a combination of claims and electronic health records (EHR) data for risk adjustment but is otherwise harmonized with the new claims-only measure. It is CMS intent to implement only one of		

	3504 Claims-Only Hospital-Wide (All-Condition, All-Procedure) Risk-Standardized Mortality Measure	0229 Hospital 30-day, all-cause, risk-standardized mortality rate (RSMR) following heart failure (HF) hospitalization	2876 Hospital 30-day, all-cause, risk-standardized mortality rate (RSMR) following acute ischemic stroke hospitalization with claims-based risk adjustment for stroke severity	0347 Death Rate in Low-Mortality Diagnosis Related Groups (PSI02)	0530 Mortality for Selected Conditions
	number of in-hospital deaths for a narrow range of conditions (CHF, stroke, hip fracture, pneumonia, acute myocardial infarction and GI hemorrhage). The HWM measure presented in this application captures all deaths after 30 days of admission, for all conditions and procedures. 5b.1 If competing, why superior or rationale for additive value: There are no competing NQF-endorsed measures.		the new stroke mortality measures (this claims-only measure or the hybrid measure) in any given program.		

Appendix E2: Related and Competing Measures (narrative format)

Comparison of NQF 3502, 1789, 1550, 0468, 1893, 2558, 0230, 0229, 2876, 0347 and 0530

3502 Hybrid Hospital-Wide (All-Condition, All-Procedure) Risk-Standardized Mortality Measure
1789 Hospital-Wide All-Cause Unplanned Readmission Measure (HWR)
1550 Hospital-level risk-standardized complication rate (RSCR) following elective primary total hip arthroplasty (THA) and/or total knee arthroplasty (TKA)
0468 Hospital 30-day, all-cause, risk-standardized mortality rate (RSMR) following pneumonia hospitalization
1893 Hospital 30-Day, all-cause, risk-standardized mortality rate (RSMR) following chronic obstructive pulmonary disease (COPD) hospitalization
2558 Hospital 30-Day, All-Cause, Risk-Standardized Mortality Rate (RSMR) Following Coronary Artery Bypass Graft (CABG) Surgery

Steward

3502 Hybrid Hospital-Wide (All-Condition, All-Procedure) Risk-Standardized Mortality Measure

Centers for Medicare & Medicaid Services (CMS)

1789 Hospital-Wide All-Cause Unplanned Readmission Measure (HWR)

Centers for Medicare & Medicaid Services (CMS)

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

Centers for Medicare & Medicaid Services

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

Centers for Medicare & Medicaid Services (CMS)

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

Centers for Medicare & Medicaid Services

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

Centers for Medicare & Medicaid Services

Description

3502 Hybrid Hospital-Wide (All-Condition, All-Procedure) Risk-Standardized Mortality Measure

The measure estimates a hospital-level 30-day risk-standardized mortality rate (RSMR), defined as death from any cause within 30 days after the index admission date for patients who are between the ages of 50 and 94.

Please note that in parallel with the hybrid HWM measure, we are submitting a claims-only HWM measure. Note that ultimately the claims and hybrid measures will be harmonized and

use the same exact cohort specifications. The intent is that prior to implementation, the two measures will be exactly the same, with the exception of the additional risk adjustment added by the CCDE in the hybrid measure. This is analogous to the currently endorsed and implemented hybrid hospital-wide readmissions measure (NQF 1789 and NQF 2879e).

Because of the homology between the claims and hybrid HWM measures, there is no reason to suspect that the results of analyses done for the claims-only measure would differ in any significant way from results of analyses for a nationally representative hybrid measure.

Below we highlight the differences between the two measures, including specifications, data used, and testing which reflect limitations of data availability, as well as actual intended differences in the measure (risk adjustment).

Differences in the measure, data, and testing that reflect limitations in data availability

1. Dataset used for development, some testing (see below for differences), and measure results:

a. The claims-only measure uses nation-wide Medicare FFS claims and the enrollment database.

b. The hybrid measure uses an electronic health record (EHR) database from 21 hospitals in the Kaiser Permanente network which includes inpatient claims data information.

2. Age of patients in cohort:

a. The claims-only measure includes Medicare FFS patients, age 65-94.

b. The hybrid measure includes all patients age 50-94 (see later discussion for justification)

3. External empiric validity testing

a. Not possible for the hybrid measure, due to limited data availability. We provide results from the claims-only measure within the hybrid testing form.

4. Socioeconomic risk factor analyses

a. Not possible for the hybrid measure, due to limited data availability. We provide results from the claims-only measure within the hybrid testing form.

5. Exclusion analyses

a. To be representative of what we expect the impact would be of the measures' exclusions in a nation-wide sample, we provide the results from the claims-only measure.

6. Meaningful differences

a. To be representative of what we expect the range of performance would be in a nation-wide sample, we provide the distribution results from the claims-only measure.

Difference between the two measures when fully harmonized, prior to implementation:

1. Risk adjustment:

a. The claims-only measure uses administrative claims data only for risk adjustment

b. The hybrid measure adds 10 clinical risk variables, derived from a set of core clinical data elements (CCDE) extracted from the EHR.

1789 Hospital-Wide All-Cause Unplanned Readmission Measure (HWR)

For the hospital-wide readmission (HWR) measure that was previously endorsed and is used in the Hospital Inpatient Quality Reporting Program (IQR), the measure estimates a hospital-level risk-standardized readmission rate (RSRR) of unplanned, all-cause readmission after

admission for any eligible condition within 30 days of hospital discharge. The measure reports a single summary RSRR, derived from the volume-weighted results of five different models, one for each of the following specialty cohorts based on groups of discharge condition categories or procedure categories: surgery/gynecology; general medicine; cardiorespiratory; cardiovascular; and neurology, each of which will be described in greater detail below. The measure also indicates the hospital-level standardized risk ratios (SRR) for each of these five specialty cohorts. The outcome is defined as unplanned readmission for any cause within 30 days of the discharge date for the index admission (the admission included in the measure cohort). A specified set of planned readmissions do not count in the readmission outcome. CMS annually reports the measure for patients who are 65 years or older, are enrolled in fee-for-service (FFS) Medicare, and hospitalized in non-federal hospitals.

For the All-Cause Readmission (ACR) measure version used in the Shared Savings Program (SSP), the measure estimates an Accountable Care Organization (ACO) facility-level RSRR of unplanned, all-cause readmission after admission for any eligible condition within 30 days of hospital discharge. The ACR measure is calculated using the same five specialty cohorts and estimates an ACO-level standardized risk ratio for each. CMS annually reports the measure for patients who are 65 years or older, are enrolled in FFS Medicare and are ACO assigned beneficiaries.

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

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

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

This measure estimates a hospital-level, 30-day risk-standardized mortality rate (RSMR) for patients discharged from the hospital with a principal discharge diagnosis of pneumonia, including aspiration pneumonia or a principal discharge diagnosis of sepsis (not severe sepsis) with a secondary discharge diagnosis of pneumonia (including aspiration pneumonia) coded as present on admission (POA). Mortality is defined as death from any cause within 30 days of the index admission date. The Centers for Medicare & Medicaid Services (CMS) annually reports the measure for patients who are 65 years or older and are either Medicare fee-for-service (FFS) beneficiaries and hospitalized in non-federal acute care hospitals.

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

This measure estimates a hospital-level, 30-day risk-standardized mortality rate (RSMR) for patients discharged from the hospital with a principal discharge diagnosis of COPD or a principal discharge diagnosis of respiratory failure with a secondary discharge diagnosis of acute exacerbation of COPD. Mortality is defined as death from any cause within 30 days of

the index admission date. The Centers for Medicare & Medicaid Services (CMS) annually reports the measure for patients who are 65 years or older and are Medicare fee-for-service (FFS) beneficiaries hospitalized in non-federal acute care hospitals

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.

Type

3502 Hybrid Hospital-Wide (All-Condition, All-Procedure) Risk-Standardized Mortality Measure

Outcome

1789 Hospital-Wide All-Cause Unplanned Readmission Measure (HWR)

Outcome

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

Outcome

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

Outcome

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

Outcome

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

Outcome

Data Source

3502 Hybrid Hospital-Wide (All-Condition, All-Procedure) Risk-Standardized Mortality Measure

Claims, Electronic Health Records, Other Clinical-Hybrid Dataset

Constructed using Kaiser Permanente Northern California matched administrative claims and electronic health record (EHR) data, admission dates from October 1, 2015 – December 30, 2016. This data source was used for measure testing. (An earlier Kaiser dataset from that included all admissions for adult patients to any of their member hospitals between January 1, 2009 and June 30, 2015 was used for measure development, as described in the attached methodology report).

The two data sources listed below were used for testing the claims-based measure; the

hybrid testing form includes some testing data from the claims-based measure (for example, for the social risk factor and external validation analyses).

HWM claims-only datasets:

Medicare Part A Inpatient Claims Data

The index dataset contains administrative inpatient hospitalization data for Medicare FFS beneficiaries, aged 65-94 on admission. The history dataset includes administrative inpatient hospitalization data on each patient for the 12 months prior to the index admission. This data was used along with the Medicare Enrollment Database (EDB) for testing the claims-based measure.

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. It was also used to determine hospice enrollment.

No data collection instrument provided Attachment Del18b2HOP5HWMHybridDataDictionary01072019.xlsx

1789 Hospital-Wide All-Cause Unplanned Readmission Measure (HWR)

Claims Data sources for the Medicare FFS measure:

HWR

1. Medicare Part A claims data for calendar years 2007 and 2008 were combined and then randomly split into two equal subsets (development sample and validation sample). Risk variable selection was done using the development sample, the risk models for each of the five specialty cohorts in the measure were applied to the validation sample and the models' performance was compared. In addition we re-tested the models in Medicare Part A claims data from calendar year 2009 to look for temporal stability in the models' performance. The number of measured entities and index admissions are listed below by specialty cohort.

2. Medicare Enrollment Database (EDB): This database contains Medicare beneficiary demographic, benefit/coverage, and vital status information. This data source was used to obtain information on several inclusion/exclusion indicators such as Medicare status on admission and following discharge from index admission

ACR

1. Medicare Part A claims data for calendar years 2013, 2014, and 2015.

2. Medicare Enrollment Database (EDB).

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.

Available in attached appendix at A.1 Attachment NQF_1789_NQF_Data_Dictionary_05-26-17_v1.0.xlsx

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

Claims, Other, Paper Medical Records Data sources:

The currently publically reported measure is specified and has been tested using:

1. Medicare Part A inpatient and Part B outpatient claims: This data source contains claims data for FFS inpatient and outpatient services including: Medicare inpatient hospital care, outpatient hospital services, as well as inpatient and outpatient physician claims for the 12 months prior to an index admission.

2. Medicare Enrollment Database (EDB): This database contains Medicare beneficiary demographic, benefit/coverage, and vital status information. This data source was used to obtain information on several inclusion/exclusion indicators such as Medicare status on admission as well as vital status at discharge. These data have previously been shown to accurately reflect patient vital status (Fleming et al., 1992).

During original measure development we validated the administrative claims-based definition of THA/TKA complication (original model specification) against a medical record data.

3. Data abstracted from medical records from eight participating hospitals (approximately 96 records per hospital; 644 total records) for Medicare beneficiaries over the age of 65 years who had a qualifying THA/TKA procedure between January 1 2007 and December 31, 2008.

The measure was also specified and testing using an all-payer claims dataset although it is only publically reported using the data sources listed above

4. California Patient Discharge Data is a large, linked database of patient hospital admissions in the state of California. Using all-payer data from California, we performed analyses to determine whether the THA/TKA complication measure can be applied to all adult patients, including not only FFS Medicare patients aged 65 years or over, but also non-FFS Medicare patients aged 18-64 years at the time of admission.

Additional Data source used for analysis of the impact of SES variables on the measure's risk model. Note, the variables derived from these data are not included in the measure as specified

5. The American Community Survey (2009-2013): The American Community Survey data is collected annually and an aggregated 5-years data was used to calculate the AHRQ socioeconomic status (SES) composite index score.

Reference:

Fleming C., Fisher ES, Chang CH, Bubolz D, Malenda J. Studying outcomes and hospital utilization in the elderly: The advantages of a merged data base for Medicare and Veterans Affairs Hospitals. Medical Care. 1992; 30(5): 377-91.

Suter LG, Parzynski CS, Grady JN, et al. 2014 Procedure Specific Complication Measure Updates and Specifications Report: Elective Primary Total Hip Arthroplasty (THA) and/or Total Knee Arthroplasty (TKA) Risk-Standardized Complication Measure (Version 3.0). 2014

No data collection instrument provided Attachment NQF_1550_HipKnee_Complication_Data_Dictionary_v1.0.xlsx

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

Claims, Other, Paper Medical Records Data sources for the Medicare FFS measure:

1. Medicare Part A inpatient and Part B outpatient claims: This data source contains claims data for FFS inpatient and outpatient services including: Medicare inpatient hospital care,

outpatient hospital services, as well as inpatient and outpatient physician claims for the 12 months prior to an index admission.

2. Medicare Enrollment Database (EDB): This database contains Medicare beneficiary demographic, benefit/coverage, and vital status information. This data source was used to obtain information on several inclusion/exclusion indicators such as Medicare status on admission as well as vital status. These data have previously been shown to accurately reflect patient vital status (Fleming et al., 1992).

3. 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 SES composite index score.

4. Data sources for the all-payer update:

For our analyses to examine use in all-payer data, we used all-payer data from California in addition to CMS data for Medicare FFS patients aged 65 years or over (65+) in California hospitals. California is a diverse state, and, with more than 37 million residents, California represents 12% of the US population. We used the California Patient Discharge Data, a large, linked database of patient hospital admissions. In 2009, there were 3,193,904 adult discharges from 446 non-Federal acute care hospitals. Records are linked by a unique patient identification number, allowing us to determine patient history from previous hospitalizations and to evaluate rates of both readmission and mortality (via linking with California vital statistics records).

Using all-payer data from California as well as CMS Medicare FFS data for California hospitals, we performed analyses to determine whether the pneumonia mortality measure can be applied to all adult patients, including not only FFS Medicare patients aged 65 or over, but also non-FFS Medicare patients aged 18-64 years at the time of admission.

Reference:

Fleming C., Fisher ES, Chang CH, Bubolz D, Malenda 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_0468_Pneumonia_Mortality_Data_Dictionary_09-26-17_v1.0.xls

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

Claims, Other, Paper Medical Records Data sources for the Medicare FFS measure:

1. Medicare Part A inpatient and Part B outpatient claims: This data source contains claims data for FFS inpatient and outpatient services including: Medicare inpatient hospital care, outpatient hospital services, as well as inpatient and outpatient physician claims for the 12 months prior to an index admission.

2. Medicare Enrollment Database (EDB): This database contains Medicare beneficiary demographic, benefit/coverage, and vital status information. This data source was used to obtain information on several inclusion/exclusion indicators such as Medicare status on admission as well as vital status. These data have previously been shown to accurately reflect patient vital status (Fleming et al., 1992).

3. 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 SES

composite index score.

4. Data sources for the all-payer testing: For our analyses to examine use in all-payer data, we used all-payer data from California. California is a diverse state, and, with more than 37 million residents, California represents 12% of the US population. We used the California Patient Discharge Data, a large, linked database of patient hospital admissions. In 2006, there were approximately 3 million adult discharges from more than 450 non-Federal acute care hospitals. Records are linked by a unique patient identification number, allowing us to determine patient history from previous hospitalizations and to evaluate rates of both readmission and mortality (via linking with California vital statistics records).

Using all-payer data from California, we performed analyses to determine whether the COPD mortality measure can be applied to all adult patients, including not only FFS Medicare patients aged 65 or over, but also non-FFS Medicare patients aged 18-64 years at the time of admission.

Reference:

Fleming C., Fisher ES, Chang CH, Bubolz D, Malenda 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_1893_COPD_Mortality_NQF_Data_Dictionary_v1.0_091818_kl.xlsx

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

Level

3502 Hybrid Hospital-Wide (All-Condition, All-Procedure) Risk-Standardized Mortality Measure

Facility

1789 Hospital-Wide All-Cause Unplanned Readmission Measure (HWR)

Facility, Integrated Delivery System

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

Facility

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

Facility

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

Facility

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

Facility

Setting

3502 Hybrid Hospital-Wide (All-Condition, All-Procedure) Risk-Standardized Mortality Measure

Inpatient/Hospital, Other Home-based primary care and home-based palliative care); Settings include: Home, Boarding home, Domiciliary, Assisted Living Facilities, Rest Home or Custodial Care Services

1789 Hospital-Wide All-Cause Unplanned Readmission Measure (HWR)

Inpatient/Hospital, Outpatient Services

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

Inpatient/Hospital

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

Inpatient/Hospital

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

Inpatient/Hospital

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

Inpatient/Hospital

Numerator Statement

3502 Hybrid Hospital-Wide (All-Condition, All-Procedure) Risk-Standardized Mortality Measure

The outcome for this measure is 30-day, all-cause mortality. Mortality is defined as death from any cause, either during or after admission, within 30 days of the index admission date.

1789 Hospital-Wide All-Cause Unplanned Readmission Measure (HWR)

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

The outcome for the ACR measure is also 30-day readmission. The outcome is defined identically to what is described above for the HWR measure.

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

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

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

The outcome for this measure is 30-day, all-cause mortality. We define mortality as death from any cause within 30 days of the index admission date for patients discharged from the hospital with a principal discharge diagnosis of pneumonia, including aspiration pneumonia, or a principal discharge diagnosis of sepsis (not including severe sepsis) with a secondary discharge diagnosis of pneumonia (including aspiration pneumonia) coded as POA and no secondary discharge diagnosis of severe sepsis.

Additional details are provided in S.5 Numerator Details.

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

The outcome for this measure is 30-day, all-cause mortality. We define mortality as death from any cause within 30 days of the index admission date for patients discharged from the hospital with either a principal discharge diagnosis of COPD or a principal discharge diagnosis of respiratory failure with a secondary discharge diagnosis of acute exacerbation of COPD.

Additional details are provided in S.5 Numerator Details.

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.

Numerator Details

3502 Hybrid Hospital-Wide (All-Condition, All-Procedure) Risk-Standardized Mortality Measure

The measure outcome is death from any cause within 30 days of the admission date of the index admission. The numerator is a binary variable (1=yes/0=no) that indicates whether the patient died within 30 days of the index admission date.

1789 Hospital-Wide All-Cause Unplanned Readmission Measure (HWR)

The measure counts readmissions to any acute care hospital for any cause within 30 days of the date of discharge of the index admission, excluding planned readmissions as defined below.

Planned Readmission Algorithm (Version 4.0)

The Planned Readmission Algorithm is a set of criteria for classifying readmissions as planned among the general Medicare population using Medicare administrative claims data. The algorithm identifies admissions that are typically planned and may occur within 30 days of discharge from the hospital.

The Planned Readmission Algorithm has three fundamental principles:

1. A few specific, limited types of care are always considered planned (obstetric delivery, transplant surgery, maintenance chemotherapy/immunotherapy, rehabilitation);

2. Otherwise, a planned readmission is defined as a non-acute readmission for a scheduled procedure; and

3. Admissions for acute illness or for complications of care are never planned.

The algorithm was developed in 2011 as part of the Hospital-Wide Readmission measure. In 2013, CMS applied the algorithm to its other readmission measures.

The Planned Readmission Algorithm and associated code tables are attached in data field S.2b (Data Dictionary or Code Table).

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

The composite complication is a dichotomous outcome (yes for any complication(s); no for

no complications). Therefore, if a patient experiences one or more complications, the outcome variable will get coded as a "yes". Complications are counted in the measure only if they occur during the index hospital admission (and are not present on admission) or during a readmission.

The complications captured in the numerator are identified during the index admission OR associated with a readmission up to 90 days post-date of index admission, depending on the complication. The follow-up period for complications from date of index admission is as follows:

The follow-up period for AMI, pneumonia, and sepsis/septicemia/shock is seven days from the date of index admission because these conditions are more likely to be attributable to the procedure if they occur within the first week after the procedure. Additionally, analyses indicated a sharp decrease in the rate of these complications after seven days.

Death, surgical site bleeding, and pulmonary embolism are followed for 30 days following admission because clinical experts agree these complications are still likely attributable to the hospital performing the procedure during this period and rates for these complications remained elevated until roughly 30 days post admission.

The measure follow-up period is 90 days after admission for mechanical complications and periprosthetic joint infection/wound infection. Experts agree that mechanical complications and periprosthetic joint infection/wound infections due to the index THA/TKA occur up to 90 days following THA/TKA.

The measure counts all complications occurring during the index admission regardless of when they occur. For example, if a patient experiences an AMI on day 10 of the index admission, the measure will count the AMI as a complication, although the specified follow-up period for AMI is seven days. Clinical experts agree with this approach, as such complications likely represent the quality of care provided during the index admission.

As of 2014 reporting, the measure does not count complications in the complications outcome that are coded as POA during the index admission; this prevents identifying a condition as a complication of care if it was present on admission for the THA/TKA procedure.

For full list of ICD-9 and ICD-10 codes defining complications, see the Data Dictionary attached in field S.2b., sheet "Complication Codes ICD9-ICD10".

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

This measure estimates a hospital-level, 30-day risk-standardized mortality rate (RSMR) for patients discharged from the hospital with a principal discharge diagnosis of pneumonia, including aspiration pneumonia or a principal discharge diagnosis of sepsis (not severe sepsis) with a secondary discharge diagnosis of pneumonia (including aspiration pneumonia) coded as present on admission (POA). Mortality is defined as death from any cause within 30 days of the index admission date. The Centers for Medicare & Medicaid Services (CMS) annually reports the measure for patients who are 65 years or older and are either Medicare fee-for-service (FFS) beneficiaries and hospitalized in non-federal acute care hospitals.

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

Outcome definition

This measure counts death from any cause within 30 days of the index admission date.

Rationale: From a patient perspective, death is the most critical outcome regardless of cause. Outcomes occurring within 30 days of admission can be influenced by hospital care and appropriate transition to the non-acute care setting. The 30-day time frame is a clinically meaningful period for hospitals to collaborate with their communities to reduce mortality (Simoes et al., 2018; Dharmarajan et al., 2015).

Identifying deaths in the Medicare FFS population

As currently reported, we identify deaths for FFS Medicare patients 65 years and older in the Medicare Enrollment Database (EDB).

Reference:

1. Simoes J, Grady J, Purvis D, et al. 2018 Condition-Specific Measures Updates and Specifications Report Hospital-Level 30-Day Risk-Standardized Mortality Measures. http://www.qualitynet.org/dcs/ContentServer?c=Page&pagename=QnetPublic/Page/QnetTier3&cid=1163010421830. Accessed June 6, 2018.

2. Dharmarajan K, Hsieh AF, Kulkarni VT, et al. 2015 Trajectories of risk after hospitalization for heart failure, acute myocardial infarction, or pneumonia: retrospective cohort study. BMJ (Clinical researched);350:h411

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.

Denominator Statement

3502 Hybrid Hospital-Wide (All-Condition, All-Procedure) Risk-Standardized Mortality Measure

The cohort includes inpatient admissions for a wide variety of conditions for patients aged between 50 and 94 years old who were discharged from short-term acute care hospitals. If a patient has more than one admission during the measurement year, one admission is randomly selected for inclusion in the measure. Additional details are provided in S.7 Denominator Details. The age range for this measure differs from that of the claims-only measure due to the limited size of the dataset used for testing. The intent is to harmonize the age range of the hybrid measure with the age range of the claims-only measure, so that both will include admissions for patients age 65-94.

1789 Hospital-Wide All-Cause Unplanned Readmission Measure (HWR)

The measure at the hospital level includes admissions for Medicare beneficiaries who are 65 years and older and are discharged from all non-federal, acute care inpatient US hospitals (including territories) with a complete claims history for the 12 months prior to admission.

The measure at the ACO level includes all relevant admissions for ACO assigned beneficiaries who are 65 and older and are discharged from all non-Federal short-stay acute care hospitals, including critical access hospitals.

Additional details are provided in S.9 Denominator Details.

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

The target population for the publically reported measure includes admissions for Medicare FFS beneficiaries who are at least 65 years of age undergoing elective primary THA and/or TKA procedures.

Additional details are provided in S.9 Denominator Details.

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

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 aged 18 years and older discharged from the hospital with a principal discharge diagnosis of pneumonia (including aspiration pneumonia) or a principal discharge diagnosis of sepsis (not including severe sepsis) with a secondary diagnosis of pneumonia (including aspiration pneumonia) coded as POA and no secondary diagnosis of severe sepsis coded as POA, and with a complete claims history for the 12 months prior to admission.

The measure is currently publicly reported by CMS for those patients 65 years and older who are Medicare FFS beneficiaries admitted to non-federal acute care hospitals.

Additional details are provided in S.7 Denominator Details.

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

This claims-based measure can be used in either of two patient cohorts: (1) patients aged 65 years or older or (2) patients aged 40 years or older. We have tested the measure in both age groups.

The cohort includes admissions for patients discharged from the hospital with either a principal discharge diagnosis of COPD, or a principal discharge diagnosis of respiratory failure with a secondary diagnosis of acute exacerbation of COPD; and with a complete claims history for the 12 months prior to admission.

The measure is currently publicly reported by CMS for those patients 65 years and older who are Medicare FFS beneficiaries admitted to non-federal hospitals

Additional details are provided in S.7 Denominator Details.

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.

Denominator Details

3502 Hybrid Hospital-Wide (All-Condition, All-Procedure) Risk-Standardized Mortality Measure

The index cohort includes all inpatient admissions for patients aged 50-94 years old. (Note: The intention is to fully harmonize the cohort definition with the claims-only measure so that both measures will capture admissions for patients age 65-94. We deviated from that definition during development and testing due to the limited dataset available that included the EHR data elements needed to calculate this measure. Note that the risk model already includes age in years, as a risk variable.)

An index admission is the hospitalization to which the mortality outcome is attributed and includes admissions for patients:

1. Not transferred from another acute care facility

Rationale: Admissions to an acute cate hospital within one day of discharge from another acute care hospital are considered transfers. Transferred patients are included in the measure cohort, but it is the initial hospitalization rather than any “transfer-in” hospitalization(s), that is included as the hospitalization to which the mortality outcome is attributed (the index admission).

2. Aged between 50 and 94 years

The hybrid measure is intended for the Medicare FFS population but was tested in a limited

dataset due to the EHR data elements included. The use of a small dataset required that we expand the sample by including admissions from patients ages 50 to 94 years. Note that the measure already adjusts for age.

3. Not admitted for primary psychiatric diagnoses

Rationale: Patients admitted for psychiatric treatment are typically cared for in separate psychiatric facilities that are not comparable to short-term acute care hospitals (see data dictionary, HWM Non-Acute Care Inclusion tab).

4. Not admitted for rehabilitation

Rationale: These admissions are not typically to a short-term acute care hospital and are not for acute care (see data dictionary, HWM Non-Acute Care Inclusion tab).

5. Not enrolled in hospice at the time of, or 12 months prior to, their index admission

Rationale: Patients enrolled in hospice in the prior 12 months or at the time of admission are unlikely to have 30-day survival as a primary goal

6. Not enrolled in hospice within two days of admission

Rationale: There is not a single, correct approach regarding patients enrolled in hospice during admission or upon discharge – mortality may or may not represent a quality signal for this group of patients and hospice enrollment is inadequate to differentiate this issue. However, for most patients and/or families who had the discussion and agreed to enroll in hospice within two days of admission, 30-day survival is not likely the primary goal due to their condition and not the quality of care received.

7. Not with a principal diagnosis of cancer and enrolled in hospice during their index admission

Rationale: Patients admitted primarily for cancer who are enrolled in hospice during admission are unlikely to have 30-day survival as a primary goal of care. (see data dictionary, HWM Cancer Inclusion tab).

8. Without any diagnosis of metastatic cancer

Rationale: Although some patients admitted with a diagnosis of metastatic cancer will have 30-day survival as a primary goal of care, for many such patients admitted to the hospital, death may be a clinically reasonable and patient-centered outcome. (see data dictionary, HWM Metastatic Cancer Inclusion tab).

9. Not with a principal discharge diagnosis, or a secondary diagnosis that is present on admission (POA) for a condition which hospitals have limited ability to influence survival

Rationale: Hospitals have little ability to impact mortality for some conditions. This list of conditions (see data dictionary, HWM ICD-10 Inclusion tab) was determined through independent review, by several clinicians, of conditions associated with high mortality. The decisions were also reviewed with our Technical Expert Panel (TEP) and Technical Work Group. Admissions are not included in the cohort if the patient had a principal diagnosis code that is on this list, or a secondary code with POA that is on the list.

In addition, for patients with multiple admissions, the measure selects only one admission, at random, for inclusion. There is no practical statistical modeling approach that can account or adjust for the complex relationship between the number of admissions and risk of mortality in the context of a hospital-wide mortality measure. Random selection ensures that providers are not penalized for a “last” admission during the measurement period; selecting

the last admission would not be as accurate a reflection of the risk of death as random selection, as the last admission is inherently associated with a higher mortality risk. Random selection is also used in CMS's condition-specific mortality measures. Note that random selection reduces the number of admissions, but does not exclude any patients from the measure.

The cohort is defined using ICD-10 Clinical Modification codes identified in Medicare Part A Inpatient claims data. The measure aggregates the ICD-10 principal diagnosis and all procedure codes of the index admission into clinically coherent groups of conditions and procedures (condition categories or procedure categories) using the Agency for Healthcare Research and Quality (AHRQ) Clinical Classifications System (CCS). There is a total of 285 mutually exclusive AHRQ condition categories, most of which are single, homogenous diseases such as pneumonia or acute myocardial infarction. Some are aggregates of conditions, such as "other bacterial infections". There is a total of 231 mutually exclusive procedure categories. Using the AHRQ CCS procedure and condition categories, the measure assigns each index hospitalization to one of 15 mutually exclusive divisions. The divisions were created based upon clinical coherence, consistency of mortality risk, adequate patient and hospital case volume for stable results reporting, and input from clinicians, patients, and patient caregivers on usability.

The measure first assigns admissions with qualifying AHRQ procedure categories to one of six surgery divisions by identifying a defining surgical procedure. The defining surgical procedure is identified using the following algorithm: 1) if a patient only has one major surgical procedure then that procedure is the defining surgical procedure; 2) if a patient has more than one major surgical procedure, the first dated procedure performed during the index admission is the defining surgical procedure; 3) if there is more than one major surgical procedure on that earliest date, the procedure with the highest mortality rate is the defining surgical procedure. These divisions include admissions likely cared for by surgical teams.

The surgical divisions are: Surgical Cancer (see note below), Cardiothoracic Surgery, General Surgery, Neurosurgery, Orthopedic Surgery, and Other Surgical Procedures.

For the Surgical Cancer division, any admission that includes a surgical procedure and a principal discharge diagnosis code of cancer is assigned to the Surgical Cancer division. This division and the logic behind it was implemented in response to feedback from our Technical Expert Panel.

The measure then assigns the remaining admissions into one of the nine non-surgical divisions based on the AHRQ diagnostic CCS of the principal discharge diagnosis. The non-surgical divisions are: Cancer, Cardiac, Gastrointestinal, Infectious Disease, Neurology, Orthopedic, Pulmonary, Renal, Other Conditions.

The full list of the specific diagnosis and procedure AHRQ CCS categories used to define the divisions are attached in the Data Dictionary.

1789 Hospital-Wide All-Cause Unplanned Readmission Measure (HWR)

To be included in the hospital level measure, cohort patients must be:

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

2. Aged 65 or over;

3. Discharged alive from a non-federal short-term acute care hospital; and

4. Not transferred to another acute care facility.

The ACO version of this measure has the additional criterion that only hospitalizations for ACO-assigned beneficiaries that meet all of the other criteria listed above are included. The cohort definition is otherwise identical to that of the HWR described below.

The measure aggregates the ICD-9 principal diagnosis and all procedure codes of the index admission into clinically coherent groups of conditions and procedures (condition categories or procedure categories) using the AHRQ CCS. There are a total of 285 mutually exclusive AHRQ condition categories, most of which are single, homogenous diseases such as pneumonia or acute myocardial infarction. Some are aggregates of conditions, such as "other bacterial infections." There are a total of 231 mutually exclusive procedure categories. Using the AHRQ CCS procedure and condition categories, the measure assigns each index hospitalization to one of five mutually exclusive specialty cohorts: surgery/gynecology, cardiorespiratory, cardiovascular, neurology, and medicine. The rationale behind this organization is that conditions typically cared for by the same team of clinicians are expected to experience similar added (or reduced) levels of readmission risk.

The measure first assigns admissions with qualifying AHRQ procedure categories to the Surgery/Gynecology Cohort. This cohort includes admissions likely cared for by surgical or gynecological teams.

The measure then sorts admissions into one of the four remaining specialty cohorts based on the AHRQ diagnosis category of the principal discharge diagnosis:

The Cardiorespiratory Cohort includes several condition categories with very high readmission rates such as pneumonia, chronic obstructive pulmonary disease, and heart failure. These admissions are combined into a single cohort because they are often clinically indistinguishable and patients are often simultaneously treated for several of these diagnoses.

The Cardiovascular Cohort includes condition categories such as acute myocardial infarction that in large hospitals might be cared for by a separate cardiac or cardiovascular team.

The Neurology Cohort includes neurologic condition categories such as stroke that in large hospitals might be cared for by a separate neurology team.

The Medicine Cohort includes all non-surgical patients who were not assigned to any of the other cohorts.

The full list of the specific diagnosis and procedure AHRQ CCS categories used to define the specialty cohorts are attached in data field S.2b (Data Dictionary or Code Table).

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

To be included in the measure cohort used in public reporting, patients must meet the following additional inclusion criteria:

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

2. Aged 65 or older

3. Having a qualifying elective primary THA/TKA procedure; elective primary THA/TKA procedures are defined as those procedures without any of the following:

• Femur, hip, or pelvic fractures coded in the principal or secondary discharge diagnosis field

of the index admission

• Partial hip arthroplasty (PHA) procedures (with a concurrent THA/TKA); partial knee arthroplasty procedures are not distinguished by ICD9 codes and are currently captured by the THA/TKA measure

• Revision procedures with a concurrent THA/TKA

• Resurfacing procedures with a concurrent THA/TKA

• Mechanical complication coded in the principal discharge

• Malignant neoplasm of the pelvis, sacrum, coccyx, lower limbs, or bone/bone marrow or a disseminated malignant neoplasm coded in the principal discharge diagnosis field

• Removal of implanted devises/prostheses

• Transfer status from another acute care facility for the THA/TKA

Patients are eligible for inclusion in the denominator if they had an elective primary THA and/or a TKA AND had continuous enrollment in Part A and Part B Medicare fee-for-service (FFS) 12 months prior to the date of index admission.

This measure can also be used for an all-payer population aged 18 years and older. We have explicitly tested the measure in both patients aged 18+ years and those aged 65+ years (see Section 2b4.11 of the Testing Attachment for details, 2b4.11).

International Classification of Diseases, 9th Revision, Clinical Modification (ICD-9-CM) codes used to define the cohort for each measure are:

ICD-9-CM codes used to define a THA or TKA:

81.51 Total Hip Replacement

81.54 Total Knee Replacement

ICD-10 Codes that define a THA or TKA:

0SR90J9 Replacement of Right Hip Joint with Synthetic Substitute, Cemented, Open Approach

0SR90JA Replacement of Right Hip Joint with Synthetic Substitute, Uncemented, Open Approach

0SR90JZ Replacement of Right Hip Joint with Synthetic Substitute, Open Approach

0SRB0J9 Replacement of Left Hip Joint with Synthetic Substitute, Cemented, Open Approach

0SRB0JA Replacement of Left Hip Joint with Synthetic Substitute, Uncemented, Open Approach

0SRB0JZReplacement of Left Hip Joint with Synthetic Substitute, Open Approach

0SRC07Z Replacement of Right Knee Joint with Autologous Tissue Substitute, Open Approach

0SRC0JZReplacement of Right Knee Joint with Synthetic Substitute, Open Approach

0SRC0KZ Replacement of Right Knee Joint with Nonautologous Tissue Substitute, Open Approach

0SRD07Z Replacement of Left Knee Joint with Autologous Tissue Substitute, Open Approach

0SRD0JZ Replacement of Left Knee Joint with Synthetic Substitute, Open Approach

0SRD0KZReplacement of Left Knee Joint with Nonautologous Tissue Substitute, Open Approach

0SRT07Z Replacement of Right Knee Joint, Femoral Surface with Autologous Tissue Substitute, Open Approach

0SRT0JZ Replacement of Right Knee Joint, Femoral Surface with Synthetic Substitute, Open Approach

0SRT0KZ Replacement of Right Knee Joint, Femoral Surface with Nonautologous Tissue Substitute, Open Approach

0SRU07Z Replacement of Left Knee Joint, Femoral Surface with Autologous Tissue Substitute, Open Approach

0SRU0JZ Replacement of Left Knee Joint, Femoral Surface with Synthetic Substitute, Open Approach

0SRU0KZ Replacement of Left Knee Joint, Femoral Surface with Nonautologous Tissue Substitute, Open Approach

0SRV07Z Replacement of Right Knee Joint, Tibial Surface with Autologous Tissue Substitute, Open Approach

0SRV0JZ Replacement of Right Knee Joint, Tibial Surface with Synthetic Substitute, Open Approach

0SRV0KZ Replacement of Right Knee Joint, Tibial Surface with Nonautologous Tissue Substitute, Open Approach

0SRW07Z Replacement of Left Knee Joint, Tibial Surface with Autologous Tissue Substitute, Open Approach

0SRW0JZ Replacement of Left Knee Joint, Tibial Surface with Synthetic Substitute, Open Approach

0SRW0KZ Replacement of Left Knee Joint, Tibial Surface with Nonautologous Tissue Substitute, Open Approach

An ICD-9 to ICD-10 crosswalk is attached in field S.2b. (Data Dictionary or Code Table).

Elective primary THA/TKA procedures are defined as those procedures without any of the following:

1) Femur, hip, or pelvic fractures coded in principal or secondary discharge diagnosis fields of the index admission

2) Partial hip arthroplasty (PHA) procedures with a concurrent THA/TKA

3) Revision procedures with a concurrent THA/TKA

4) Resurfacing procedures with a concurrent THA/TKA

5) Mechanical complication coded in the principal discharge

6) Malignant neoplasm of the pelvis, sacrum, coccyx, lower limbs, or bone/bone marrow or a disseminated malignant neoplasm coded in the principal discharge diagnosis field

7) Removal of implanted devises/prostheses

8) Transfer status from another acute care facility for the THA/TKA

For a full list of ICD-9 and ICD-10 codes defining the following see attached Data Dictionary, sheet “THA TKA Cohort Codes Part 2.”

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

To be included in the measure cohort used in public reporting, patients must meet the following inclusion criteria:

1. Have a principal discharge diagnosis of pneumonia (including aspiration pneumonia) or sepsis (not including severe sepsis) with a secondary diagnosis of pneumonia (including aspiration pneumonia) coded as POA and no secondary diagnosis of severe sepsis coded as POA;

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

3. Aged 65 or over; and

4. Not transferred from another acute care facility

ICD-9 and ICD-10 cohort codes are included in the attached Data Dictionary.

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

To be included in the measure cohort used in public reporting, patients must meet the following inclusion criteria:

1. Have principal discharge diagnosis of COPD or principal discharge diagnosis of respiratory failure with a secondary diagnosis of COPD with exacerbation;

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

3. Aged 65 or over; and

4. Not transferred from another acute care facility.

ICD-9 and ICD-10 cohort codes are included in the attached Data Dictionary.

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.

Exclusions

3502 Hybrid Hospital-Wide (All-Condition, All-Procedure) Risk-Standardized Mortality Measure

The measure excludes index admissions for patients:

1. With inconsistent or unknown vital status (from claims data) or other unreliable claims data;

2. Discharged against medical advice (AMA);

3. With an admission for spinal cord injury (CCS 227), skull and face fractures (CCS 228), Intracranial Injury (CCS 233), Crushing injury or internal injury (CCS 234), Open wounds of head/neck/trunk (CCS 235), and burns (CCS 240); and

4. With a principal discharge diagnosis within a CCS with fewer than 100 admissions in that division within the measurement year.

1789 Hospital-Wide All-Cause Unplanned Readmission Measure (HWR)

The measure excludes index admissions for patients:

1. Admitted to Prospective Payment System (PPS)-exempt cancer hospitals;

2. Without at least 30 days post-discharge enrollment in FFS Medicare;

3. Discharged against medical advice (AMA);

4. Admitted for primary psychiatric diagnoses;

5. Admitted for rehabilitation; or

6. Admitted for medical treatment of cancer.

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

This measure excludes index admissions for patients:

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

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

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

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

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

This mortality measure excludes index admissions for patients:

1. Discharged alive on the day of admission or the following day who were not transferred to another acute care facility;

2. With inconsistent or unknown vital status or other unreliable demographic (age and

gender) data;

3. Enrolled in the Medicare hospice program any time in the 12 months prior to the index admission, including the first day of the index admission; or,

4. Discharged against medical advice.

For patients with more than one admission for a given condition in a given year, only one index admission for that condition is randomly selected for inclusion in the cohort. Similarly, for the three-year combined data, when index admissions occur during the transition between measure reporting periods (June and July of each year) and both are randomly selected for inclusion in the measure, the measure includes only the June admission. The July admissions are excluded to avoid assigning a single death to two admissions.

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

The mortality measure excludes index admissions for patients:

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

2. Enrolled in the Medicare hospice program any time in the 12 months prior to the index admission, including the first day of the index admission; or

3. Discharged against medical advice

For patients with more than one admission for a given condition in a given year, only one index admission for that condition is randomly selected for inclusion in the cohort. Additional admissions within that year are excluded.

Similarly, for the three-year combined data, when index admissions occur during the transition between measure reporting periods (June and July of each year) and both are randomly selected for inclusion in the measure, the measure includes only the June admission. The July admissions are excluded to avoid assigning a single death to two admissions.

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.

Exclusion Details

3502 Hybrid Hospital-Wide (All-Condition, All-Procedure) Risk-Standardized Mortality Measure

1. With inconsistent or unknown vital status (from claims data) or other unreliable claims data.

Rationale: The measure does not include stays for patients where the admission date is after the date of death, or where the date of death occurs before the date of discharge but the

patient was discharged alive because these are likely errors in the data.

2. Discharged against medical advice (AMA)

Rationale: Providers did not have the opportunity to deliver full care and prepare the patient for discharge.

3. With an admission for spinal cord injury (CCS 227), skull and face fractures (CCS 228), Intracranial Injury (CCS 233), Crushing injury or internal injury (CCS 234), Open wounds of head/neck/trunk (CCS 235), and burns (CCS 240).

Rationale: Even though a hospital likely can influence the outcome of some of these conditions, in many cases death events are not a signal of poor quality of care when patients present with these conditions. These conditions are also infrequent events that are unlikely to be uniformly distributed across hospitals.

4. With a principal discharge diagnosis within a CCS with fewer than 100 admissions in that division within the measurement year.

Rationale: To calculate a stable and precise risk model, there are a minimum number of admissions that are needed. In addition, a minimum number of admissions and/or outcome events are required to inform grouping admissions into larger categories. These admissions present challenges to both accurate risk prediction and coherent risk grouping and are therefore excluded.

Note: During measure development we analyzed different volume cut-offs (25, 50 and 100). Using cut-off values below 100 resulted in too many CCS codes in some of the divisions (the CCS category codes are used in risk adjustment) which resulted in non-convergence of those division-level risk models. The total number of patients excluded is very small (13,597 or 0.21% of admissions for a cut off of 100). During measure development we also explored the option of pooling low-volume CCS codes (CCS<100 patients) into one group, however, the heterogeneity in mortality rates for the individual ICD-10 codes in those groups would preclude adequate risk adjustment. The TEP supported excluding these admissions.

1789 Hospital-Wide All-Cause Unplanned Readmission Measure (HWR)

1. Admitted to a PPS-exempt cancer hospital, identified by the Medicare provider ID.

2. Admissions without at least 30 days post-discharge enrollment in FFS Medicare are determined using data captured in the Medicare Enrollment Database (EDB).

3. Discharges against medical advice (AMA) are identified using the discharge disposition indicator in claims data.

4. Admitted for primary psychiatric disease, identified by a principal diagnosis in one of the specific AHRQ CCS categories listed in the attached data dictionary.

5. Admitted for rehabilitation care, identified by the specific ICD-9 diagnosis codes included in CCS 254 (Rehabilitation care; fitting of prostheses; and adjustment of devices).

6. Admitted for medical treatment of cancer, identified by the specific AHRQ CCS categories listed in the attached data dictionary.

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

This measure excludes index admissions for patients:

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

Rationale: The 90-day complication outcome cannot be assessed in this group since claims data are used to determine whether a complication of care occurred.

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

Rationale: Providers did not have the opportunity to deliver full care and prepare the patient for discharge.

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

Rationale: Although clinically possible, it is highly unlikely that patients would receive more than two elective THA/TKA procedures in one hospitalization, which may reflect a coding error.

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

1. Inconsistent vital status or unreliable data are identified if any of the following conditions are met 1) the patient's age is greater than 115 years; 2) if the discharge date for a hospitalization is before the admission date; 3) if the patient has a sex other than 'male' or 'female'.

2. Hospice enrollment in the 12 months prior to or on the index admission is identified using hospice enrollment data.

3. Discharges against medical advice (AMA) are identified using the discharge disposition indicator.

After exclusions #1-3 are applied, the measure randomly selects one index admission per patient per year for inclusion in the cohort so that each episode of care is mutually independent with the same probability of the outcome. Additional admissions within that year are excluded. For each patient, the probability of death increases with each subsequent admission and therefore the episodes of care are not mutually independent. For the three-year combined data, when index admissions occur during the transition between measure reporting periods (June and July of each year) and both are randomly selected for inclusion in the measure, the measure includes only the June admission. The July admissions are excluded to avoid assigning a single death to two admissions.

Individual codes with descriptors can be found in the attached Data Dictionary.

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

1. Inconsistent vital status or unreliable demographic data in the claims

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

Enrolled in the Medicare hospice program any time in the 12 months prior to the index admission, including the first day of the index admission. Enrollment to Medicare beneficiaries is determined using the Medicare Enrollment Database. Rationale: These patients are likely continuing to seek comfort measures only, so mortality is not necessarily an adverse outcome or signal of poor quality care.

2. Discharges against medical advice (AMA) are identified using the discharge disposition indicator in the claim.

Rationale: Providers did not have the opportunity to deliver full care and prepare the patient for discharge.

Individual codes with descriptors can be found in the attached Data Dictionary.

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.

Risk Adjustment

3502 Hybrid Hospital-Wide (All-Condition, All-Procedure) Risk-Standardized Mortality Measure

Statistical risk model

1789 Hospital-Wide All-Cause Unplanned Readmission Measure (HWR)

Statistical risk model

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

Statistical risk model

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

Statistical risk model

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

Statistical risk model

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

Statistical risk model

Stratification

3502 Hybrid Hospital-Wide (All-Condition, All-Procedure) Risk-Standardized Mortality Measure

N/A

1789 Hospital-Wide All-Cause Unplanned Readmission Measure (HWR)

N/A

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

N/A

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

N/A

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

N/A

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

N/A

Type Score

3502 Hybrid Hospital-Wide (All-Condition, All-Procedure) Risk-Standardized Mortality Measure

Rate/proportion better quality = lower score

1789 Hospital-Wide All-Cause Unplanned Readmission Measure (HWR)

Rate/proportion better quality = lower score

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

Rate/proportion better quality = lower score

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

Rate/proportion better quality = lower score

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

Rate/proportion better quality = lower 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

Algorithm

3502 Hybrid Hospital-Wide (All-Condition, All-Procedure) Risk-Standardized Mortality Measure

The measure estimates hospital-level, risk-standardized mortality rates (RSMRs) within 30 days of hospital admission using hierarchical logistical regression models through a Bayesian Markov Chain Monte Carlo (MCMC) procedure. In brief, we used hierarchical logistic regression to model the log-odds of mortality for each of the 15 service-line divisions. Death within 30 days was modeled as a function of patient-level demographic and clinical characteristics and a random hospital-level intercept. This model specification accounts for within-hospital correlation of the observed outcomes and models the assumption that underlying differences in quality among the health care facilities being evaluated lead to systematic differences in outcomes. We estimated a separate hierarchical logistic regression model for each service-line division. In order to obtain the variance and interval estimates, we fit the hierarchical model under the Bayesian framework along with the Markov Chain Monte Carlo (MCMC) technique.

Admissions are assigned to one of 15 mutually exclusive divisions (groups of discharge condition categories and procedure categories). For each division and each hospital with patients in that division, the standardized mortality ratio (SMR) is calculated as the ratio of the number of “predicted” deaths to the number of “expected” deaths at a given hospital. The predicted number of deaths is based on the hospital’s performance with its observed case mix and service mix, and 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 for each cohort is added to the sum of the estimated regression coefficients multiplied by patient characteristics. The results are transformed via an inverse logit function and summed over all patients attributed to a hospital to get a predicted value. The expected number of deaths is based on the nation’s performance with that hospital’s case mix and service mix and 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 transformed via an inverse logit function and summed over all patients in the hospital to get an expected value. This approach is analogous to a ratio of “observed” to “expected” used in other types of statistical analyses. It conceptually allows a particular hospital’s performance, given its case mix and service mix, to be compared to an average hospital’s performance with the same case mix and service mix. Thus, a lower ratio indicates lower-than-expected mortality rates or better quality, while a higher ratio indicates higher-than-expected mortality rates or worse quality.

To assess hospital performance for each reporting period, the measure re-estimates the model coefficients using the data in that period.

The division-level SMRs are then pooled for each hospital using an inverse variance-weighted geometric mean to create a hospital-wide composite SMR. (Note that in the case of the hybrid measure, we are presenting data from 9 of the total 15 divisions due to limitations in availability of electronic health records data). The hospital-wide SMR is then multiplied by the national observed mortality rate to produce the RSMR.

1789 Hospital-Wide All-Cause Unplanned Readmission Measure (HWR)

This measure estimates a hospital-level 30-day all-cause RSRR using hierarchical logistic regression models. In brief, the approach simultaneously models data at the patient, and hospital levels to account for variance in patient outcomes within and between hospitals (Normand et al., 2007). At the patient level, it models the log-odds of readmission within 30 days of discharge using age, selected clinical covariates, and a hospital -specific effect. At the hospital level, the approach models the hospital- specific effects as arising from a normal distribution. The hospital effect represents the underlying risk of a readmission, after accounting for patient risk. The hospital-specific effects are given a distribution to account for the clustering (non-independence) of patients within the same hospital (Normand et al., 2007). If there were no differences among hospitals, then after adjusting for patient risk, the hospital effects should be identical across all hospitals.

Admissions are assigned to one of five mutually exclusive specialty cohort groups consisting of related conditions or procedures. For each specialty cohort group, the standardized readmission ratio (SRR) is calculated as the ratio of the number of "predicted" readmissions to the number of "expected" readmissions at a given hospital. For each hospital, the numerator of the ratio is the number of readmissions within 30 days predicted based on the hospital's performance with its observed case mix and service mix, and the denominator is the number of readmissions expected based on the nation's performance with that hospital's case mix and service mix. This approach is analogous to a ratio of "observed" to "expected" used in other types of statistical analyses. It conceptually allows a particular hospital's performance, given its case mix and service mix, to be compared to an average hospital's performance with the same case mix and service mix. Thus, a lower ratio indicates lower-than-expected readmission rates or better quality, while a higher ratio indicates higher-than-expected readmission rates or worse quality.

For each specialty cohort, the "predicted" number of readmissions (the numerator) is calculated by using the coefficients estimated by regressing the risk factors (found in Table D.9) and the hospital-specific effect on the risk of readmission. The estimated hospital-specific effect for each cohort is added to the sum of the estimated regression coefficients multiplied by patient characteristics. The results are log transformed and summed over all patients attributed to a hospital to get a predicted value. The "expected" number of readmissions (the denominator) is obtained in the same manner, but a common effect using all hospitals in our sample is added in place of the hospital-specific effect. The results are log transformed and summed over all patients in the hospital to get an expected value. To assess hospital performance for each reporting period, we re-estimate the model coefficients using the data in that period.

The specialty cohort SRRs are then pooled for each hospital using a volume-weighted geometric mean to create a hospital-wide composite SRR. The composite SRR is multiplied by the national observed readmission rate to produce the RSRR. The statistical modeling approach is described fully in Appendix A and in the original methodology report (Horwitz et al., 2012).

The ACR quality measure was adapted from the HWR quality measure. The unit of analysis was changed from the hospital to the ACO. This was possible because both the HWR and ACR measures assess readmission performance for a population that clusters patients together (either in hospitals or in ACOs). The goal is to isolate the effects of beneficiary characteristics on the probability that a patient will be readmitted from the effects of being in a specific

hospital or ACO. In addition, planned readmissions are excluded for the ACR quality measure in the same way that they are excluded for the HWR measure. The ACR measure is calculated identically to what is described above for the HWR measure.

References:

Horwitz L, Partovian C, Lin Z, et al. Hospital-Wide All-Cause Unplanned Readmission Measure: Final Technical Report. 2012; http://www.qualitynet.org/dcs/BlobServer?blobkey=id&blobnocache=true&blobwhere=1228889825199&blobheader=multipart%2Foctet-stream&blobheadername1=Content-Disposition&blobheadervalue1=attachment%3Bfilename%3DDryRun_HWR_TechReport_081012.pdf&blobcol=urldata&blobtable=MungoBlobs. Accessed 30 April, 2014.

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

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

The measure estimates hospital-level RSCRs following elective primary THA/TKA using hierarchical logistic regression models. In brief, the approach simultaneously models data at the patient and hospital levels to account for variance in patient outcomes within and between hospitals (Normand and Shahian, 2007). At the patient level, it models the log-odds of a complication occurring within 90 days of the index admission using age, sex, selected clinical covariates, and a hospital-specific intercept. At the hospital level, it models the hospital-specific intercepts as arising from a normal distribution. The hospital intercept represents the underlying risk of a complication at the hospital, after accounting for patient risk. The hospital-specific intercepts are given a distribution to account for the clustering (non-independence) of patients within the same hospital. If there were no differences among hospitals, then after adjusting for patient risk, the hospital intercepts should be identical across all hospitals.

The RSCR is calculated as the ratio of the number of “predicted” to the number of “expected” admissions with a complication at a given hospital, multiplied by the national observed complication rate. For each hospital, the numerator of the ratio is the number of complications within 90 days predicted on the basis of the hospital’s performance with its observed case mix, and the denominator is the number of complications expected based on the nation’s performance with that hospital’s case mix. This approach is analogous to a ratio of “observed” to “expected” used in other types of statistical analyses. It conceptually allows for a comparison of a particular hospital’s performance given its case mix to an average hospital’s performance with the same case mix. Thus, a lower ratio indicates lower-than-expected complication rates or better quality, and a higher ratio indicates higher-than-expected complication rates or worse quality.

The “predicted” number of admissions with a complication (the numerator) is calculated by using the coefficients estimated by regressing the risk factors and the hospital-specific intercept on the risk of having an admission with a complication. The estimated hospital-specific intercept is added to the sum of the estimated regression coefficients multiplied by the patient characteristics. The results are log transformed and summed over all patients attributed to a hospital to get a predicted value. The “expected” number of admissions with a complication (the denominator) is obtained in the same manner, but a common intercept using all hospitals in our sample is added in place of the hospital-specific effect. The results are log transformed and summed over all patients in the hospital to get an expected value.

To assess hospital performance for each reporting period, we re-estimate the model coefficients using the years of data in that period.

This calculation transforms the ratio of predicted over expected into a rate that is compared to the national observed complication rate. The hierarchical logistic regression models are described fully in the original methodology report (Grosso et al., 2012).

References:

Grosso L, Curtis J, Geary L, et al. Hospital-level Risk-Standardized Complication Rate Following Elective Primary Total Hip Arthroplasty (THA) And/Or Total Knee Arthroplasty (TKA) Measure Methodology Report. 2012.

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

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

The measure estimates hospital-level 30-day all-cause RSMRs following hospitalization for pneumonia using hierarchical logistic regression models. In brief, the approach simultaneously models data at the patient and hospital levels to account for variance in patient outcomes within and between hospitals (Normand and Shahian, 2007). At the patient level, it models the log-odds of mortality within 30 days of index admission using age, sex, selected clinical covariates, and a hospital-specific intercept. At the hospital level, it models the hospital-specific intercepts as arising from a normal distribution. The hospital intercept represents the underlying risk of a mortality at the hospital, after accounting for patient risk. The hospital-specific intercepts are given a distribution to account for the clustering (non-independence) of patients within the same hospital. If there were no differences among hospitals, then after adjusting for patient risk, the hospital intercepts should be identical across all hospitals.

The RSMR is calculated as the ratio of the number of “predicted” 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 on the basis of 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 for a comparison of a particular hospital’s performance given its case mix to an average hospital’s performance with the same case mix. Thus, a lower ratio indicates lower-than-expected mortality rates or better quality, and 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 intercept 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 intercept using all hospitals in our sample is added in place of the hospital-specific intercept. 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 readmission rate. The hierarchical logistic regression models are described fully in the original methodology report (Krumholz et al., 2005).

References:

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

2. Krumholz H, Normand S, Galusha D, et al. 2005. Risk-Adjustment Models for AMI and HF 30-Day Mortality Methodology.

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

The measure estimates hospital-level 30-day all-cause RSMRs following hospitalization for COPD using hierarchical logistic regression models. In brief, the approach simultaneously models data at the patient and hospital levels to account for variance in patient outcomes within and between hospitals (Normand and Shahian, 2007). At the patient level, it models the log-odds of mortality within 30 days of index admission using age, sex, selected clinical covariates, and a hospital-specific intercept. At the hospital level, it models the hospital-specific intercepts as arising from a normal distribution. The hospital intercept represents the underlying risk of a mortality at the hospital, after accounting for patient risk. The hospital-specific intercepts are given a distribution to account for the clustering (non-independence) of patients within the same hospital. If there were no differences among hospitals, then after adjusting for patient risk, the hospital intercepts should be identical across all hospitals.

The RSMR is calculated as the ratio of the number of “predicted” 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 on the basis of 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 for a comparison of a particular hospital’s performance given its case mix to an average hospital’s performance with the same case mix. Thus, a lower ratio indicates lower-than-expected mortality rates or better quality, and 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 intercept 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 intercept using all hospitals in our sample is added in place of the hospital-specific intercept. 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 readmission rate. The hierarchical logistic regression models are described fully in the original methodology report (Krumholz et al., 2005).

References:

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

2. Krumholz H, Normand S, Galusha D, et al. 2005. Risk-Adjustment Models for AMI and HF 30-Day Mortality Methodology.

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

Submission items

3502 Hybrid Hospital-Wide (All-Condition, All-Procedure) Risk-Standardized Mortality Measure

5.1 Identified measures:

5a.1 Are specs completely harmonized? Yes

5a.2 If not completely harmonized, identify difference, rationale, impact: This hybrid HWM measure incorporates patient-level clinical data from the EHR into the risk adjustment model, compared to the claims-only hospital-wide mortality measure. This hybrid HWM measure is intended to complement the existing CMS Hospital-Wide All-Cause Risk-Standardized Readmission Measure (NQF #1789) to allow assessment of trends in hospital performance for both readmission and mortality outcomes, similar to other complementary pairs of readmission and mortality measures for specific conditions and procedures. By measuring mortality outcomes across almost all hospitalized patients, this measure will provide an important additional performance assessment that will complement condition- and procedure-specific or other more narrowly defined mortality measures and allow a greater number of patients and hospitals to be evaluated. This HWM measure captures a similarly broad cohort to the CMS Hospital-Wide All-Cause Risk-Standardized Readmission Measure (NQF #1789), and a broader cohort than those of other CMS condition-specific measures. Because the mortality measure is focused on a different outcome, it differs from the existing CMS Hospital-Wide All-Cause Risk Standardized Readmission Measure (NQF #1789) in a couple of ways. First, this HWM measure includes patients with a principal discharge diagnosis of cancer, whereas those patients are not included in the readmission measure. Cancer patients are appropriate to include as many have survival as their primary goal, however due to cancer treatment plans, readmissions are frequently part of the plan and expected and therefore are not a reasonable signal of quality. Another difference between the two measures is the number of divisions or specialty cohorts the patients are divided into in order to more accurately risk adjust for case-mix and service-mix. The readmission measure divides patients into six categories, or “specialty cohorts”, while the mortality measure uses 15. This is because the risk of mortality is much more closely related to patient factors than readmission is related to patient factors. PSI-02 (NQF #0357) is another complementary mortality measure, which captures a different patient population and a different outcome compared with the HWM measure submitted with this application. PSI-02 captures patients 18 years of age or older, or obstetric patients, whereas the HWM measure captures patients between the ages of 65 and 94. PSI-02 captures DRGs with less than 0.5% mortality rate, whereas the HWM measure captures all patients within all CCSs, regardless of mortality rate. HWM captures mortality up to 30 days past admission, where AHRQ PSI-02 only captures in-hospital mortality. IQI 90 (NQF #0530) is another complimentary mortality measure, which is a composite measure of the number of in-hospital deaths for a narrow range of conditions (CHF, stroke, hip fracture, pneumonia, acute myocardial infarction and GI hemorrhage). The HWM measure presented in this application captures all deaths after 30 days of admission, for all conditions and procedures.

5b.1 If competing, why superior or rationale for additive value: There are no competing NQF-endorsed measures.

1789 Hospital-Wide All-Cause Unplanned Readmission Measure (HWR)

5.1 Identified measures: 1768 : Plan All-Cause Readmissions (PCR)

1891 : Hospital 30-day, all-cause, risk-standardized readmission rate (RSRR) following chronic obstructive pulmonary disease (COPD) hospitalization

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

0695 : Hospital 30-Day Risk-Standardized Readmission Rates following Percutaneous Coronary Intervention (PCI)

0329 : Risk-Adjusted 30-Day All-Cause Readmission Rate

0330 : Hospital 30-day, all-cause, risk-standardized readmission rate (RSRR) following heart failure (HF) hospitalization

0505 : Hospital 30-day all-cause risk-standardized readmission rate (RSRR) following acute myocardial infarction (AMI) hospitalization.

0506 : Hospital 30-day, all-cause, risk-standardized readmission rate (RSRR) following pneumonia hospitalization

5a.1 Are specs completely harmonized? No

5a.2 If not completely harmonized, identify difference, rationale, impact: This measure and the National Committee for Quality Assurance (NCQA) Plan All-Cause Readmissions (PCR) Measure #1768 are related measures, but are not competing because they don't have the same measure focus and same target population. In addition, both have been previously harmonized to the extent possible under the guidance of the National Quality Forum Steering Committee in 2011. Each of these measures has different specifications. NCQA's Measure #1768 counts the number of inpatient stays for patients aged 18 and older during a measurement year that were followed by an acute readmission for any diagnosis to any hospital within 30 days. It contrasts this count with a calculation of the predicted probability of an acute readmission. NCQA's measure is intended for quality monitoring and accountability at the health plan level. This measure estimates the risk-standardized rate of unplanned, all-cause readmissions to a hospital or ACO for any eligible condition within 30 days of hospital discharge for patients aged 18 and older. The measure will result in a single summary risk-adjusted readmission rate for conditions or procedures that fall under five specialties: surgery/gynecology, general medicine, cardiorespiratory, cardiovascular, and neurology. This measure is specified for evaluating hospital or ACO performance. However, despite these differences in cohort specifications, both measures under NQF guidance have been harmonized to the extent possible through modifications such as exclusion of planned readmissions. We did not include in our list of related measures any non-outcome (e.g., process) measures with the same target population as our measure. Because this is an outcome measure, clinical coherence of the cohort takes precedence over alignment with related non-outcome measures. Furthermore, non-outcome measures are limited due to broader patient exclusions. This is because they typically only include a specific subset of patients who are eligible for that measure (for example, patients who receive a specific medication or undergo a specific procedure).

5b.1 If competing, why superior or rationale for additive value: N/A

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

5.1 Identified measures: 0534 : Hospital specific risk-adjusted measure of mortality or one or more major complications within 30 days of a lower extremity bypass (LEB).

0564 : Cataracts: Complications within 30 Days Following Cataract Surgery Requiring Additional Surgical Procedures

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

2052 : Reduction of Complications through the use of Cystoscopy during Surgery for Stress Urinary Incontinence

5a.1 Are specs completely harmonized? Yes

5a.2 If not completely harmonized, identify difference, rationale, impact: We did not include in our list of related measures any non-outcome measures (for example, process measures) with the same target population as our measure. Because this is an outcome measure, clinical coherence of the cohort takes precedence over alignment with related non-outcome measures. Furthermore, non-outcome measures are limited due to broader patient exclusions. This is because they typically only include a specific subset of patients who are eligible for that measure (for example, patients who receive a specific medication or undergo a specific procedure).

5b.1 If competing, why superior or rationale for additive value: N/A

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

5.1 Identified measures: 0708 : Proportion of Patients with Pneumonia that have a Potentially Avoidable Complication (during the episode time window)

0231 : Pneumonia Mortality Rate (IQI #20)

0506 : Hospital 30-day, all-cause, risk-standardized readmission rate (RSRR) following pneumonia hospitalization

0279 : Community Acquired Pneumonia Admission Rate (PQI 11)

2579 : Hospital-level, risk-standardized payment associated with a 30-day episode of care for pneumonia (PN)

5a.1 Are specs completely harmonized? No

5a.2 If not completely harmonized, identify difference, rationale, impact: The pneumonia mortality measure cohort, version 9.0, is harmonized with the hospital-level, risk-standardized payment associated with a 30-day episode of care for pneumonia cohort. Version 9.2 of the pneumonia mortality measure cohort is, however, not harmonized with the pneumonia payment measure cohort. There is intention to harmonize the pneumonia mortality and payment measure cohorts in the future. We did not include in our list of related measures any non-outcome (for example, process) measures with the same target population as our measure. Because this is an outcome measure, clinical coherence of the cohort takes precedence over alignment with related non-outcome measures. Furthermore, non-outcome measures are limited due to broader patient 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). Lastly,

this measure and the NQF Inpatient Pneumonia Mortality (AHRQ) Measure #0231 are complementary rather than competing measures. Although they both assess mortality for patients admitted to acute care hospitals with a principal discharge diagnosis of pneumonia, the specified outcomes are different. This measure assesses 30-day mortality while #0231 assesses inpatient mortality. Assessment of 30-day and inpatient mortality outcomes have distinct advantages and uses which make them complementary as opposed to competing. For example the 30-day period provides a broader perspective on hospital care and utilizes standard time period to examine hospital performance to avoid bias by differences in length of stay among hospitals. However, in some settings it may not be feasible to capture post-discharge mortality making the inpatient measure more useable. We have previously consulted with AHRQ to examine harmonization of complementary measures of mortality for patients with AMI and stroke. We have found that the measures are harmonized to the extent possible given that small differences in cohort inclusion and exclusion criteria are warranted on the basis of the use of different outcomes. However, this current measure has been modified from the last endorsed version to include patients with a principal discharge diagnosis of sepsis and a secondary discharge diagnosis of pneumonia that is present on admission. The cohort was also expanded to include patients with a principal discharge diagnosis of aspiration pneumonia. Thus the current measure cohort is no longer harmonized with measure #0231.

5b.1 If competing, why superior or rationale for additive value: N/A

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

5.1 Identified measures: 0701 : Functional Capacity in COPD patients before and after Pulmonary Rehabilitation

0700 : Health-related Quality of Life in COPD patients before and after Pulmonary Rehabilitation

0275 : Chronic Obstructive Pulmonary Disease (COPD) or Asthma in Older Adults Admission Rate (PQI 05)

1891 : Hospital 30-day, all-cause, risk-standardized readmission rate (RSRR) following chronic obstructive pulmonary disease (COPD) hospitalization

5a.1 Are specs completely harmonized? Yes

5a.2 If not completely harmonized, identify difference, rationale, impact: We did not include in our list of related measures any non-outcome (for example, process) measures with the same target population as our measure. Our measure cohort was heavily vetted by clinical experts, a technical expert panel, and a public comment period. Additionally, the measure, with the specified cohort, has been publicly reported since December 2014. Because this is an outcome measure, clinical coherence of the cohort takes precedence over alignment with related non-outcome measures. Furthermore, non-outcome measures are limited due to broader patient exclusions. This is because they typically only include a specific subset of patients who are eligible for that measure (for example, patients who receive a specific medication or undergo a specific procedure).

5b.1 If competing, why superior or rationale for additive value: N/A

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

5.1 Identified measures: 0114 : Risk-Adjusted Postoperative Renal Failure

0115 : Risk-Adjusted Surgical Re-exploration

0119 : Risk-Adjusted Operative Mortality for CABG

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

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

0129 : Risk-Adjusted Postoperative Prolonged Intubation (Ventilation)

0130 : Risk-Adjusted Deep Sternal Wound Infection

0131 : Risk-Adjusted Stroke/Cerebrovascular Accident

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

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

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.

Comparison of NQF 3502, 1789, 1550, 0468, 1893, 2558, 0230, 0229, 2876, 0347 and 0530 continued…

3502 Hybrid Hospital-Wide (All-Condition, All-Procedure) Risk-Standardized Mortality Measure
0230 Hospital 30-day, all-cause, risk-standardized mortality rate (RSMR) following acute myocardial infarction (AMI) hospitalization
0229 Hospital 30-day, all-cause, risk-standardized mortality rate (RSMR) following heart failure (HF) hospitalization
2876 Hospital 30-day, all-cause, risk-standardized mortality rate (RSMR) following acute ischemic stroke hospitalization with claims-based risk adjustment for stroke severity
0347 Death Rate in Low-Mortality Diagnosis Related Groups (PSI02)
0530 Mortality for Selected Conditions

Steward

3502 Hybrid Hospital-Wide (All-Condition, All-Procedure) Risk-Standardized Mortality Measure

Centers for Medicare & Medicaid Services (CMS)

0230 Hospital 30-day, all-cause, risk-standardized mortality rate (RSMR) following acute myocardial infarction (AMI) hospitalization

Centers for Medicare & Medicaid Services (CMS)

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

Centers for Medicare & Medicaid Services

2876 Hospital 30-day, all-cause, risk-standardized mortality rate (RSMR) following acute ischemic stroke hospitalization with claims-based risk adjustment for stroke severity

Centers for Medicare & Medicaid Services (CMS)

0347 Death Rate in Low-Mortality Diagnosis Related Groups (PSI02)

Agency for Healthcare Research and Quality

0530 Mortality for Selected Conditions

Agency for Healthcare Research and Quality

Description

3502 Hybrid Hospital-Wide (All-Condition, All-Procedure) Risk-Standardized Mortality Measure

The measure estimates a hospital-level 30-day risk-standardized mortality rate (RSMR), defined as death from any cause within 30 days after the index admission date for patients who are between the ages of 50 and 94.

Please note that in parallel with the hybrid HWM measure, we are submitting a claims-only HWM measure. Note that ultimately the claims and hybrid measures will be harmonized and use the same exact cohort specifications. The intent is that prior to implementation, the two measures will be exactly the same, with the exception of the additional risk adjustment added by the CCDE in the hybrid measure. This is analogous to the currently

endorsed and implemented hybrid hospital-wide readmissions measure (NQF 1789 and NQF 2879e).

Because of the homology between the claims and hybrid HWM measures, there is no reason to suspect that the results of analyses done for the claims-only measure would differ in any significant way from results of analyses for a nationally representative hybrid measure.

Below we highlight the differences between the two measures, including specifications, data used, and testing which reflect limitations of data availability, as well as actual intended differences in the measure (risk adjustment).

Differences in the measure, data, and testing that reflect limitations in data availability

1. Dataset used for development, some testing (see below for differences), and measure results:

a. The claims-only measure uses nation-wide Medicare FFS claims and the enrollment database.

b. The hybrid measure uses an electronic health record (EHR) database from 21 hospitals in the Kaiser Permanente network which includes inpatient claims data information.

2. Age of patients in cohort:

a. The claims-only measure includes Medicare FFS patients, age 65-94.

b. The hybrid measure includes all patients age 50-94 (see later discussion for justification)

3. External empiric validity testing

a. Not possible for the hybrid measure, due to limited data availability. We provide results from the claims-only measure within the hybrid testing form.

4. Socioeconomic risk factor analyses

a. Not possible for the hybrid measure, due to limited data availability. We provide results from the claims-only measure within the hybrid testing form.

5. Exclusion analyses

a. To be representative of what we expect the impact would be of the measures' exclusions in a nation-wide sample, we provide the results from the claims-only measure.

6. Meaningful differences

a. To be representative of what we expect the range of performance would be in a nation-wide sample, we provide the distribution results from the claims-only measure.

Difference between the two measures when fully harmonized, prior to implementation:

1. Risk adjustment:

a. The claims-only measure uses administrative claims data only for risk adjustment

b. The hybrid measure adds 10 clinical risk variables, derived from a set of core clinical data elements (CCDE) extracted from the EHR.

0230 Hospital 30-day, all-cause, risk-standardized mortality rate (RSMR) following acute myocardial infarction (AMI) hospitalization

This measure estimates a hospital-level, 30-day risk-standardized mortality rate (RSMR) for patients discharged from the hospital with a principal diagnosis of acute myocardial infarction (AMI). Mortality is defined as death from any cause within 30 days after the index admission date. The Centers for Medicare & Medicaid Services (CMS) annually

reports the measure for patients who are 65 years and older and are Medicare fee-for-service (FFS) beneficiaries hospitalized in non-federal hospitals or patients hospitalized in Veterans Health Administration (VA) facilities.

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

The measure estimates a hospital-level 30-day risk-standardized mortality rate (RSMR). Mortality is defined as death for any cause within 30 days after the admission date for the index admission, for patients 18 and older discharged from the hospital with a principal diagnosis of heart failure (HF). The Centers for Medicare & Medicaid Services (CMS) annually reports the measure for patients who are 65 years or older and are either Medicare fee-for-service (FFS) beneficiaries and hospitalized in non-federal hospitals or patients hospitalized in Veterans Health Administration (VA) facilities.

2876 Hospital 30-day, all-cause, risk-standardized mortality rate (RSMR) following acute ischemic stroke hospitalization with claims-based risk adjustment for stroke severity

This stroke mortality measure estimates the hospital-level, risk-standardized mortality rate (RSMR) for patients discharged from the hospital with a principal discharge diagnosis of acute ischemic stroke. The outcome is all-cause 30-day mortality, defined as death from any cause within 30 days of the index admission date, including in-hospital death, for stroke patients. This is a newly developed measure with a cohort and outcome that is harmonized with the CMS's current publicly reported claims-based stroke mortality measure and includes the National Institutes of Health (NIH) Stroke Scale as an assessment of stroke severity in the risk-adjustment model. This measure uses Medicare fee-for-service (FFS) administrative claims for the cohort derivation, outcome, and risk adjustment.

0347 Death Rate in Low-Mortality Diagnosis Related Groups (PSI02)

In-hospital deaths per 1,000 discharges for low mortality (< 0.5%) Diagnosis Related Groups (DRGs) among patients ages 18 years and older or obstetric patients. Excludes cases with trauma, cases with cancer, cases with an immunocompromised state, and transfers to an acute care facility.

[NOTE: The software provides the rate per hospital discharge. However, common practice reports the measure as per 1,000 discharges. The user must multiply the rate obtained from the software by 1,000 to report in-hospital deaths per 1,000 hospital discharges.]

0530 Mortality for Selected Conditions

A composite measure of in-hospital mortality indicators for selected conditions.

Type

3502 Hybrid Hospital-Wide (All-Condition, All-Procedure) Risk-Standardized Mortality Measure

Outcome

0230 Hospital 30-day, all-cause, risk-standardized mortality rate (RSMR) following acute myocardial infarction (AMI) hospitalization

Outcome

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

Outcome

2876 Hospital 30-day, all-cause, risk-standardized mortality rate (RSMR) following acute ischemic stroke hospitalization with claims-based risk adjustment for stroke severity

Outcome

0347 Death Rate in Low-Mortality Diagnosis Related Groups (PSI02)

Outcome

0530 Mortality for Selected Conditions

Composite

Data Source

3502 Hybrid Hospital-Wide (All-Condition, All-Procedure) Risk-Standardized Mortality Measure

Claims, Electronic Health Records, Other Clinical-Hybrid Dataset

Constructed using Kaiser Permanente Northern California matched administrative claims and electronic health record (EHR) data, admission dates from October 1, 2015 – December 30, 2016. This data source was used for measure testing. (An earlier Kaiser dataset from that included all admissions for adult patients to any of their member hospitals between January 1, 2009 and June 30, 2015 was used for measure development, as described in the attached methodology report).

The two data sources listed below were used for testing the claims-based measure; the hybrid testing form includes some testing data from the claims-based measure (for example, for the social risk factor and external validation analyses).

HWM claims-only datasets:

Medicare Part A Inpatient Claims Data

The index dataset contains administrative inpatient hospitalization data for Medicare FFS beneficiaries, aged 65-94 on admission. The history dataset includes administrative inpatient hospitalization data on each patient for the 12 months prior to the index admission. This data was used along with the Medicare Enrollment Database (EDB) for testing the claims-based measure.

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. It was also used to determine hospice enrollment.

No data collection instrument provided Attachment Del18b2HOP5HWMHybridDataDictionary01072019.xlsx

0230 Hospital 30-day, all-cause, risk-standardized mortality rate (RSMR) following acute myocardial infarction (AMI) hospitalization

Claims, Other, Paper Medical Records Data sources for the Medicare FFS measure:

1. Medicare Part A inpatient and Part B outpatient claims: This data source contains claims data for fee-for service inpatient and outpatient services including: Medicare inpatient

hospital care, outpatient hospital services, skilled nursing facility care, some home health agency services, as well as inpatient and outpatient physician claims for the 12 months prior to an index admission.

2. Medicare Enrollment Database (EDB): This database contains Medicare beneficiary demographic, benefit/coverage, and vital status information. This data source was used to obtain information on several inclusion/exclusion indicators such as Medicare status on admission as well as vital status. These data have previously been shown to accurately reflect patient vital status (Fleming et al., 1992).

3. Veterans Health Administration Data: This data source contains claims data for VA inpatient and outpatient services including: inpatient hospital care, outpatient hospital services, skilled nursing facility care, some home health agency services, as well as inpatient and outpatient physician claims for the 12 months prior to and including each index admission. Unlike Medicare FFS patients, VA patients are not required to have been enrolled in Part A and Part B Medicare for the 12 months prior to the date of admission.

All-payer data sources:

For our analyses to examine use in all-payer data, we used all-payer data from California in addition to CMS data for Medicare FFS 65+ patients in California hospitals. California is a diverse state, and, with more than 37 million residents, California represents 12% of the US population. We used the California Patient Discharge Data, a large, linked database of patient hospital admissions. 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 as well as CMS Medicare FFS data for California hospitals, we performed analyses to determine whether the AMI mortality measure can be applied to all adult patients, including not only FFS Medicare patients aged 65+ but also non-FFS Medicare patients aged 65+ and younger patients aged 18-64 years at the time of admission.

References:

Fleming C, Fisher ES, Chang CH, Bubolz TA, Malenka DJ. 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_0230_AMI_Mortality_Data_Dictionary_Final-636973300643762106.xlsx

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

Claims, Other, Paper Medical Records Data sources for the Medicare FFS measure:

1. Medicare Part A inpatient and Part B outpatient claims: This data source contains claims data for FFS inpatient and outpatient services including: Medicare inpatient hospital care, outpatient hospital services, skilled nursing facility care, some home health agency services, as well as inpatient and outpatient physician claims for the 12 months prior to an index admission.

2. Medicare Enrollment Database (EDB): This database contains Medicare beneficiary demographic, benefit/coverage, and vital status information. This data source was used to

obtain information on several inclusion/exclusion indicators such as Medicare status on admission as well as vital status. These data have previously been shown to accurately reflect patient vital status (Fleming et al., 1992).

3. Veterans Health Administration (VA) Data: This data source contains claims data for VA inpatient and outpatient services including: inpatient hospital care, outpatient hospital services, skilled nursing facility care, some home health agency services, as well as inpatient and outpatient physician claims for the 12 months prior to and including each index admission. Unlike Medicare FFS patients, VA patients are not required to have been enrolled in Part A and Part B Medicare for the 12 months prior to the date of admission.

All-payer data sources:

For our analyses to examine use in all-payer data, we used all-payer data from California in addition to CMS data for Medicare FFS 65+ patients in California hospitals. California is a diverse state, and, with more than 37 million residents, California represents 12% of the US population. We used the California Patient Discharge Data, a large, linked database of patient hospital admissions. 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 as well as CMS Medicare FFS data for California hospitals, we performed analyses to determine whether the HF mortality measure can be applied to all adult patients, including not only FFS Medicare patients aged 65+ but also non-FFS Medicare patients aged 18-64 years at the time of admission.

Reference:

Fleming C, Fisher ES, Chang CH, Bubolz TA, Malenka DJ. 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_0229_S2b_HF_Mortality_Data_Dictionary_v1.0_Final-636973301131111819.xlsx

2876 Hospital 30-day, all-cause, risk-standardized mortality rate (RSMR) following acute ischemic stroke hospitalization with claims-based risk adjustment for stroke severity

Claims (Only), Other, Registry For measure implementation the data sources will be:

1. Medicare Part A inpatient and Part B outpatient claims: This data source contains claims data for fee-for service inpatient and outpatient services including: Medicare inpatient hospital care, outpatient hospital services, skilled nursing facility care, some home health agency services, as well as inpatient and outpatient physician claims for the 12 months prior to an index admission.

2. Medicare Enrollment Database (EDB): This database contains Medicare beneficiary demographic, benefit/coverage, and vital status information. This data source was used to obtain information on several inclusion/exclusion indicators such as Medicare status on admission, as well as vital status. These data have previously been shown to accurately reflect patient vital status (Fleming et al., 1992).

3. For measure development purposes only, we linked the data sources above with data from the AHA/ASA GWTG-Stroke Registry. The registry data were used to obtain the National Institutes of Health (NIH) Stroke Scale scores and clinical risk variables. When this

measure is implemented NIH Stroke Scale scores will be derived from ICD-10 codes in Medicare claims.

Reference:

Fleming C, Fisher ES, Chang CH, Bubolz TA, Malenka DJ. 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. Data sources for the all-payer update

No data collection instrument provided Attachment NQF_2876_Claims-Only_Stroke_Mortality_S2b_Mortality_Data_Dictionary_v1.0-635884757617681755.xlsx

0347 Death Rate in Low-Mortality Diagnosis Related Groups (PSI02)

Claims While the measure is tested and specified using data from the Healthcare Cost and Utilization Project (HCUP) (see section 1.1 and 1.2 of the measure testing form), the measure specifications and software are specified to be used with any ICD-9-CM-coded administrative billing/claims/discharge dataset with Present on Admission (POA) information. Note that in Version 5.0 (April 2015), the AHRQ QI software will no longer support prediction of POA status using an embedded prediction module. Users are expected to provide POA data.

Available at measure-specific web page URL identified in S.1 Attachment PSI_02_Death_Rate_in_Low-Mortality_Diagnosis_Related_Groups_-DRGs-_-_Editable.xlsx

0530 Mortality for Selected Conditions

Electronic administrative data/claims

Level

3502 Hybrid Hospital-Wide (All-Condition, All-Procedure) Risk-Standardized Mortality Measure

Facility

0230 Hospital 30-day, all-cause, risk-standardized mortality rate (RSMR) following acute myocardial infarction (AMI) hospitalization

Facility

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

Facility

2876 Hospital 30-day, all-cause, risk-standardized mortality rate (RSMR) following acute ischemic stroke hospitalization with claims-based risk adjustment for stroke severity

Facility

0347 Death Rate in Low-Mortality Diagnosis Related Groups (PSI02)

Facility

0530 Mortality for Selected Conditions

Facility/Agency

Setting

3502 Hybrid Hospital-Wide (All-Condition, All-Procedure) Risk-Standardized Mortality Measure

Inpatient/Hospital, Other Home-based primary care and home-based palliative care); Settings include: Home, Boarding home, Domiciliary, Assisted Living Facilities, Rest Home or Custodial Care Services

0230 Hospital 30-day, all-cause, risk-standardized mortality rate (RSMR) following acute myocardial infarction (AMI) hospitalization

Inpatient/Hospital

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

Inpatient/Hospital, Other Hospital & Hospital: Acute Care Facility

2876 Hospital 30-day, all-cause, risk-standardized mortality rate (RSMR) following acute ischemic stroke hospitalization with claims-based risk adjustment for stroke severity

Hospital

0347 Death Rate in Low-Mortality Diagnosis Related Groups (PSI02)

Inpatient/Hospital

0530 Mortality for Selected Conditions

Hospital

Numerator Statement

3502 Hybrid Hospital-Wide (All-Condition, All-Procedure) Risk-Standardized Mortality Measure

The outcome for this measure is 30-day, all-cause mortality. Mortality is defined as death from any cause, either during or after admission, within 30 days of the index admission date.

0230 Hospital 30-day, all-cause, risk-standardized mortality rate (RSMR) following acute myocardial infarction (AMI) hospitalization

The outcome for this measure is 30-day all-cause mortality. We define mortality as death from any cause within 30 days from the date of admission for patients discharged from the hospital with a principal diagnosis of AMI.

Additional details are provided in S.5 Numerator Details.

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

The outcome for this measure is 30-day all-cause mortality. We define mortality as death from any cause within 30 days of the index admission date for patients 65 and older discharged from the hospital with a principal diagnosis of HF.

Additional details are provided in S.5 Numerator Details.

2876 Hospital 30-day, all-cause, risk-standardized mortality rate (RSMR) following acute ischemic stroke hospitalization with claims-based risk adjustment for stroke severity

The outcome for this measure is 30-day, all-cause mortality. We define mortality as death from any cause within 30 days of the index admission for patients with a principal discharge diagnosis of acute ischemic stroke.

0347 Death Rate in Low-Mortality Diagnosis Related Groups (PSI02)

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

0530 Mortality for Selected Conditions

Number of in-hospital deaths

Numerator Details

3502 Hybrid Hospital-Wide (All-Condition, All-Procedure) Risk-Standardized Mortality Measure

The measure outcome is death from any cause within 30 days of the admission date of the index admission. The numerator is a binary variable (1=yes/0=no) that indicates whether the patient died within 30 days of the index admission date.

0230 Hospital 30-day, all-cause, risk-standardized mortality rate (RSMR) following acute myocardial infarction (AMI) hospitalization

Outcome definition

This measure counts death from any cause within 30 days after the index admission date.

Rationale: From a patient perspective, death is the most critical outcome regardless of cause. Outcomes occurring within 30 days of admission can be influenced by hospital care and early transition to the non-acute care setting. The 30-day time frame is a clinically meaningful period for hospitals to collaborate with their communities to reduce mortality. (Simoes et al., 2018; Dharmarajan et al., 2015).

Identifying deaths in the Medicare FFS population

As currently reported, we identify deaths for FFS Medicare patients 65 years and older in the Medicare Enrollment Database (EDB).

Identifying deaths in the all-payer population

For the purposes of development of an all-payer measure, deaths were identified using the California vital statistics data file. Nationally, post-discharge deaths can be identified using an external source of vital status, such as the Social Security Administration's Death Master File (DMF) or the Centers for Disease Control and Prevention's National Death Index (NDI).

Reference:

1. Simoes J, Grady J, Purvis D, et al. 2018 Condition-Specific Measures Updates and Specifications Report Hospital-Level 30-Day Risk-Standardized Mortality Measures. http://www.qualitynet.org/dcs/ContentServer?c=Page&pagename=QnetPublic/Page/QnetTier3&cid=1163010421830. Accessed May 4, 2018.

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

Outcome Definition

The measure counts deaths for any cause within 30 days of the date of admission of the index HF hospitalization.

Rationale: From a patient perspective, death is a critical outcome regardless of cause. Outcomes occurring within 30 days of the start of the admission can be influenced by hospital care and early transition to the non-acute care setting. The 30-day time frame is a clinically meaningful period for hospitals to collaborate with their communities to reduce mortality (Simoes et al., 2017; Dharmarajan et al., 2015).

Identifying deaths in the FFS measure

As currently reported, we identify deaths for FFS Medicare patients 65 years and older in the Medicare Enrollment Database (EDB).

Identifying deaths in the all-payer measure

For the purposes of development of an all-payer measure, deaths were identified using the California vital statistics data file. Nationally, post-discharge deaths can be identified using an external source of vital status, such as the Social Security Administration's Death Master File (DMF) or the Centers for Disease Control and Prevention's National Death Index (NDI).

Reference:

1. Simoes J, Grady J, DeBuhr J, et al. 2017 Condition-Specific Measures Updates and Specifications Report Hospital-Level 30-Day Risk-Standardized Mortality Measures. http://www.qualitynet.org/dcs/ContentServer?c=Page&pagename=QnetPublic/Page/QnetTier3&cid=1163010421830. Accessed June 7, 2017.

2. Dharmarajan K, Hsieh AF, Kulkarni VT, et al. 2015 Trajectories of risk after hospitalization for heart failure, acute myocardial infarction, or pneumonia: retrospective cohort study. BMJ (Clinical researched);350:h411

2876 Hospital 30-day, all-cause, risk-standardized mortality rate (RSMR) following acute ischemic stroke hospitalization with claims-based risk adjustment for stroke severity

The measure outcome is death from any cause within 30 days of the index admission date. As currently specified, we identify deaths for FFS Medicare patients, age 65 years and older, in the Medicare Enrollment Database (EDB).

0347 Death Rate in Low-Mortality Diagnosis Related Groups (PSI02)

Not applicable

0530 Mortality for Selected Conditions

Number of in-hospital deaths for CHF, stroke, hip fracture, pneumonia, acute myocardial infarction and GI

hemorrhage (separately). See Inpatient Quality Indicators: Technical Specifications for additional details (http://www.qualityindicators.ahrq.gov/Modules/IQI_TechSpec.aspx).

Denominator Statement

3502 Hybrid Hospital-Wide (All-Condition, All-Procedure) Risk-Standardized Mortality Measure

The cohort includes inpatient admissions for a wide variety of conditions for patients aged between 50 and 94 years old who were discharged from short-term acute care hospitals. If a patient has more than one admission during the measurement year, one admission is randomly selected for inclusion in the measure. Additional details are provided in S.7

Denominator Details. The age range for this measure differs from that of the claims-only measure due to the limited size of the dataset used for testing. The intent is to harmonize the age range of the hybrid measure with the age range of the claims-only measure, so that both will include admissions for patients age 65-94.

0230 Hospital 30-day, all-cause, risk-standardized mortality rate (RSMR) following acute myocardial infarction (AMI) hospitalization

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 discharged from the hospital with a principal discharge diagnosis of AMI and with a complete claims history for the 12 months prior to admission. The measure is currently publicly reported by CMS for those patients 65 years and older who are either Medicare FFS beneficiaries admitted to non-federal hospitals or patients admitted to VA hospitals.

Additional details are provided in S.7 Denominator Details.

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

This claims-based measure can be used in either of two patient cohorts: (1) patients aged 65 years or older or (2) patients aged 18 years or older. We have explicitly tested the measure in both age groups.

The cohort for the publically reported measure includes admissions for patients aged 65 years and older discharged from the hospital with a principal discharge diagnosis of HF and with a complete claims history for the 12 months prior to admission. The measure is currently publicly reported by CMS for those patients 65 years and older who are either Medicare FFS beneficiaries admitted to non-federal hospitals or patients admitted to VA hospitals.

Additional details are provided in S.7 Denominator Details.

2876 Hospital 30-day, all-cause, risk-standardized mortality rate (RSMR) following acute ischemic stroke hospitalization with claims-based risk adjustment for stroke severity

The cohort includes inpatient admissions to all non-federal, short-term, acute care hospitals for Medicare FFS patients age 65 years and older with a principal discharge diagnosis of acute ischemic stroke.

Additional details are provided in S.9 Denominator Details.

0347 Death Rate in Low-Mortality Diagnosis Related Groups (PSI02)

Discharges, for patients ages 18 years and older or MDC 14 (pregnancy, childbirth, and puerperium), with a low-mortality (less than 0.5% mortality) MS-DRG code (LOWMODR). If an MS-DRG is divided into “without/with (major) complications and comorbidities,” both codes without complications/comorbidities and codes with (major) complications/comorbidities must have mortality rates below 0.5% in the reference population to qualify for inclusion.

0530 Mortality for Selected Conditions

Number of eligible discharges (all indicators are limited to the adult population)

Denominator Details

3502 Hybrid Hospital-Wide (All-Condition, All-Procedure) Risk-Standardized Mortality Measure

The index cohort includes all inpatient admissions for patients aged 50-94 years old. (Note: The intention is to fully harmonize the cohort definition with the claims-only measure so that both measures will capture admissions for patients age 65-94. We deviated from that definition during development and testing due to the limited dataset available that included the EHR data elements needed to calculate this measure. Note that the risk model already includes age in years, as a risk variable.)

An index admission is the hospitalization to which the mortality outcome is attributed and includes admissions for patients:

1. Not transferred from another acute care facility

Rationale: Admissions to an acute cate hospital within one day of discharge from another acute care hospital are considered transfers. Transferred patients are included in the measure cohort, but it is the initial hospitalization rather than any "transfer-in" hospitalization(s), that is included as the hospitalization to which the mortality outcome is attributed (the index admission).

2. Aged between 50 and 94 years

The hybrid measure is intended for the Medicare FFS population but was tested in a limited dataset due to the EHR data elements included. The use of a small dataset required that we expand the sample by including admissions from patients ages 50 to 94 years. Note that the measure already adjusts for age.

3. Not admitted for primary psychiatric diagnoses

Rationale: Patients admitted for psychiatric treatment are typically cared for in separate psychiatric facilities that are not comparable to short-term acute care hospitals (see data dictionary, HWM Non-Acute Care Inclusion tab).

4. Not admitted for rehabilitation

Rationale: These admissions are not typically to a short-term acute care hospital and are not for acute care (see data dictionary, HWM Non-Acute Care Inclusion tab).

5. Not enrolled in hospice at the time of, or 12 months prior to, their index admission

Rationale: Patients enrolled in hospice in the prior 12 months or at the time of admission are unlikely to have 30-day survival as a primary goal

6. Not enrolled in hospice within two days of admission

Rationale: There is not a single, correct approach regarding patients enrolled in hospice during admission or upon discharge – mortality may or may not represent a quality signal for this group of patients and hospice enrollment is inadequate to differentiate this issue. However, for most patients and/or families who had the discussion and agreed to enroll in hospice within two days of admission, 30-day survival is not likely the primary goal due to their condition and not the quality of care received.

7. Not with a principal diagnosis of cancer and enrolled in hospice during their index admission

Rationale: Patients admitted primarily for cancer who are enrolled in hospice during admission are unlikely to have 30-day survival as a primary goal of care. (see data dictionary, HWM Cancer Inclusion tab).

8. Without any diagnosis of metastatic cancer

Rationale: Although some patients admitted with a diagnosis of metastatic cancer will have 30-day survival as a primary goal of care, for many such patients admitted to the hospital, death may be a clinically reasonable and patient-centered outcome. (see data dictionary, HWM Metastatic Cancer Inclusion tab).

9. Not with a principal discharge diagnosis, or a secondary diagnosis that is present on admission (POA) for a condition which hospitals have limited ability to influence survival

Rationale: Hospitals have little ability to impact mortality for some conditions. This list of conditions (see data dictionary, HWM ICD-10 Inclusion tab) was determined through independent review, by several clinicians, of conditions associated with high mortality. The decisions were also reviewed with our Technical Expert Panel (TEP) and Technical Work Group. Admissions are not included in the cohort if the patient had a principal diagnosis code that is on this list, or a secondary code with POA that is on the list.

In addition, for patients with multiple admissions, the measure selects only one admission, at random, for inclusion. There is no practical statistical modeling approach that can account or adjust for the complex relationship between the number of admissions and risk of mortality in the context of a hospital-wide mortality measure. Random selection ensures that providers are not penalized for a "last" admission during the measurement period; selecting the last admission would not be as accurate a reflection of the risk of death as random selection, as the last admission is inherently associated with a higher mortality risk. Random selection is also used in CMS's condition-specific mortality measures. Note that random selection reduces the number of admissions, but does not exclude any patients from the measure.

The cohort is defined using ICD-10 Clinical Modification codes identified in Medicare Part A Inpatient claims data. The measure aggregates the ICD-10 principal diagnosis and all procedure codes of the index admission into clinically coherent groups of conditions and procedures (condition categories or procedure categories) using the Agency for Healthcare Research and Quality (AHRQ) Clinical Classifications System (CCS). There is a total of 285 mutually exclusive AHRQ condition categories, most of which are single, homogenous diseases such as pneumonia or acute myocardial infarction. Some are aggregates of conditions, such as "other bacterial infections". There is a total of 231 mutually exclusive procedure categories. Using the AHRQ CCS procedure and condition categories, the measure assigns each index hospitalization to one of 15 mutually exclusive divisions. The divisions were created based upon clinical coherence, consistency of mortality risk, adequate patient and hospital case volume for stable results reporting, and input from clinicians, patients, and patient caregivers on usability.

The measure first assigns admissions with qualifying AHRQ procedure categories to one of six surgery divisions by identifying a defining surgical procedure. The defining surgical procedure is identified using the following algorithm: 1) if a patient only has one major surgical procedure then that procedure is the defining surgical procedure; 2) if a patient has more than one major surgical procedure, the first dated procedure performed during the index admission is the defining surgical procedure; 3) if there is more than one major surgical procedure on that earliest date, the procedure with the highest mortality rate is the defining surgical procedure. These divisions include admissions likely cared for by surgical teams.

The surgical divisions are: Surgical Cancer (see note below), Cardiothoracic Surgery, General Surgery, Neurosurgery, Orthopedic Surgery, and Other Surgical Procedures.

For the Surgical Cancer division, any admission that includes a surgical procedure and a principal discharge diagnosis code of cancer is assigned to the Surgical Cancer division. This division and the logic behind it was implemented in response to feedback from our Technical Expert Panel.

The measure then assigns the remaining admissions into one of the nine non-surgical divisions based on the AHRQ diagnostic CCS of the principal discharge diagnosis. The non-surgical divisions are: Cancer, Cardiac, Gastrointestinal, Infectious Disease, Neurology, Orthopedic, Pulmonary, Renal, Other Conditions.

The full list of the specific diagnosis and procedure AHRQ CCS categories used to define the divisions are attached in the Data Dictionary.

0230 Hospital 30-day, all-cause, risk-standardized mortality rate (RSMR) following acute myocardial infarction (AMI) hospitalization

To be included in the measure cohort used in public reporting, patients must meet the following additional inclusion criteria:

1. Having a principal discharge diagnosis of AMI;

2. Enrolled in Medicare FFS Part A and Part B for the first 12 months prior to the date of admission, enrolled in Part A during the index admission, or those who are VA beneficiaries;

3. Aged 65 or over; and

4. Not transferred from another acute care facility.

ICD-9 and ICD-10 cohort codes are included in the attached Data Dictionary.

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

To be included in the HF measure cohort used in public reporting, patients must meet the following additional inclusion criteria:

1. Have a principal discharge diagnosis of heart failure (HF);

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 Part A during the index admission, or those who are VA beneficiaries (in the cases of the AMI, HF, and pneumonia measures);

3. Aged 65 or over; and,

4. Not transferred from another acute care facility.

VA beneficiaries are eligible for inclusion in the AMI, HF, and pneumonia measure cohorts regardless of Medicare FFS enrollment or whether they were hospitalized in a VA or non-VA short-term acute care hospital.

This measure can also be used for an all-payer population aged 18 years and older. We have explicitly tested the measure in both patients aged 18+ years and those aged 65+ years.

ICD-9 and ICD-10 cohort codes are included in the attached Data Dictionary.

2876 Hospital 30-day, all-cause, risk-standardized mortality rate (RSMR) following acute ischemic stroke hospitalization with claims-based risk adjustment for stroke severity

The denominator includes all Medicare FFS beneficiaries, age 65 and over, with a principal discharge diagnosis of acute ischemic stroke. To be included in the measure cohort used in public reporting, patients must meet the following additional inclusion criteria:

1. Enrolled in Medicare fee-for-service (FFS) during the index admission;

2. Not transferred from another acute care facility; and

3. Enrolled in Part A and Part B Medicare for the 12 months prior to the date of index admission.

ICD-9-CM codes that define the patient cohort:

433.01 Occlusion and stenosis of basilar artery with cerebral infarction

433.11 Occlusion and stenosis of carotid artery with cerebral infarction

433.21 Occlusion and stenosis of vertebral artery with cerebral infarction

433.31 Occlusion and stenosis of multiple and bilateral precerebral arteries with cerebral infarction

433.81 Occlusion and stenosis of other specified precerebral artery with cerebral infarction

433.91 Occlusion and stenosis of unspecified precerebral artery with cerebral infarction

434.01 Cerebral thrombosis with cerebral infarction

434.11 Cerebral embolism with cerebral infarction

434.91 Cerebral artery occlusion, unspecified with cerebral infarction

436 Acute, but ill-defined, cerebrovascular disease

ICD-10 codes that define the patient cohort:

I63.22 Cerebral infarction due to unspecified occlusion or stenosis of basilar arteries

I63.139 Cerebral infarction due to embolism of unspecified carotid artery

I63.239 Cerebral infarction due to unspecified occlusion or stenosis of unspecified carotid arteries

I63.019 Cerebral infarction due to thrombosis of unspecified vertebral artery

I63.119 Cerebral infarction due to embolism of unspecified vertebral artery

I63.219 Cerebral infarction due to unspecified occlusion or stenosis of unspecified vertebral arteries

I63.59 Cerebral infarction due to unspecified occlusion or stenosis of other cerebral artery

I63.20 Cerebral infarction due to unspecified occlusion or stenosis of unspecified precerebral arteries

I63.30 Cerebral infarction due to thrombosis of unspecified cerebral artery

I63.40 Cerebral infarction due to embolism of unspecified cerebral artery

I63.50 Cerebral infarction due to unspecified occlusion or stenosis of unspecified cerebral artery

I67.8 Other specified cerebrovascular diseases

I67.89 Other cerebrovascular diseases

An ICD-9 to ICD-10 crosswalk is attached in field S.2b. (Data Dictionary or Code Table).

0347 Death Rate in Low-Mortality Diagnosis Related Groups (PSI02)

LOWMODR: Low-mortality (less than 0.5%) MS-DRG codes

(See attached technical specifications for detailed list of codes.)

0530 Mortality for Selected Conditions

Number of eligible adult discharges for CHF, stroke, hip fracture, pneumonia, acute myocardial infarction and GI

hemorrhage (separately).

See Inpatient Quality Indicators: Technical Specifications for additional details (http://www.qualityindicators.ahrq.gov/Modules/IQI_TechSpec.aspx).

Exclusions

3502 Hybrid Hospital-Wide (All-Condition, All-Procedure) Risk-Standardized Mortality Measure

The measure excludes index admissions for patients:

1. With inconsistent or unknown vital status (from claims data) or other unreliable claims data;

2. Discharged against medical advice (AMA);

3. With an admission for spinal cord injury (CCS 227), skull and face fractures (CCS 228), Intracranial Injury (CCS 233), Crushing injury or internal injury (CCS 234), Open wounds of head/neck/trunk (CCS 235), and burns (CCS 240); and

4. With a principal discharge diagnosis within a CCS with fewer than 100 admissions in that division within the measurement year.

0230 Hospital 30-day, all-cause, risk-standardized mortality rate (RSMR) following acute myocardial infarction (AMI) hospitalization

The mortality measure excludes index hospitalizations that meet any of the following exclusion criteria:

1. Discharged alive on the day of admission or the following day who were not transferred to another acute care facility;

2. Inconsistent or unknown vital status or other unreliable demographic (age and gender) data;

3. Enrolled in the Medicare hospice program or used VA hospice services any time in the 12 months prior to the index admission, including the first day of the index admission, or

4. Discharged against medical advice (AMA).

For patients with more than one admission for a given condition in a given year, only one index admission for that condition is randomly selected for inclusion in the cohort. Similarly, for the three-year combined data, when index admissions occur during the transition between measure reporting periods (June and July of each year) and both are randomly selected for inclusion in the measure, the measure includes only the June admission. The July admissions are excluded to avoid assigning a single death to two admissions.

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

The HF mortality measure excludes index hospitalizations that meet any of the following exclusion criteria:

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

2. Enrolled in the Medicare hospice program or used VA hospice services any time in the 12 months prior to the index admission, including the first day of the index admission; or,

3. Discharged against medical advice.

4. Discharged alive on the day of admission or the following day who were not transferred to another acute care facility; or

5. With a procedure code for LVAD implantation or heart transplantation either during the index admission or in the 12 months prior to the index admission.

For patients with more than one admission for a given condition in a given year, only one index admission for that condition is randomly selected for inclusion in the cohort.

2876 Hospital 30-day, all-cause, risk-standardized mortality rate (RSMR) following acute ischemic stroke hospitalization with claims-based risk adjustment for stroke severity

The measure excludes admissions for patients:

1. With inconsistent or unknown vital status or other unreliable data;

2. Enrolled in the Medicare hospice program at any time in the 12 months prior to the index admission, including the first day of the index admission; and

3. Discharged against medical advice (AMA).

For patients with more than one admission for stroke in a given year, only one index admission for that condition is randomly selected for inclusion in the cohort.

0347 Death Rate in Low-Mortality Diagnosis Related Groups (PSI02)

Exclude cases:

- with any listed ICD-10-CM diagnosis codes for trauma (Appendix G: TRAUMID)
- with any listed ICD-10-CM diagnosis codes for cancer (Appendix H: CANCEID)
- with any listed ICD-10-CM diagnosis codes for immunocompromised state (Appendix I: IMMUNID)
- with any listed ICD-10-PCS procedure codes for immunocompromised state (Appendix I: IMMUNIP)
- transfer to an acute care facility (DISP=2)
- with missing discharge disposition (DISP=missing), gender (SEX=missing), age (AGE=missing), quarter (DQTR=missing), year (YEAR=missing), or principal diagnosis (DX1=missing)

0530 Mortality for Selected Conditions

Indicator specific

Exclusion Details

3502 Hybrid Hospital-Wide (All-Condition, All-Procedure) Risk-Standardized Mortality Measure

1. With inconsistent or unknown vital status (from claims data) or other unreliable claims data.

Rationale: The measure does not include stays for patients where the admission date is after the date of death, or where the date of death occurs before the date of discharge but the patient was discharged alive because these are likely errors in the data.

2. Discharged against medical advice (AMA)

Rationale: Providers did not have the opportunity to deliver full care and prepare the patient for discharge.

3. With an admission for spinal cord injury (CCS 227), skull and face fractures (CCS 228), Intracranial Injury (CCS 233), Crushing injury or internal injury (CCS 234), Open wounds of head/neck/trunk (CCS 235), and burns (CCS 240).

Rationale: Even though a hospital likely can influence the outcome of some of these conditions, in many cases death events are not a signal of poor quality of care when patients present with these conditions. These conditions are also infrequent events that are unlikely to be uniformly distributed across hospitals.

4. With a principal discharge diagnosis within a CCS with fewer than 100 admissions in that division within the measurement year.

Rationale: To calculate a stable and precise risk model, there are a minimum number of admissions that are needed. In addition, a minimum number of admissions and/or outcome events are required to inform grouping admissions into larger categories. These admissions present challenges to both accurate risk prediction and coherent risk grouping and are therefore excluded.

Note: During measure development we analyzed different volume cut-offs (25, 50 and 100). Using cut-off values below 100 resulted in too many CCS codes in some of the divisions (the CCS category codes are used in risk adjustment) which resulted in non-convergence of those division-level risk models. The total number of patients excluded is very small (13,597 or 0.21% of admissions for a cut off of 100). During measure development we also explored the option of pooling low-volume CCS codes (CCS<100 patients) into one group, however, the heterogeneity in mortality rates for the individual ICD-10 codes in those groups would preclude adequate risk adjustment. The TEP supported excluding these admissions.

0230 Hospital 30-day, all-cause, risk-standardized mortality rate (RSMR) following acute myocardial infarction (AMI) hospitalization

1. Discharged alive on the day of admission or the following day who were not transferred to another acute care facility. Discharges are identified using data from the claims.

Rationale: It is unlikely that these patients had clinically significant AMI.

2. Inconsistent or unknown vital status or other unreliable demographic data

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

3. Enrolled in the Medicare hospice program or used VA hospice services any time in the 12 months prior to the index admission, including the first day of the index admission. Enrollment to Medicare beneficiaries is determined using the Medicare Enrollment Database.

Rationale: These patients are likely continuing to seek comfort measures only, so mortality is not necessarily an adverse outcome or signal of poor quality care.

4. Discharged against medical advice. Discharge status is identified using the claims

Rationale: Providers did not have the opportunity to deliver full care and prepare the patient for discharge.

After exclusions #1-4 are applied, the measure randomly selects one index admission per patient per year for inclusion in the cohort so that each episode of care is mutually independent with the same probability of the outcome. Additional admissions within that year are excluded. For each patient, the probability of death increases with each subsequent admission and therefore the episodes of care are not mutually independent.

For the three-year combined data, when index admissions occur during the transition between measure reporting periods (June and July of each year) and both are randomly selected for inclusion in the measure, the measure includes only the June admission. July admissions are excluded to avoid assigning a single death to two admissions.

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

1. Inconsistent or unknown vital status or other unreliable demographic data

Inconsistent vital status or unreliable data are identified if any of the following conditions are met 1) the patient's age is greater than 115 years: 2) if the discharge date for a hospitalization is before the admission date; 3) if the patient has a sex other than 'male'

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

2. Enrolled in the Medicare hospice program any time in the 12 months prior to the index admission, including the first day of the index admission

Rationale: Hospice enrollment in the 12 months prior to or on the index admission is identified using hospice data and the Inpatient standard analytic file (SAF). This exclusion applies when the measure is used in Medicare FFS patients only.

Rationale: These patients are likely continuing to seek comfort measures only; thus, mortality is not necessarily an adverse outcome or signal of poor quality care.

3. Discharged against medical advice

Discharges against medical advice are identified using the discharge disposition indicator.

Rationale: Providers did not have the opportunity to deliver full care and prepare the patient for discharge.

4. Discharged alive on the day of admission or the following day who were not transferred to another acute care facility. The discharge disposition indicator is used to identify patients alive at discharge. Transfers are identified in the claims when a patient with a qualifying admission is discharged from an acute care hospital and admitted to another acute care hospital on the same day or next day.

Rationale: It is unlikely that these patients had clinically significant HF.

5. With a procedure code for LVAD implantation or heart transplantation either during the index admission or in the 12 months prior to the index admission

Patients with LVAD implantation or heart transplantation during an index admission or in the previous 12 months are identified by the corresponding codes for these procedures included in claims data.

Rationale: These patients represent a clinically distinct group (ICD-10-PCS code list).

The data sources for these analyses are Medicare administrative claims and enrollment information for patients with hospitalizations between July 1, 2013 and June 30, 2016.

After exclusions #1-5 are applied, the measure randomly selects one index admission per patient per year for inclusion in the cohort so that each episode of care is mutually independent with the same probability of the outcome. Additional admissions within that year are excluded. For each patient, the probability of death increases with each subsequent admission and therefore the episodes of care are not mutually independent. For the three-year combined data, when index admissions occur during the transition between measure reporting periods (June and July of each year) and both are randomly selected for inclusion in the measure, the measure includes only the June admission. The July admissions are excluded to avoid assigning a single death to two admissions.

2876 Hospital 30-day, all-cause, risk-standardized mortality rate (RSMR) following acute ischemic stroke hospitalization with claims-based risk adjustment for stroke severity

1. Inconsistent vital status or unreliable data: We do not include stays for patients where the age is greater than 115, where the gender is neither male nor female, where the admission date is after the date of death in the Medicare Enrollment Database, or where the date of death occurs before the date of discharge but the patient was discharged alive.

2. Hospice enrollment in the 12 months prior to or on the index admission is identified using hospice data and the Inpatient Standard Analytic File (SAF). These patients are likely continuing to seek comfort measures only; thus, mortality is not necessarily an adverse outcome or signal of poor quality care for these patients.

3. Discharges against medical advice (AMA) are identified using the discharge disposition indicator. After all exclusions are applied, the measure randomly selects one index admission per patient per year for inclusion in the cohort so that each episode of care is mutually independent with the same probability of the outcome. For each patient, the probability of death increases with each subsequent admission, and therefore, the episodes of care are not mutually independent. Similarly, for the three year combined data, when index admissions occur during the transition between measure reporting periods (June and July of each year) and both are randomly selected for inclusion in the measure, the measure includes only the June admission. The July admissions are excluded to avoid assigning a single death to two admissions.

0347 Death Rate in Low-Mortality Diagnosis Related Groups (PSI02)

Appendix G: Trauma Diagnosis Codes

Appendix H: Cancer Diagnosis Codes

Appendix I: Immunocompromised State Diagnosis and Procedure Codes

(See attached Appendix G, Appendix H, and Appendix I for detailed list of codes.)

0530 Mortality for Selected Conditions

See Inpatient Quality Indicators: Technical Specifications for additional details (available at http://www.qualityindicators.ahrq.gov/Modules/IQI_TechSpec.aspx).

Risk Adjustment

3502 Hybrid Hospital-Wide (All-Condition, All-Procedure) Risk-Standardized Mortality Measure

Statistical risk model

0230 Hospital 30-day, all-cause, risk-standardized mortality rate (RSMR) following acute myocardial infarction (AMI) hospitalization

Statistical risk model

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

Statistical risk model

2876 Hospital 30-day, all-cause, risk-standardized mortality rate (RSMR) following acute ischemic stroke hospitalization with claims-based risk adjustment for stroke severity

Statistical risk model

0347 Death Rate in Low-Mortality Diagnosis Related Groups (PSI02)

No risk adjustment or risk stratification

0530 Mortality for Selected Conditions

No risk adjustment or risk stratification

Stratification

3502 Hybrid Hospital-Wide (All-Condition, All-Procedure) Risk-Standardized Mortality Measure

N/A

0230 Hospital 30-day, all-cause, risk-standardized mortality rate (RSMR) following acute myocardial infarction (AMI) hospitalization

N/A

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

N/A

2876 Hospital 30-day, all-cause, risk-standardized mortality rate (RSMR) following acute ischemic stroke hospitalization with claims-based risk adjustment for stroke severity

N/A

0347 Death Rate in Low-Mortality Diagnosis Related Groups (PSI02)

Not applicable

0530 Mortality for Selected Conditions

Type Score

3502 Hybrid Hospital-Wide (All-Condition, All-Procedure) Risk-Standardized Mortality Measure

Rate/proportion better quality = lower score

0230 Hospital 30-day, all-cause, risk-standardized mortality rate (RSMR) following acute myocardial infarction (AMI) hospitalization

Rate/proportion better quality = lower score

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

Rate/proportion better quality = lower score

2876 Hospital 30-day, all-cause, risk-standardized mortality rate (RSMR) following acute ischemic stroke hospitalization with claims-based risk adjustment for stroke severity

Rate/proportion better quality = lower score

0347 Death Rate in Low-Mortality Diagnosis Related Groups (PSI02)

Rate/proportion better quality = lower score

0530 Mortality for Selected Conditions

Algorithm

3502 Hybrid Hospital-Wide (All-Condition, All-Procedure) Risk-Standardized Mortality Measure

The measure estimates hospital-level, risk-standardized mortality rates (RSMRs) within 30 days of hospital admission using hierarchical logistical regression models through a Bayesian Markov Chain Monte Carlo (MCMC) procedure. In brief, we used hierarchical logistic regression to model the log-odds of mortality for each of the 15 service-line divisions. Death within 30 days was modeled as a function of patient-level demographic and clinical characteristics and a random hospital-level intercept. This model specification accounts for within-hospital correlation of the observed outcomes and models the assumption that underlying differences in quality among the health care facilities being evaluated lead to systematic differences in outcomes. We estimated a separate hierarchical logistic regression model for each service-line division. In order to obtain the variance and interval estimates, we fit the hierarchical model under the Bayesian framework along with the Markov Chain Monte Carlo (MCMC) technique.

Admissions are assigned to one of 15 mutually exclusive divisions (groups of discharge condition categories and procedure categories). For each division and each hospital with patients in that division, the standardized mortality ratio (SMR) is calculated as the ratio of the number of “predicted” deaths to the number of “expected” deaths at a given hospital. The predicted number of deaths is based on the hospital’s performance with its observed case mix and service mix, and 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 for each cohort is added to the sum of the estimated regression coefficients multiplied by patient characteristics. The results are transformed via an inverse logit function and summed over all patients attributed to a hospital to get a

predicted value. The expected number of deaths is based on the nation's performance with that hospital's case mix and service mix and 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 transformed via an inverse logit function and summed over all patients in the hospital to get an expected value. This approach is analogous to a ratio of "observed" to "expected" used in other types of statistical analyses. It conceptually allows a particular hospital's performance, given its case mix and service mix, to be compared to an average hospital's performance with the same case mix and service mix. Thus, a lower ratio indicates lower-than-expected mortality rates or better quality, while a higher ratio indicates higher-than-expected mortality rates or worse quality.

To assess hospital performance for each reporting period, the measure re-estimates the model coefficients using the data in that period.

The division-level SMRs are then pooled for each hospital using an inverse variance-weighted geometric mean to create a hospital-wide composite SMR. (Note that in the case of the hybrid measure, we are presenting data from 9 of the total 15 divisions due to limitations in availability of electronic health records data). The hospital-wide SMR is then multiplied by the national observed mortality rate to produce the RSMR.

0230 Hospital 30-day, all-cause, risk-standardized mortality rate (RSMR) following acute myocardial infarction (AMI) hospitalization

The measure estimates hospital-level 30-day all-cause RSMRs following hospitalization for AMI using hierarchical logistic regression models. In brief, the approach simultaneously models data at the patient and hospital levels to account for variance in patient outcomes within and between hospitals (Normand and Shahian, 2007). At the patient level, it models the log-odds of mortality within 30 days of discharge using age, sex, selected clinical covariates, and a hospital-specific intercept. At the hospital level, it models the hospital-specific intercepts as arising from a normal distribution. The hospital intercept represents the underlying risk of mortality at the hospital, after accounting for patient risk. The hospital-specific intercepts are given a distribution to account for the clustering (non-independence) of patients within the same hospital. If there were no differences among hospitals, then after adjusting for patient risk, the hospital intercepts should be identical across all hospitals.

The RSMR is calculated as the ratio of the number of "predicted" to the number of "expected" deaths, multiplied by the national unadjusted mortality rate. For each hospital, the numerator of the ratio ("predicted") is the number of deaths within 30 days predicted on the basis of the hospital's performance with its observed case mix, and the denominator ("expected") is the number of deaths expected on the basis of the nation's performance with that hospital's case mix. This approach is analogous to a ratio of "observed" to "expected" used in other types of statistical analyses. It conceptually allows for a comparison of a particular hospital's performance given its case mix to an average hospital's performance with the same case mix. Thus, a lower ratio indicates lower- than-expected mortality or better quality and a higher ratio indicates higher-than-expected mortality 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 intercept 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 intercept using all hospitals in our sample is added in place of the hospital specific intercept. 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 readmission rate. The hierarchical logistic regression models are described fully in the original methodology report (Krumholz et al., 2005).

References:

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

2. Krumholz H, Normand S, Galusha D, et al. Risk-Adjustment Models for AMI and HF 30-Day Mortality Methodology. 2005.

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

The measure estimates hospital-level 30-day all-cause RSMRs following hospitalization for HF using hierarchical logistic regression models. In brief, the approach simultaneously models data at the patient and hospital levels to account for variance in patient outcomes within and between hospitals (Normand and Shahian, 2007). At the patient level, it models the log-odds of mortality within 30 days of index admission using age, sex, selected clinical covariates, and a hospital-specific intercept. At the hospital level, it models the hospital-specific intercepts as arising from a normal distribution. The hospital intercept represents the underlying risk of a mortality at the hospital, after accounting for patient risk. The hospital-specific intercepts are given a distribution to account for the clustering (non-independence) of patients within the same hospital. If there were no differences among hospitals, then after adjusting for patient risk, the hospital intercepts should be identical across all hospitals.

The RSMR is calculated as the ratio of the number of "predicted" 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 on the basis of 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 for a comparison of a particular hospital's performance given its case mix to an average hospital's performance with the same case mix. Thus, a lower ratio indicates lower-than-expected mortality rates or better quality, and 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 intercept 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 intercept using all hospitals in our sample is added in place of the

hospital-specific intercept. 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 (Krumholz et al., 2005).

References:

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

2. Krumholz H, Normand S, Galusha D, et al. 2005. Risk-Adjustment Models for AMI and HF 30-Day Mortality Methodology.

2876 Hospital 30-day, all-cause, risk-standardized mortality rate (RSMR) following acute ischemic stroke hospitalization with claims-based risk adjustment for stroke severity

The measure estimates hospital-level, 30-day, all-cause RSMRs following hospitalization for stroke using hierarchical logistic regression models. In brief, the approach simultaneously models data at the patient and hospital levels to account for variance in patient outcomes within and between hospitals (Normand and Shahian, 2007). At the patient level, it models the log-odds of mortality within 30 days of index admission using age, selected clinical covariates, and a hospital-specific intercept. At the hospital level, it models the hospital-specific intercepts as arising from a normal distribution. The hospital intercept represents the underlying risk of a mortality at the hospital, after accounting for patient risk. The hospital-specific intercepts are given a distribution to account for the clustering (non-independence) of patients within the same hospital. If there were no differences among hospitals, then after adjusting for patient risk, the hospital intercepts should be identical across all hospitals.

The RSMR is calculated as the ratio of the number of “predicted” 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 on the basis of 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 for a comparison of a particular hospital’s performance given its case mix to an average hospital’s performance with the same case mix. Thus, a lower ratio indicates lower-than-expected mortality rates or better quality, and 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 intercept on the risk of mortality. The estimated hospital-specific intercept is added to the sum of the estimated regression coefficients multiplied by the patient characteristics. The results are transformed and summed over all patients attributed to a hospital to get a predicted value. The “expected” number of deaths (the denominator) is obtained in the same manner, but a common intercept using all hospitals in our sample is added in place of the hospital-specific intercept. The results are transformed and summed over all patients in the hospital to get an expected value. To assess hospital performance for each reporting period, we re-estimate the model coefficients using the years of data in that period.

This calculation transforms the ratio of predicted over expected into a rate that is compared to the national observed mortality rate. The hierarchical logistic regression models are described fully in the original methodology report (Grosso et al., 2011).

References:

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

0347 Death Rate in Low-Mortality Diagnosis Related Groups (PSI02)

Risk adjustment is not currently included in the ICD-10-CM/PCS v2018 of the AHRQ QI specifications, due to the transition to ICD-10-CM/PCS (October 1, 2015). At least one full year of data coded in ICD-10-CM/PCS is needed in order to develop robust risk adjustment models. A full year of ICD-10-CM/PCS coded all-payer data will not be available until mid-2019. AHRQ will announce an anticipated date as soon as one is known.

0530 Mortality for Selected Conditions

Submission items

3502 Hybrid Hospital-Wide (All-Condition, All-Procedure) Risk-Standardized Mortality Measure

5.1 Identified measures:

5a.1 Are specs completely harmonized? Yes

5a.2 If not completely harmonized, identify difference, rationale, impact: This hybrid HWM measure incorporates patient-level clinical data from the EHR into the risk adjustment model, compared to the claims-only hospital-wide mortality measure. This hybrid HWM measure is intended to complement the existing CMS Hospital-Wide All-Cause Risk-Standardized Readmission Measure (NQF #1789) to allow assessment of trends in hospital performance for both readmission and mortality outcomes, similar to other complementary pairs of readmission and mortality measures for specific conditions and procedures. By measuring mortality outcomes across almost all hospitalized patients, this measure will provide an important additional performance assessment that will complement condition- and procedure-specific or other more narrowly defined mortality measures and allow a greater number of patients and hospitals to be evaluated. This HWM measure captures a similarly broad cohort to the CMS Hospital-Wide All-Cause Risk-Standardized Readmission Measure (NQF #1789), and a broader cohort than those of other CMS condition-specific measures. Because the mortality measure is focused on a different outcome, it differs from the existing CMS Hospital-Wide All-Cause Risk Standardized Readmission Measure (NQF #1789) in a couple of ways. First, this HWM measure includes patients with a principal discharge diagnosis of cancer, whereas those patients are not included in the readmission measure. Cancer patients are appropriate to include as many have survival as their primary goal, however due to cancer treatment plans, readmissions are frequently part of the plan and expected and therefore are not a reasonable signal of quality. Another difference between the two measures is the number of divisions or specialty cohorts the patients are divided into in order to more accurately risk adjust for case-mix and service-mix. The readmission measure divides patients into six categories, or “specialty cohorts”, while the mortality measure uses 15. This is because the risk of mortality is much more closely related to patient factors than readmission is related to

patient factors. PSI-02 (NQF #0357) is another complementary mortality measure, which captures a different patient population and a different outcome compared with the HWM measure submitted with this application. PSI-02 captures patients 18 years of age or older, or obstetric patients, whereas the HWM measure captures patients between the ages of 65 and 94. PSI-02 captures DRGs with less than 0.5% mortality rate, whereas the HWM measure captures all patients within all CCSs, regardless of mortality rate. HWM captures mortality up to 30 days past admission, where AHRQ PSI-02 only captures in-hospital mortality. IQI 90 (NQF #0530) is another complimentary mortality measure, which is a composite measure of the number of in-hospital deaths for a narrow range of conditions (CHF, stroke, hip fracture, pneumonia, acute myocardial infarction and GI hemorrhage). The HWM measure presented in this application captures all deaths after 30 days of admission, for all conditions and procedures.

5b.1 If competing, why superior or rationale for additive value: There are no competing NQF-endorsed measures.

0230 Hospital 30-day, all-cause, risk-standardized mortality rate (RSMR) following acute myocardial infarction (AMI) hospitalization

5.1 Identified measures: 2431 : Hospital-level, risk-standardized payment associated with a 30-day episode-of-care for Acute Myocardial Infarction (AMI)

1789 : Hospital-Wide All-Cause Unplanned Readmission Measure (HWR)

1891 : Hospital 30-day, all-cause, risk-standardized readmission rate (RSRR) following chronic obstructive pulmonary disease (COPD) hospitalization

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

0506 : Hospital 30-day, all-cause, risk-standardized readmission rate (RSRR) following pneumonia hospitalization

0330 : Hospital 30-day, all-cause, risk-standardized readmission rate (RSRR) following heart failure (HF) hospitalization

0505 : Hospital 30-day all-cause risk-standardized readmission rate (RSRR) following acute myocardial infarction (AMI) hospitalization.

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

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

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

5a.1 Are specs completely harmonized? Yes

5a.2 If not completely harmonized, identify difference, rationale, impact: We did not include in our list of related measures any non-outcome (e.g., process) measures with the same target population as our measure. Our measure cohort was heavily vetted by clinical experts. Additionally, the measure, with the specified cohort, has been publicly reported since 2008. Because this is an outcome measure, clinical coherence of the cohort takes precedence over alignment with related non-outcome measures. Furthermore, non-outcome measures are limited due to broader patient exclusions. This is because they

typically only include a specific subset of patients who are eligible for that measure (for example, patients who receive a specific medication or undergo a specific procedure).

5b.1 If competing, why superior or rationale for additive value: N/A

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

5.1 Identified measures: 0358 : Heart Failure Mortality Rate (IQI 16)

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

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

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

1891 : Hospital 30-day, all-cause, risk-standardized readmission rate (RSRR) following chronic obstructive pulmonary disease (COPD) hospitalization

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

0506 : Hospital 30-day, all-cause, risk-standardized readmission rate (RSRR) following pneumonia hospitalization

0330 : Hospital 30-day, all-cause, risk-standardized readmission rate (RSRR) following heart failure (HF) hospitalization

0505 : Hospital 30-day all-cause risk-standardized readmission rate (RSRR) following acute myocardial infarction (AMI) hospitalization.

1789 : Hospital-Wide All-Cause Unplanned Readmission Measure (HWR)

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. Additionally, the measure, with the specified cohort, has been publicly reported since 2008. Because this is an outcome measure, clinical coherence of the cohort takes precedence over alignment with related non-outcome measures. Furthermore, non-outcome measures are limited due to broader patient exclusions. This is because they typically only include a specific subset of patients who are eligible for that measure (for example, patients who receive a specific medication or undergo a specific procedure).

5b.1 If competing, why superior or rationale for additive value: N/A

2876 Hospital 30-day, all-cause, risk-standardized mortality rate (RSMR) following acute ischemic stroke hospitalization with claims-based risk adjustment for stroke severity

5.1 Identified measures: 0467 : Acute Stroke Mortality Rate (IQI 17)

5a.1 Are specs completely harmonized? No

5a.2 If not completely harmonized, identify difference, rationale, impact: We did not include in our list of related measures any non-outcome (such as process) measures with the same target population as our measure. Because this is an outcome measure, clinical coherence of the cohort takes precedence over alignment with related non-outcome

measures. Furthermore, non-outcome measures are limited due to broader patient exclusions. This is because they typically only include a specific subset of patients who are eligible for that measure (for example, patients who receive a specific medication or undergo a specific procedure). Additionally, this measure and the NQF endorsed Acute Stroke Mortality Rate (IQI 17) (AHRQ) Measure #0467 are complementary and related rather than competing measures. Although they both assess mortality for patients admitted to acute care hospitals with a principal discharge diagnosis of acute ischemic stroke, the specified outcomes are different. Our measure assesses 30-day mortality, while #0467 assesses inpatient mortality. The 30-day mortality and inpatient mortality outcomes each have distinct advantages and uses, which make them complementary (and related) as opposed to competing. For example the 30-day period provides a broader perspective on hospital care and utilizes a standard time period to examine hospital performance to avoid bias by differences in length of stay among hospitals. However, in some settings it may not be feasible to capture post-discharge mortality, making the inpatient measure more useable. We have previously consulted with AHRQ to examine harmonization of the measures' cohort. As a result of that collaboration, we have found that the measures' cohorts are harmonized to the extent possible and that the small differences in cohort inclusion and exclusion criteria are appropriate because the measures assess different outcomes.

5b.1 If competing, why superior or rationale for additive value: This measure looks at a longer outcome time frame (30-days versus in-hospital) and incorporates stroke severity into the risk-model.

The current publicly reported measure, Hospital 30-Day Mortality Following Acute Ischemic Stroke Hospitalization Measure, is a potentially competing measure. It is CMS intent to replace the current measure in any given program with this newly developed measure, which includes stroke severity in the risk model.

The Hybrid Hospital 30-Day, All-Cause, Risk-Standardized Mortality Rate (RSMR) Following Acute Ischemic Stroke with Risk Adjustment for Stroke Severity measure is also being submitted to NQF for endorsement. This measure uses a combination of claims and electronic health records (EHR) data for risk adjustment but is otherwise harmonized with the new claims-only measure. It is CMS intent to implement only one of the new stroke mortality measures (this claims-only measure or the hybrid measure) in any given program.

0347 Death Rate in Low-Mortality Diagnosis Related Groups (PSI02)

5.1 Identified measures:

5a.1 Are specs completely harmonized?

5a.2 If not completely harmonized, identify difference, rationale, impact: not applicable

5b.1 If competing, why superior or rationale for additive value: Not applicable

0530 Mortality for Selected Conditions

5.1 Identified measures:

5a.1 Are specs completely harmonized?

5a.2 If not completely harmonized, identify difference, rationale, impact:

5b.1 If competing, why superior or rationale for additive value:

Comparison of NQF 3504, 1789, 1550, 0468, 1893, 2558, 0230, 0229, 2867, 0347 and 0530

3504 Claims-Only Hospital-Wide (All-Condition, All-Procedure) Risk-Standardized Mortality Measure
1789 Hospital-Wide All-Cause Unplanned Readmission Measure (HWR)
1550 Hospital-level risk-standardized complication rate (RSCR) following elective primary total hip arthroplasty (THA) and/or total knee arthroplasty (TKA)
0468 Hospital 30-day, all-cause, risk-standardized mortality rate (RSMR) following pneumonia hospitalization
1893 Hospital 30-Day, all-cause, risk-standardized mortality rate (RSMR) following chronic obstructive pulmonary disease (COPD) hospitalization
2558 Hospital 30-Day, All-Cause, Risk-Standardized Mortality Rate (RSMR) Following Coronary Artery Bypass Graft (CABG) Surgery
0230 Hospital 30-day, all-cause, risk-standardized mortality rate (RSMR) following acute myocardial infarction (AMI) hospitalization

Steward

3504 Claims-Only Hospital-Wide (All-Condition, All-Procedure) Risk-Standardized Mortality Measure

Centers for Medicare & Medicaid Services (CMS)

1789 Hospital-Wide All-Cause Unplanned Readmission Measure (HWR)

Centers for Medicare & Medicaid Services (CMS)

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

Centers for Medicare & Medicaid Services

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

Centers for Medicare & Medicaid Services (CMS)

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

Centers for Medicare & Medicaid Services

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

Centers for Medicare & Medicaid Services

0230 Hospital 30-day, all-cause, risk-standardized mortality rate (RSMR) following acute myocardial infarction (AMI) hospitalization

Centers for Medicare & Medicaid Services (CMS)

Description

3504 Claims-Only Hospital-Wide (All-Condition, All-Procedure) Risk-Standardized Mortality Measure

The measure estimates a hospital-level 30-day hospital-wide risk-standardized mortality rate (RSMR), defined as death from any cause within 30 days after the index admission date, for Medicare fee-for-service (FFS) patients who are between the ages of 65 and 94.

Please note that in parallel with the claims-only HWM measure, we are submitting a hybrid HWM measure. Note that ultimately the claims and hybrid measures will be harmonized and use the same exact cohort specifications. The intent is that prior to implementation, the two measures will be exactly the same, with the exception of the additional risk adjustment added by the CCDE in the hybrid measure. This is analogous to the currently endorsed and implemented hybrid hospital-wide readmissions measure (NQF 1789 and NQF 2879e).

Because of the homology between the claims and hybrid HWM measures, there is no reason to suspect that the results of analyses done for the claims-only measure would differ in any significant way from results of analyses for a nationally representative hybrid measure.

Below we highlight the differences between the two measures, including specifications, data used, and testing which reflect limitations of data availability, as well as actual intended differences in the measure (risk adjustment).

Differences in the measure, data, and testing that reflect limitations in data availability

1. Dataset used for development, some testing (see below for differences), and measure results:

a. The claims-only measure uses nation-wide Medicare FFS claims and the enrollment database.

b. The hybrid measure uses an electronic health record (EHR) database from 21 hospitals in the Kaiser Permanente network which includes inpatient claims data information.

2. Age of patients in cohort:

a. The claims-only measure includes Medicare FFS patients, age 65-94.

b. The hybrid measure includes all patients age 50-94 (see later discussion for justification)

3. External empiric validity testing

a. Not possible for the hybrid measure, due to limited data availability. We provide results from the claims-only measure within the hybrid testing form.

4. Socioeconomic risk factor analyses

a. Not possible for the hybrid measure, due to limited data availability. We provide results from the claims-only measure within the hybrid testing form.

5. Exclusion analyses

a. To be representative of what we expect the impact would be of the measures' exclusions in a nation-wide sample, we provide the results from the claims-only measure.

6. Meaningful differences

a. To be representative of what we expect the range of performance would be in a nation-wide sample, we provide the distribution results from the claims-only measure.

Difference between the two measures when fully harmonized, prior to implementation:

1. Risk adjustment:

a. The claims-only measure uses administrative claims data only for risk adjustment

b. The hybrid measure adds 10 clinical risk variables, derived from a set of core clinical data elements (CCDE) extracted from the EHR.

1789 Hospital-Wide All-Cause Unplanned Readmission Measure (HWR)

For the hospital-wide readmission (HWR) measure that was previously endorsed and is used in the Hospital Inpatient Quality Reporting Program (IQR), the measure estimates a hospital-level risk-standardized readmission rate (RSRR) of unplanned, all-cause readmission after admission for any eligible condition within 30 days of hospital discharge. The measure reports a single summary RSRR, derived from the volume-weighted results of five different models, one for each of the following specialty cohorts based on groups of discharge condition categories or procedure categories: surgery/gynecology; general medicine; cardiorespiratory; cardiovascular; and neurology, each of which will be described in greater detail below. The measure also indicates the hospital-level standardized risk ratios (SRR) for each of these five specialty cohorts. The outcome is defined as unplanned readmission for any cause within 30 days of the discharge date for the index admission (the admission included in the measure cohort). A specified set of planned readmissions do not count in the readmission outcome. CMS annually reports the measure for patients who are 65 years or older, are enrolled in fee-for-service (FFS) Medicare, and hospitalized in non-federal hospitals.

For the All-Cause Readmission (ACR) measure version used in the Shared Savings Program (SSP), the measure estimates an Accountable Care Organization (ACO) facility-level RSRR of unplanned, all-cause readmission after admission for any eligible condition within 30 days of hospital discharge. The ACR measure is calculated using the same five specialty cohorts and estimates an ACO-level standardized risk ratio for each. CMS annually reports the measure for patients who are 65 years or older, are enrolled in FFS Medicare and are ACO assigned beneficiaries.

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

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

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

This measure estimates a hospital-level, 30-day risk-standardized mortality rate (RSMR) for patients discharged from the hospital with a principal discharge diagnosis of pneumonia, including aspiration pneumonia or a principal discharge diagnosis of sepsis (not severe sepsis) with a secondary discharge diagnosis of pneumonia (including aspiration pneumonia) coded as present on admission (POA). Mortality is defined as death from any cause within 30 days of the index admission date. The Centers for Medicare & Medicaid

Services (CMS) annually reports the measure for patients who are 65 years or older and are either Medicare fee-for-service (FFS) beneficiaries and hospitalized in non-federal acute care hospitals.

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

This measure estimates a hospital-level, 30-day risk-standardized mortality rate (RSMR) for patients discharged from the hospital with a principal discharge diagnosis of COPD or a principal discharge diagnosis of respiratory failure with a secondary discharge diagnosis of acute exacerbation of COPD. Mortality is defined as death from any cause within 30 days of the index admission date. The Centers for Medicare & Medicaid Services (CMS) annually reports the measure for patients who are 65 years or older and are Medicare fee-for-service (FFS) beneficiaries hospitalized in non-federal acute care hospitals

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.

0230 Hospital 30-day, all-cause, risk-standardized mortality rate (RSMR) following acute myocardial infarction (AMI) hospitalization

This measure estimates a hospital-level, 30-day risk-standardized mortality rate (RSMR) for patients discharged from the hospital with a principal diagnosis of acute myocardial infarction (AMI). Mortality is defined as death from any cause within 30 days after the index admission date. The Centers for Medicare & Medicaid Services (CMS) annually reports the measure for patients who are 65 years and older and are Medicare fee-for-service (FFS) beneficiaries hospitalized in non-federal hospitals or patients hospitalized in Veterans Health Administration (VA) facilities.

Type

3504 Claims-Only Hospital-Wide (All-Condition, All-Procedure) Risk-Standardized Mortality Measure

Outcome

1789 Hospital-Wide All-Cause Unplanned Readmission Measure (HWR)

Outcome

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

Outcome

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

Outcome

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

Outcome

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

Outcome

0230 Hospital 30-day, all-cause, risk-standardized mortality rate (RSMR) following acute myocardial infarction (AMI) hospitalization

Outcome

Data Source

3504 Claims-Only Hospital-Wide (All-Condition, All-Procedure) Risk-Standardized Mortality Measure

Claims, Enrollment Data, Other Data sources for the Medicare FFS measure:

1. Medicare Part A Inpatient: The index dataset contains administrative inpatient hospitalization data for Medicare FFS beneficiaries, aged 65-94 on admission, hospitalized from July 1, 2016-June 30, 2017. The history dataset includes administrative inpatient hospitalization data on each patient for the 12 months prior to the index admission.

2. Medicare Enrollment Database (EDB): This database contains Medicare beneficiary demographic, benefit/coverage, and vital status information. This data source was used to obtain information on several inclusion/exclusion indicators such as Medicare status on admission as well as vital status. It was also used to determine hospice enrollment.

No data collection instrument provided Attachment Del18b1HOP5HWMClaimsDataDictionary01072019.xlsx

1789 Hospital-Wide All-Cause Unplanned Readmission Measure (HWR)

Claims Data sources for the Medicare FFS measure:

HWR

1. Medicare Part A claims data for calendar years 2007 and 2008 were combined and then randomly split into two equal subsets (development sample and validation sample). Risk variable selection was done using the development sample, the risk models for each of the five specialty cohorts in the measure were applied to the validation sample and the models' performance was compared. In addition we re-tested the models in Medicare Part A claims data from calendar year 2009 to look for temporal stability in the models' performance. The number of measured entities and index admissions are listed below by specialty cohort.

2. Medicare Enrollment Database (EDB): This database contains Medicare beneficiary demographic, benefit/coverage, and vital status information. This data source was used to obtain information on several inclusion/exclusion indicators such as Medicare status on admission and following discharge from index admission

ACR

1. Medicare Part A claims data for calendar years 2013, 2014, and 2015.

2. Medicare Enrollment Database (EDB).

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.

Available in attached appendix at A.1 Attachment NQF_1789_NQF_Data_Dictionary_05-26-17_v1.0.xlsx

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

Claims, Other, Paper Medical Records Data sources:

The currently publically reported measure is specified and has been tested using:

1. Medicare Part A inpatient and Part B outpatient claims: This data source contains claims data for FFS inpatient and outpatient services including: Medicare inpatient hospital care, outpatient hospital services, as well as inpatient and outpatient physician claims for the 12 months prior to an index admission.

2. Medicare Enrollment Database (EDB): This database contains Medicare beneficiary demographic, benefit/coverage, and vital status information. This data source was used to obtain information on several inclusion/exclusion indicators such as Medicare status on admission as well as vital status at discharge. These data have previously been shown to accurately reflect patient vital status (Fleming et al., 1992).

During original measure development we validated the administrative claims-based definition of THA/TKA complication (original model specification) against a medical record data.

3. Data abstracted from medical records from eight participating hospitals (approximately 96 records per hospital; 644 total records) for Medicare beneficiaries over the age of 65 years who had a qualifying THA/TKA procedure between January 1 2007 and December 31, 2008.

The measure was also specified and testing using an all-payer claims dataset although it is only publically reported using the data sources listed above

4. California Patient Discharge Data is a large, linked database of patient hospital admissions in the state of California. Using all-payer data from California, we performed analyses to determine whether the THA/TKA complication measure can be applied to all adult patients, including not only FFS Medicare patients aged 65 years or over, but also non-FFS Medicare patients aged 18-64 years at the time of admission.

Additional Data source used for analysis of the impact of SES variables on the measure's risk model. Note, the variables derived from these data are not included in the measure as specified

5. The American Community Survey (2009-2013): The American Community Survey data is collected annually and an aggregated 5-years data was used to calculate the AHRQ socioeconomic status (SES) composite index score.

Reference:

Fleming C., Fisher ES, Chang CH, Bubolz D, Malenda J. Studying outcomes and hospital utilization in the elderly: The advantages of a merged data base for Medicare and Veterans Affairs Hospitals. Medical Care. 1992; 30(5): 377-91.

Suter LG, Parzynski CS, Grady JN, et al. 2014 Procedure Specific Complication Measure Updates and Specifications Report: Elective Primary Total Hip Arthroplasty (THA) and/or Total Knee Arthroplasty (TKA) Risk-Standardized Complication Measure (Version 3.0). 2014

No data collection instrument provided Attachment NQF_1550_HipKnee_Complication_Data_Dictionary_v1.0.xlsx

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

Claims, Other, Paper Medical Records Data sources for the Medicare FFS measure:

1. Medicare Part A inpatient and Part B outpatient claims: This data source contains claims data for FFS inpatient and outpatient services including: Medicare inpatient hospital care, outpatient hospital services, as well as inpatient and outpatient physician claims for the 12 months prior to an index admission.

2. Medicare Enrollment Database (EDB): This database contains Medicare beneficiary demographic, benefit/coverage, and vital status information. This data source was used to obtain information on several inclusion/exclusion indicators such as Medicare status on admission as well as vital status. These data have previously been shown to accurately reflect patient vital status (Fleming et al., 1992).

3. 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 SES composite index score.

4. Data sources for the all-payer update:

For our analyses to examine use in all-payer data, we used all-payer data from California in addition to CMS data for Medicare FFS patients aged 65 years or over (65+) in California hospitals. California is a diverse state, and, with more than 37 million residents, California represents 12% of the US population. We used the California Patient Discharge Data, a large, linked database of patient hospital admissions. In 2009, there were 3,193,904 adult discharges from 446 non-Federal acute care hospitals. Records are linked by a unique patient identification number, allowing us to determine patient history from previous hospitalizations and to evaluate rates of both readmission and mortality (via linking with California vital statistics records).

Using all-payer data from California as well as CMS Medicare FFS data for California hospitals, we performed analyses to determine whether the pneumonia mortality measure can be applied to all adult patients, including not only FFS Medicare patients aged 65 or over, but also non-FFS Medicare patients aged 18-64 years at the time of admission.

Reference:

Fleming C., Fisher ES, Chang CH, Bubolz D, Malenda 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_0468_Pneumonia_Mortality_Data_Dictionary_09-26-17_v1.0.xls

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

Claims, Other, Paper Medical Records Data sources for the Medicare FFS measure:

1. Medicare Part A inpatient and Part B outpatient claims: This data source contains claims data for FFS inpatient and outpatient services including: Medicare inpatient hospital care, outpatient hospital services, as well as inpatient and outpatient physician claims for the 12 months prior to an index admission.

2. Medicare Enrollment Database (EDB): This database contains Medicare beneficiary demographic, benefit/coverage, and vital status information. This data source was used to obtain information on several inclusion/exclusion indicators such as Medicare status on admission as well as vital status. These data have previously been shown to accurately reflect patient vital status (Fleming et al., 1992).

3. 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 SES composite index score.

4. Data sources for the all-payer testing: For our analyses to examine use in all-payer data, we used all-payer data from California. California is a diverse state, and, with more than 37 million residents, California represents 12% of the US population. We used the California Patient Discharge Data, a large, linked database of patient hospital admissions. In 2006, there were approximately 3 million adult discharges from more than 450 non-Federal acute care hospitals. Records are linked by a unique patient identification number, allowing us to determine patient history from previous hospitalizations and to evaluate rates of both readmission and mortality (via linking with California vital statistics records).

Using all-payer data from California, we performed analyses to determine whether the COPD mortality measure can be applied to all adult patients, including not only FFS Medicare patients aged 65 or over, but also non-FFS Medicare patients aged 18-64 years at the time of admission.

Reference:

Fleming C., Fisher ES, Chang CH, Bubolz D, Malenda 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_1893_COPD_Mortality_NQF_Data_Dictionary_v1.0_091818_kl.xlsx

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

0230 Hospital 30-day, all-cause, risk-standardized mortality rate (RSMR) following acute myocardial infarction (AMI) hospitalization

Claims, Other, Paper Medical Records Data sources for the Medicare FFS measure:

1. Medicare Part A inpatient and Part B outpatient claims: This data source contains claims data for fee-for service inpatient and outpatient services including: Medicare inpatient hospital care, outpatient hospital services, skilled nursing facility care, some home health agency services, as well as inpatient and outpatient physician claims for the 12 months prior to an index admission.

2. Medicare Enrollment Database (EDB): This database contains Medicare beneficiary demographic, benefit/coverage, and vital status information. This data source was used to obtain information on several inclusion/exclusion indicators such as Medicare status on admission as well as vital status. These data have previously been shown to accurately reflect patient vital status (Fleming et al., 1992).

3. Veterans Health Administration Data: This data source contains claims data for VA inpatient and outpatient services including: inpatient hospital care, outpatient hospital services, skilled nursing facility care, some home health agency services, as well as inpatient and outpatient physician claims for the 12 months prior to and including each index admission. Unlike Medicare FFS patients, VA patients are not required to have been enrolled in Part A and Part B Medicare for the 12 months prior to the date of admission.

All-payer data sources:

For our analyses to examine use in all-payer data, we used all-payer data from California in addition to CMS data for Medicare FFS 65+ patients in California hospitals. California is a diverse state, and, with more than 37 million residents, California represents 12% of the US population. We used the California Patient Discharge Data, a large, linked database of patient hospital admissions. 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 as well as CMS Medicare FFS data for California hospitals, we performed analyses to determine whether the AMI mortality measure can be applied to all adult patients, including not only FFS Medicare patients aged 65+ but also non-FFS Medicare patients aged 65+ and younger patients aged 18-64 years at the time of admission.

References:

Fleming C, Fisher ES, Chang CH, Bubolz TA, Malenka DJ. 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_0230_AMI_Mortality_Data_Dictionary_Final-636973300643762106.xlsx

Level

3504 Claims-Only Hospital-Wide (All-Condition, All-Procedure) Risk-Standardized Mortality Measure

Facility

1789 Hospital-Wide All-Cause Unplanned Readmission Measure (HWR)

Facility, Integrated Delivery System

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

Facility

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

Facility

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

Facility

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

Facility

0230 Hospital 30-day, all-cause, risk-standardized mortality rate (RSMR) following acute myocardial infarction (AMI) hospitalization

Facility

Setting

3504 Claims-Only Hospital-Wide (All-Condition, All-Procedure) Risk-Standardized Mortality Measure

Inpatient/Hospital

1789 Hospital-Wide All-Cause Unplanned Readmission Measure (HWR)

Inpatient/Hospital, Outpatient Services

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

Inpatient/Hospital

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

Inpatient/Hospital

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

Inpatient/Hospital

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

Inpatient/Hospital

0230 Hospital 30-day, all-cause, risk-standardized mortality rate (RSMR) following acute myocardial infarction (AMI) hospitalization

Inpatient/Hospital

Numerator Statement

3504 Claims-Only Hospital-Wide (All-Condition, All-Procedure) Risk-Standardized Mortality Measure

The outcome for this measure is 30-day, all-cause mortality. Mortality is defined as death from any cause, either during or after admission, within 30 days of the index admission date.

1789 Hospital-Wide All-Cause Unplanned Readmission Measure (HWR)

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

The outcome for the ACR measure is also 30-day readmission. The outcome is defined identically to what is described above for the HWR measure.

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

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

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

The outcome for this measure is 30-day, all-cause mortality. We define mortality as death from any cause within 30 days of the index admission date for patients discharged from the hospital with a principal discharge diagnosis of pneumonia, including aspiration pneumonia, or a principal discharge diagnosis of sepsis (not including severe sepsis) with a secondary discharge diagnosis of pneumonia (including aspiration pneumonia) coded as POA and no secondary discharge diagnosis of severe sepsis.

Additional details are provided in S.5 Numerator Details.

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

The outcome for this measure is 30-day, all-cause mortality. We define mortality as death from any cause within 30 days of the index admission date for patients discharged from the hospital with either a principal discharge diagnosis of COPD or a principal discharge diagnosis of respiratory failure with a secondary discharge diagnosis of acute exacerbation of COPD.

Additional details are provided in S.5 Numerator Details.

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.

0230 Hospital 30-day, all-cause, risk-standardized mortality rate (RSMR) following acute myocardial infarction (AMI) hospitalization

The outcome for this measure is 30-day all-cause mortality. We define mortality as death from any cause within 30 days from the date of admission for patients discharged from the hospital with a principal diagnosis of AMI.

Additional details are provided in S.5 Numerator Details.

Numerator Details

3504 Claims-Only Hospital-Wide (All-Condition, All-Procedure) Risk-Standardized Mortality Measure

The measure outcome is death from any cause within 30 days of the admission date of the index admission, for Medicare FFS patients identified using the Medicare Enrollment Database (EDB). The numerator is a binary variable (1=yes/0=no) that indicates whether the patient died within 30 days of the index admission date.

1789 Hospital-Wide All-Cause Unplanned Readmission Measure (HWR)

The measure counts readmissions to any acute care hospital for any cause within 30 days of the date of discharge of the index admission, excluding planned readmissions as defined below.

Planned Readmission Algorithm (Version 4.0)

The Planned Readmission Algorithm is a set of criteria for classifying readmissions as planned among the general Medicare population using Medicare administrative claims

data. The algorithm identifies admissions that are typically planned and may occur within 30 days of discharge from the hospital.

The Planned Readmission Algorithm has three fundamental principles:

1. A few specific, limited types of care are always considered planned (obstetric delivery, transplant surgery, maintenance chemotherapy/immunotherapy, rehabilitation);

2. Otherwise, a planned readmission is defined as a non-acute readmission for a scheduled procedure; and

3. Admissions for acute illness or for complications of care are never planned.

The algorithm was developed in 2011 as part of the Hospital-Wide Readmission measure. In 2013, CMS applied the algorithm to its other readmission measures.

The Planned Readmission Algorithm and associated code tables are attached in data field S.2b (Data Dictionary or Code Table).

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

The composite complication is a dichotomous outcome (yes for any complication(s); no for no complications). Therefore, if a patient experiences one or more complications, the outcome variable will get coded as a "yes". Complications are counted in the measure only if they occur during the index hospital admission (and are not present on admission) or during a readmission.

The complications captured in the numerator are identified during the index admission OR associated with a readmission up to 90 days post-date of index admission, depending on the complication. The follow-up period for complications from date of index admission is as follows:

The follow-up period for AMI, pneumonia, and sepsis/septicemia/shock is seven days from the date of index admission because these conditions are more likely to be attributable to the procedure if they occur within the first week after the procedure. Additionally, analyses indicated a sharp decrease in the rate of these complications after seven days.

Death, surgical site bleeding, and pulmonary embolism are followed for 30 days following admission because clinical experts agree these complications are still likely attributable to the hospital performing the procedure during this period and rates for these complications remained elevated until roughly 30 days post admission.

The measure follow-up period is 90 days after admission for mechanical complications and periprosthetic joint infection/wound infection. Experts agree that mechanical complications and periprosthetic joint infection/wound infections due to the index THA/TKA occur up to 90 days following THA/TKA.

The measure counts all complications occurring during the index admission regardless of when they occur. For example, if a patient experiences an AMI on day 10 of the index admission, the measure will count the AMI as a complication, although the specified follow-up period for AMI is seven days. Clinical experts agree with this approach, as such complications likely represent the quality of care provided during the index admission.

As of 2014 reporting, the measure does not count complications in the complications outcome that are coded as POA during the index admission; this prevents identifying a condition as a complication of care if it was present on admission for the THA/TKA procedure.

For full list of ICD-9 and ICD-10 codes defining complications, see the Data Dictionary attached in field S.2b., sheet “Complication Codes ICD9-ICD10”.

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

Outcome definition

This measure counts death from any cause within 30 days of the index admission date.

Rationale: From a patient perspective, death is the most critical outcome regardless of cause. Outcomes occurring within 30 days of admission can be influenced by hospital care and early transition to the non-acute care setting. The 30-day time frame is a clinically meaningful period for hospitals to collaborate with their communities to reduce mortality (Simoes et al., 2017; Dharmarajan et al., 2015).

Identifying deaths in the Medicare FFS population

As currently reported, we identify deaths for FFS Medicare patients 65 years and older in the Medicare Enrollment Database (EDB).

Identifying deaths in the all-payer population

For the purposes of development of an all-payer measure, deaths were identified using the California vital statistics data file. Nationally, post-discharge deaths can be identified using an external source of vital status, such as the Social Security Administration’s Death Master File (DMF) or the Centers for Disease Control and Prevention’s National Death Index (NDI).

References:

1. Simoes J, Grady J, DeBuhr J, et al. 2017 Condition-Specific Measures Updates and Specifications Report Hospital-Level 30-Day Risk-Standardized Mortality Measures. http://www.qualitynet.org/dcs/ContentServer?c=Page&pagename=QnetPublic/Page/QnetTier3&cid=1163010421830. Accessed June 7, 2017.

2. Dharmarajan K, Hsieh AF, Kulkarni VT, et al. 2015 Trajectories of risk after hospitalization for heart failure, acute myocardial infarction, or pneumonia: retrospective cohort study. BMJ (Clinical research ed);350:h411

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

Outcome definition

This measure counts death from any cause within 30 days of the index admission date.

Rationale: From a patient perspective, death is the most critical outcome regardless of cause. Outcomes occurring within 30 days of admission can be influenced by hospital care and appropriate transition to the non-acute care setting. The 30-day time frame is a clinically meaningful period for hospitals to collaborate with their communities to reduce mortality (Simoes et al., 2018; Dharmarajan et al., 2015).

Identifying deaths in the Medicare FFS population

As currently reported, we identify deaths for FFS Medicare patients 65 years and older in the Medicare Enrollment Database (EDB).

Reference:

1. Simoes J, Grady J, Purvis D, et al. 2018 Condition-Specific Measures Updates and Specifications Report Hospital-Level 30-Day Risk-Standardized Mortality Measures.

http://www.qualitynet.org/dcs/ContentServer?c=Page&pagename=QnetPublic/Page/QnetTier3&cid=1163010421830. Accessed June 6, 2018.

2. Dharmarajan K, Hsieh AF, Kulkarni VT, et al. 2015 Trajectories of risk after hospitalization for heart failure, acute myocardial infarction, or pneumonia: retrospective cohort study. BMJ (Clinical researched);350:h411

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.

0230 Hospital 30-day, all-cause, risk-standardized mortality rate (RSMR) following acute myocardial infarction (AMI) hospitalization

Outcome definition

This measure counts death from any cause within 30 days after the index admission date.

Rationale: From a patient perspective, death is the most critical outcome regardless of cause. Outcomes occurring within 30 days of admission can be influenced by hospital care and early transition to the non-acute care setting. The 30-day time frame is a clinically meaningful period for hospitals to collaborate with their communities to reduce mortality. (Simoes et al., 2018; Dharmarajan et al., 2015).

Identifying deaths in the Medicare FFS population

As currently reported, we identify deaths for FFS Medicare patients 65 years and older in the Medicare Enrollment Database (EDB).

Identifying deaths in the all-payer population

For the purposes of development of an all-payer measure, deaths were identified using the California vital statistics data file. Nationally, post-discharge deaths can be identified using an external source of vital status, such as the Social Security Administration's Death Master File (DMF) or the Centers for Disease Control and Prevention's National Death Index (NDI).

Reference:

1. Simoes J, Grady J, Purvis D, et al. 2018 Condition-Specific Measures Updates and Specifications Report Hospital-Level 30-Day Risk-Standardized Mortality Measures. http://www.qualitynet.org/dcs/ContentServer?c=Page&pagename=QnetPublic/Page/QnetTier3&cid=1163010421830. Accessed May 4, 2018.

Denominator Statement

3504 Claims-Only Hospital-Wide (All-Condition, All-Procedure) Risk-Standardized Mortality Measure

The cohort includes inpatient admissions for a wide variety of conditions for Medicare FFS patients aged between 65 and 94 years old who were admitted to short-term acute care hospitals. If a patient has more than one admission during the measurement year, one admission is randomly selected for inclusion in the measure. Additional details are provided in S.7 Denominator Details.

1789 Hospital-Wide All-Cause Unplanned Readmission Measure (HWR)

The measure at the hospital level includes admissions for Medicare beneficiaries who are 65 years and older and are discharged from all non-federal, acute care inpatient US hospitals (including territories) with a complete claims history for the 12 months prior to admission.

The measure at the ACO level includes all relevant admissions for ACO assigned beneficiaries who are 65 and older and are discharged from all non-Federal short-stay acute care hospitals, including critical access hospitals.

Additional details are provided in S.9 Denominator Details.

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

The target population for the publically reported measure includes admissions for Medicare FFS beneficiaries who are at least 65 years of age undergoing elective primary THA and/or TKA procedures.

Additional details are provided in S.9 Denominator Details.

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

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 aged 18 years and older discharged from the hospital with a principal discharge diagnosis of pneumonia (including aspiration pneumonia) or a principal discharge diagnosis of sepsis (not including severe sepsis) with a

secondary diagnosis of pneumonia (including aspiration pneumonia) coded as POA and no secondary diagnosis of severe sepsis coded as POA, and with a complete claims history for the 12 months prior to admission.

The measure is currently publicly reported by CMS for those patients 65 years and older who are Medicare FFS beneficiaries admitted to non-federal acute care hospitals.

Additional details are provided in S.7 Denominator Details.

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

This claims-based measure can be used in either of two patient cohorts: (1) patients aged 65 years or older or (2) patients aged 40 years or older. We have tested the measure in both age groups.

The cohort includes admissions for patients discharged from the hospital with either a principal discharge diagnosis of COPD, or a principal discharge diagnosis of respiratory failure with a secondary diagnosis of acute exacerbation of COPD; and with a complete claims history for the 12 months prior to admission.

The measure is currently publicly reported by CMS for those patients 65 years and older who are Medicare FFS beneficiaries admitted to non-federal hospitals

Additional details are provided in S.7 Denominator Details.

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.

0230 Hospital 30-day, all-cause, risk-standardized mortality rate (RSMR) following acute myocardial infarction (AMI) hospitalization

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 discharged from the hospital with a principal discharge diagnosis of AMI and with a complete claims history for the 12 months prior to admission. The measure is currently publicly reported by CMS for those patients 65 years and older who are either Medicare FFS beneficiaries admitted to non-federal hospitals or patients admitted to VA hospitals.

Additional details are provided in S.7 Denominator Details.

Denominator Details

3504 Claims-Only Hospital-Wide (All-Condition, All-Procedure) Risk-Standardized Mortality Measure

An index admission is the hospitalization to which the mortality outcome is attributed and includes admissions for patients:

1. Enrolled in Medicare FFS Part A for at least 12 months prior to the date of admission and during the index admission

Rationale: Claims data are consistently available only for Medicare FFS beneficiaries. The 12-month prior enrollment criterion ensures a full year of administrative data is available for risk adjustment.

2. Not transferred from another acute care facility

Rationale: Admissions to an acute cate hospital within one day of discharge from another acute care hospital are considered transfers. Transferred patients are included in the measure cohort, but it is the initial hospitalization rather than any "transfer-in" hospitalization(s), that is included as the hospitalization to which the mortality outcome is attributed (the index admission).

3. Aged between 65 and 94 years

Rationale: Medicare patients younger than 65 are not included in the measure because they usually qualify for the program due to severe disability and are considered to be clinically distinct from Medicare patients 65 and over. Patients over age 94 are not included to avoid holding hospitals responsible for the survival of the very elderly patients, who may be less likely to have survival as a primary goal.

Note that the hybrid measure (submitted for NQF endorsement in parallel with the claims-only measure) differs from the claims-only measure in terms of the age range of included admissions; the hybrid measure includes all inpatient admissions for patients aged 50-94 years old. The intention is to fully harmonize the cohort definitions for the two measures, so that both measures will capture admissions for patients age 65-94. We deviated from that definition during development and testing for the hybrid measure due to the limited dataset available that included the EHR data elements needed to calculate the hybrid measure. Note that the risk model already includes age in years, as a risk variable.)

4. Not admitted for primary psychiatric diagnoses

Rationale: Patients admitted for psychiatric treatment are typically cared for in separate psychiatric facilities that are not comparable to short-term acute care hospitals (see data dictionary, HWM Non-Acute Care Inclusion tab).

5. Not admitted for rehabilitation

Rationale: These admissions are not typically to a short-term acute care hospital and are not for acute care (see data dictionary, HWM Non-Acute Care Inclusion tab).

6. Not enrolled in hospice at the time of, or 12 months prior to, their index admission

Rationale: Patients enrolled in hospice in the prior 12 months or at the time of admission are unlikely to have 30-day survival as a primary goal.

7. Not enrolled in hospice within two days of admission

Rationale: There is not a single, correct approach regarding patients enrolled in hospice during admission or upon discharge – mortality may or may not represent a quality signal for this group of patients and hospice enrollment is inadequate to differentiate this issue.

However, for most patients and/or families who had the discussion and agreed to enroll in hospice within two days of admission, 30-day survival is not likely the primary goal due to their condition and not the quality of care received.

8. Not with a principal diagnosis of cancer and enrolled in hospice during their index admission

Rationale: Patients admitted primarily for cancer who are enrolled in hospice during admission are unlikely to have 30-day survival as a primary goal of care. (see data dictionary, HWM Cancer Inclusion tab).

9. Without any diagnosis of metastatic cancer

Rationale: Although some patients admitted with a diagnosis of metastatic cancer will have 30-day survival as a primary goal of care, for many such patients admitted to the hospital, death may be a clinically reasonable and patient-centered outcome. (see data dictionary, HWM Metastatic Cancer Inclusion tab).

10. Not with a principal discharge diagnosis, or a secondary diagnosis that is present on admission (POA) for a condition which hospitals have limited ability to influence survival

Rationale: Hospitals have little ability to impact mortality for some conditions. This list of conditions (see data dictionary, HWM ICD-10 Inclusion tab) was determined through independent review, by several clinicians, of conditions associated with high mortality. The decisions were also reviewed with our Technical Expert Panel (TEP) and Technical Work Group. Admissions are not included in the cohort if the patient had a principal diagnosis code that is on this list, or a secondary code with POA that is on the list.

In addition, for patients with multiple admissions, the measure selects only one admission, at random, for inclusion. There is no practical statistical modeling approach that can account or adjust for the complex relationship between the number of admissions and risk of mortality in the context of a hospital-wide mortality measure. Random selection ensures that providers are not penalized for a “last” admission during the measurement period; selecting the last admission would not be as accurate a reflection of the risk of death as random selection, as the last admission is inherently associated with a higher mortality risk. Random selection is also used in CMS’s condition-specific mortality measures. Note that random selection reduces the number of admissions, but does not exclude any patients from the measure.

The cohort is defined using ICD-10 Clinical Modification codes identified in Medicare Part A Inpatient claims data. The measure aggregates the ICD-10 principal diagnosis and all procedure codes of the index admission into clinically coherent groups of conditions and procedures (condition categories or procedure categories) using the Agency for Healthcare Research and Quality (AHRQ) Clinical Classifications System (CCS). There is a total of 285 mutually exclusive AHRQ condition categories, most of which are single, homogenous diseases such as pneumonia or acute myocardial infarction. Some are aggregates of conditions, such as “other bacterial infections”. There is a total of 231 mutually exclusive procedure categories. Using the AHRQ CCS procedure and condition categories, the measure assigns each index hospitalization to one of 15 mutually exclusive divisions. The divisions were created based upon clinical coherence, consistency of mortality risk, adequate patient and hospital case volume for stable results reporting, and input from clinicians, patients, and patient caregivers on usability.

The measure first assigns admissions with qualifying AHRQ procedure categories to one of six surgery divisions by identifying a defining surgical procedure. The defining surgical

procedure is identified using the following algorithm: 1) if a patient only has one major surgical procedure then that procedure is the defining surgical procedure; 2) if a patient has more than one major surgical procedure, the first dated procedure performed during the index admission is the defining surgical procedure; 3) if there is more than one major surgical procedure on that earliest date, the procedure with the highest mortality rate is the defining surgical procedure. These divisions include admissions likely cared for by surgical teams.

The surgical divisions are: Surgical Cancer (see note below), Cardiothoracic Surgery, General Surgery, Neurosurgery, Orthopedic Surgery, and Other Surgical Procedures.

For the Surgical Cancer division, any admission that includes a surgical procedure and a principal discharge diagnosis code of cancer is assigned to the Surgical Cancer division. This division and the logic behind it was implemented in response to feedback from our Technical Expert Panel.

The measure then assigns the remaining admissions into one of the nine non-surgical divisions based on the AHRQ diagnostic CCS of the principal discharge diagnosis. The non-surgical divisions are: Cancer, Cardiac, Gastrointestinal, Infectious Disease, Neurology, Orthopedic, Pulmonary, Renal, Other Conditions.

The full list of the specific diagnosis and procedure AHRQ CCS categories used to define the divisions are attached in the Data Dictionary.

1789 Hospital-Wide All-Cause Unplanned Readmission Measure (HWR)

To be included in the hospital level measure, cohort patients must be:

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

2. Aged 65 or over;

3. Discharged alive from a non-federal short-term acute care hospital; and

4. Not transferred to another acute care facility.

The ACO version of this measure has the additional criterion that only hospitalizations for ACO-assigned beneficiaries that meet all of the other criteria listed above are included. The cohort definition is otherwise identical to that of the HWR described below.

The measure aggregates the ICD-9 principal diagnosis and all procedure codes of the index admission into clinically coherent groups of conditions and procedures (condition categories or procedure categories) using the AHRQ CCS. There are a total of 285 mutually exclusive AHRQ condition categories, most of which are single, homogenous diseases such as pneumonia or acute myocardial infarction. Some are aggregates of conditions, such as “other bacterial infections.” There are a total of 231 mutually exclusive procedure categories. Using the AHRQ CCS procedure and condition categories, the measure assigns each index hospitalization to one of five mutually exclusive specialty cohorts: surgery/gynecology, cardiorespiratory, cardiovascular, neurology, and medicine. The rationale behind this organization is that conditions typically cared for by the same team of clinicians are expected to experience similar added (or reduced) levels of readmission risk.

The measure first assigns admissions with qualifying AHRQ procedure categories to the Surgery/Gynecology Cohort. This cohort includes admissions likely cared for by surgical or gynecological teams.

The measure then sorts admissions into one of the four remaining specialty cohorts based on the AHRQ diagnosis category of the principal discharge diagnosis:

The Cardiorespiratory Cohort includes several condition categories with very high readmission rates such as pneumonia, chronic obstructive pulmonary disease, and heart failure. These admissions are combined into a single cohort because they are often clinically indistinguishable and patients are often simultaneously treated for several of these diagnoses.

The Cardiovascular Cohort includes condition categories such as acute myocardial infarction that in large hospitals might be cared for by a separate cardiac or cardiovascular team.

The Neurology Cohort includes neurologic condition categories such as stroke that in large hospitals might be cared for by a separate neurology team.

The Medicine Cohort includes all non-surgical patients who were not assigned to any of the other cohorts.

The full list of the specific diagnosis and procedure AHRQ CCS categories used to define the specialty cohorts are attached in data field S.2b (Data Dictionary or Code Table).

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

To be included in the measure cohort used in public reporting, patients must meet the following additional inclusion criteria:

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

2. Aged 65 or older

3. Having a qualifying elective primary THA/TKA procedure; elective primary THA/TKA procedures are defined as those procedures without any of the following:

• Femur, hip, or pelvic fractures coded in the principal or secondary discharge diagnosis field of the index admission

• Partial hip arthroplasty (PHA) procedures (with a concurrent THA/TKA); partial knee arthroplasty procedures are not distinguished by ICD9 codes and are currently captured by the THA/TKA measure

• Revision procedures with a concurrent THA/TKA

• Resurfacing procedures with a concurrent THA/TKA

• Mechanical complication coded in the principal discharge

• Malignant neoplasm of the pelvis, sacrum, coccyx, lower limbs, or bone/bone marrow or a disseminated malignant neoplasm coded in the principal discharge diagnosis field

• Removal of implanted devises/prostheses

• Transfer status from another acute care facility for the THA/TKA

Patients are eligible for inclusion in the denominator if they had an elective primary THA and/or a TKA AND had continuous enrollment in Part A and Part B Medicare fee-for-service (FFS) 12 months prior to the date of index admission.

This measure can also be used for an all-payer population aged 18 years and older. We have explicitly tested the measure in both patients aged 18+ years and those aged 65+ years (see Section 2b4.11 of the Testing Attachment for details, 2b4.11).

International Classification of Diseases, 9th Revision, Clinical Modification (ICD-9-CM) codes used to define the cohort for each measure are:

ICD-9-CM codes used to define a THA or TKA:

81.51 Total Hip Replacement

81.54 Total Knee Replacement

ICD-10 Codes that define a THA or TKA:

0SR90J9 Replacement of Right Hip Joint with Synthetic Substitute, Cemented, Open Approach

0SR90JA Replacement of Right Hip Joint with Synthetic Substitute, Uncemented, Open Approach

0SR90JZ Replacement of Right Hip Joint with Synthetic Substitute, Open Approach

0SRB0J9 Replacement of Left Hip Joint with Synthetic Substitute, Cemented, Open Approach

0SRB0JA Replacement of Left Hip Joint with Synthetic Substitute, Uncemented, Open Approach

0SRB0JZReplacement of Left Hip Joint with Synthetic Substitute, Open Approach

0SRC07Z Replacement of Right Knee Joint with Autologous Tissue Substitute, Open Approach

0SRC0JZReplacement of Right Knee Joint with Synthetic Substitute, Open Approach

0SRC0KZ Replacement of Right Knee Joint with Nonautologous Tissue Substitute, Open Approach

0SRD07Z Replacement of Left Knee Joint with Autologous Tissue Substitute, Open Approach

0SRD0JZ Replacement of Left Knee Joint with Synthetic Substitute, Open Approach

0SRD0KZReplacement of Left Knee Joint with Nonautologous Tissue Substitute, Open Approach

0SRT07Z Replacement of Right Knee Joint, Femoral Surface with Autologous Tissue Substitute, Open Approach

0SRT0JZ Replacement of Right Knee Joint, Femoral Surface with Synthetic Substitute, Open Approach

0SRT0KZ Replacement of Right Knee Joint, Femoral Surface with Nonautologous Tissue Substitute, Open Approach

0SRU07Z Replacement of Left Knee Joint, Femoral Surface with Autologous Tissue Substitute, Open Approach

0SRU0JZ Replacement of Left Knee Joint, Femoral Surface with Synthetic Substitute, Open Approach

0SRU0KZ Replacement of Left Knee Joint, Femoral Surface with Nonautologous Tissue Substitute, Open Approach

0SRV07Z Replacement of Right Knee Joint, Tibial Surface with Autologous Tissue Substitute, Open Approach

0SRV0JZ Replacement of Right Knee Joint, Tibial Surface with Synthetic Substitute, Open Approach

0SRV0KZ Replacement of Right Knee Joint, Tibial Surface with Nonautologous Tissue Substitute, Open Approach

0SRW07Z Replacement of Left Knee Joint, Tibial Surface with Autologous Tissue Substitute, Open Approach

0SRW0JZ Replacement of Left Knee Joint, Tibial Surface with Synthetic Substitute, Open Approach

0SRW0KZ Replacement of Left Knee Joint, Tibial Surface with Nonautologous Tissue Substitute, Open Approach

An ICD-9 to ICD-10 crosswalk is attached in field S.2b. (Data Dictionary or Code Table).

Elective primary THA/TKA procedures are defined as those procedures without any of the following:

1) Femur, hip, or pelvic fractures coded in principal or secondary discharge diagnosis fields of the index admission

2) Partial hip arthroplasty (PHA) procedures with a concurrent THA/TKA

3) Revision procedures with a concurrent THA/TKA

4) Resurfacing procedures with a concurrent THA/TKA

5) Mechanical complication coded in the principal discharge

6) Malignant neoplasm of the pelvis, sacrum, coccyx, lower limbs, or bone/bone marrow or a disseminated malignant neoplasm coded in the principal discharge diagnosis field

7) Removal of implanted devises/prostheses

8) Transfer status from another acute care facility for the THA/TKA

For a full list of ICD-9 and ICD-10 codes defining the following see attached Data Dictionary, sheet “THA TKA Cohort Codes Part 2.”

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

To be included in the measure cohort used in public reporting, patients must meet the following inclusion criteria:

1. Have a principal discharge diagnosis of pneumonia (including aspiration pneumonia) or sepsis (not including severe sepsis) with a secondary diagnosis of pneumonia (including aspiration pneumonia) coded as POA and no secondary diagnosis of severe sepsis coded as POA;

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

3. Aged 65 or over; and

4. Not transferred from another acute care facility

ICD-9 and ICD-10 cohort codes are included in the attached Data Dictionary.

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

To be included in the measure cohort used in public reporting, patients must meet the following inclusion criteria:

1. Have principal discharge diagnosis of COPD or principal discharge diagnosis of respiratory failure with a secondary diagnosis of COPD with exacerbation;

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

3. Aged 65 or over; and

4. Not transferred from another acute care facility.

ICD-9 and ICD-10 cohort codes are included in the attached Data Dictionary.

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.

0230 Hospital 30-day, all-cause, risk-standardized mortality rate (RSMR) following acute myocardial infarction (AMI) hospitalization

To be included in the measure cohort used in public reporting, patients must meet the following additional inclusion criteria:

1. Having a principal discharge diagnosis of AMI;

2. Enrolled in Medicare FFS Part A and Part B for the first 12 months prior to the date of admission, enrolled in Part A during the index admission, or those who are VA beneficiaries;

3. Aged 65 or over; and

4. Not transferred from another acute care facility.

ICD-9 and ICD-10 cohort codes are included in the attached Data Dictionary.

Exclusions

3504 Claims-Only Hospital-Wide (All-Condition, All-Procedure) Risk-Standardized Mortality Measure

The measure excludes index admissions for patients:

1. With inconsistent or unknown vital status (from claims data) or other unreliable claims data;

2. Discharged against medical advice (AMA);

3. With an admission for spinal cord injury (CCS 227), skull and face fractures (CCS 228), Intracranial Injury (CCS 233), Crushing injury or internal injury (CCS 234), Open wounds of head/neck/trunk (CCS 235), and burns (CCS 240); and

4. With a principal discharge diagnosis within a CCS with fewer than 100 admissions within the measurement year.

1789 Hospital-Wide All-Cause Unplanned Readmission Measure (HWR)

The measure excludes index admissions for patients:

1. Admitted to Prospective Payment System (PPS)-exempt cancer hospitals;

2. Without at least 30 days post-discharge enrollment in FFS Medicare;

3. Discharged against medical advice (AMA);

4. Admitted for primary psychiatric diagnoses;

5. Admitted for rehabilitation; or

6. Admitted for medical treatment of cancer.

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

This measure excludes index admissions for patients:

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

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

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

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

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

This mortality measure excludes index admissions for patients:

1. Discharged alive on the day of admission or the following day who were not transferred to another acute care facility;

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

3. Enrolled in the Medicare hospice program any time in the 12 months prior to the index admission, including the first day of the index admission; or,

4. Discharged against medical advice.

For patients with more than one admission for a given condition in a given year, only one index admission for that condition is randomly selected for inclusion in the cohort.

Similarly, for the three-year combined data, when index admissions occur during the transition between measure reporting periods (June and July of each year) and both are randomly selected for inclusion in the measure, the measure includes only the June admission. The July admissions are excluded to avoid assigning a single death to two admissions.

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

The mortality measure excludes index admissions for patients:

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

2. Enrolled in the Medicare hospice program any time in the 12 months prior to the index admission, including the first day of the index admission; or

3. Discharged against medical advice

For patients with more than one admission for a given condition in a given year, only one index admission for that condition is randomly selected for inclusion in the cohort. Additional admissions within that year are excluded.

Similarly, for the three-year combined data, when index admissions occur during the transition between measure reporting periods (June and July of each year) and both are randomly selected for inclusion in the measure, the measure includes only the June admission. The July admissions are excluded to avoid assigning a single death to two admissions.

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.

0230 Hospital 30-day, all-cause, risk-standardized mortality rate (RSMR) following acute myocardial infarction (AMI) hospitalization

The mortality measure excludes index hospitalizations that meet any of the following exclusion criteria:

1. Discharged alive on the day of admission or the following day who were not transferred to another acute care facility;

2. Inconsistent or unknown vital status or other unreliable demographic (age and gender) data;

3. Enrolled in the Medicare hospice program or used VA hospice services any time in the 12 months prior to the index admission, including the first day of the index admission, or

4. Discharged against medical advice (AMA).

For patients with more than one admission for a given condition in a given year, only one index admission for that condition is randomly selected for inclusion in the cohort.

Similarly, for the three-year combined data, when index admissions occur during the transition between measure reporting periods (June and July of each year) and both are randomly selected for inclusion in the measure, the measure includes only the June admission. The July admissions are excluded to avoid assigning a single death to two admissions.

Exclusion Details

3504 Claims-Only Hospital-Wide (All-Condition, All-Procedure) Risk-Standardized Mortality Measure

1. With inconsistent or unknown vital status (from claims data) or other unreliable claims data

Rationale: The measure does not include stays for patients where the admission date is after the date of death in the Medicare Enrollment Database, or where the date of death occurs before the date of discharge but the patient was discharged alive because these are likely errors in the data.

2. Discharged against medical advice (AMA)

Rationale: Providers did not have the opportunity to deliver full care and prepare the patient for discharge.

3. With an admission for spinal cord injury (CCS 227), skull and face fractures (CCS 228), Intracranial Injury (CCS 233), Crushing injury or internal injury (CCS 234), Open wounds of head/neck/trunk (CCS 235), and burns (CCS 240)

Rationale: Even though a hospital likely can influence the outcome of some of these conditions, in many cases death events are not a signal of poor quality of care when patients present with these conditions. These conditions are also infrequent events that are unlikely to be uniformly distributed across hospitals.

4. With a principal discharge diagnosis within a CCS with fewer than 100 admissions in that division within the measurement year.

Rationale: To calculate a stable and precise risk model, there are a minimum number of admissions that are needed. In addition, a minimum number of admissions and/or outcome events are required to inform grouping admissions into larger categories. These admissions present challenges to both accurate risk prediction and coherent risk grouping and are therefore excluded.

Note: During measure development we analyzed different volume cut-offs (25, 50 and 100). Using cut-off values below 100 resulted in too many CCS codes in some of the divisions (the CCS category codes are used in risk adjustment) which resulted in non-convergence of those division-level risk models. The total number of patients excluded is very small (13,597 or 0.21% of admissions for a cut off of 100). During measure development we also explored the option of pooling low-volume CCS codes (CCS<100 patients) into one group, however, the heterogeneity in mortality rates for the individual ICD-10 codes in those groups would preclude adequate risk adjustment. The TEP supported excluding these admissions.

1789 Hospital-Wide All-Cause Unplanned Readmission Measure (HWR)

1. Admitted to a PPS-exempt cancer hospital, identified by the Medicare provider ID.

2. Admissions without at least 30 days post-discharge enrollment in FFS Medicare are determined using data captured in the Medicare Enrollment Database (EDB).

3. Discharges against medical advice (AMA) are identified using the discharge disposition indicator in claims data.

4. Admitted for primary psychiatric disease, identified by a principal diagnosis in one of the specific AHRQ CCS categories listed in the attached data dictionary.

5. Admitted for rehabilitation care, identified by the specific ICD-9 diagnosis codes included in CCS 254 (Rehabilitation care; fitting of prostheses; and adjustment of devices).

6. Admitted for medical treatment of cancer, identified by the specific AHRQ CCS categories listed in the attached data dictionary.

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

This measure excludes index admissions for patients:

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

Rationale: The 90-day complication outcome cannot be assessed in this group since claims data are used to determine whether a complication of care occurred.

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

Rationale: Providers did not have the opportunity to deliver full care and prepare the patient for discharge.

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

Rationale: Although clinically possible, it is highly unlikely that patients would receive more than two elective THA/TKA procedures in one hospitalization, which may reflect a coding error.

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

1. Inconsistent vital status or unreliable data are identified if any of the following conditions are met 1) the patient's age is greater than 115 years; 2) if the discharge date for a hospitalization is before the admission date; 3) if the patient has a sex other than 'male' or 'female'.

2. Hospice enrollment in the 12 months prior to or on the index admission is identified using hospice enrollment data.

3. Discharges against medical advice (AMA) are identified using the discharge disposition indicator.

After exclusions #1-3 are applied, the measure randomly selects one index admission per patient per year for inclusion in the cohort so that each episode of care is mutually independent with the same probability of the outcome. Additional admissions within that year are excluded. For each patient, the probability of death increases with each subsequent admission and therefore the episodes of care are not mutually independent. For the three-year combined data, when index admissions occur during the transition between measure reporting periods (June and July of each year) and both are randomly selected for inclusion in the measure, the measure includes only the June admission. The July admissions are excluded to avoid assigning a single death to two admissions.

Individual codes with descriptors can be found in the attached Data Dictionary.

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

1. Inconsistent vital status or unreliable demographic data in the claims

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

Enrolled in the Medicare hospice program any time in the 12 months prior to the index admission, including the first day of the index admission. Enrollment to Medicare beneficiaries is determined using the Medicare Enrollment Database. Rationale: These patients are likely continuing to seek comfort measures only, so mortality is not necessarily an adverse outcome or signal of poor quality care.

2. Discharges against medical advice (AMA) are identified using the discharge disposition indicator in the claim.

Rationale: Providers did not have the opportunity to deliver full care and prepare the patient for discharge.

Individual codes with descriptors can be found in the attached Data Dictionary.

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.

0230 Hospital 30-day, all-cause, risk-standardized mortality rate (RSMR) following acute myocardial infarction (AMI) hospitalization

1. Discharged alive on the day of admission or the following day who were not transferred to another acute care facility. Discharges are identified using data from the claims.

Rationale: It is unlikely that these patients had clinically significant AMI.

2. Inconsistent or unknown vital status or other unreliable demographic data

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

3. Enrolled in the Medicare hospice program or used VA hospice services any time in the 12 months prior to the index admission, including the first day of the index admission. Enrollment to Medicare beneficiaries is determined using the Medicare Enrollment Database.

Rationale: These patients are likely continuing to seek comfort measures only, so mortality is not necessarily an adverse outcome or signal of poor quality care.

4. Discharged against medical advice. Discharge status is identified using the claims

Rationale: Providers did not have the opportunity to deliver full care and prepare the patient for discharge.

After exclusions #1-4 are applied, the measure randomly selects one index admission per patient per year for inclusion in the cohort so that each episode of care is mutually independent with the same probability of the outcome. Additional admissions within that year are excluded. For each patient, the probability of death increases with each subsequent admission and therefore the episodes of care are not mutually independent.

For the three-year combined data, when index admissions occur during the transition between measure reporting periods (June and July of each year) and both are randomly selected for inclusion in the measure, the measure includes only the June admission. July admissions are excluded to avoid assigning a single death to two admissions.

Risk Adjustment

3504 Claims-Only Hospital-Wide (All-Condition, All-Procedure) Risk-Standardized Mortality Measure

Statistical risk model

1789 Hospital-Wide All-Cause Unplanned Readmission Measure (HWR)

Statistical risk model

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

The HWR measure employs a hierarchical logistic regression model to create a hospital-level 30-day RSRR. In brief, the approach simultaneously models data at the patient and hospital levels to account for the variance in patient outcomes within and between hospitals (Normand & Shahian, 2007). At the patient level, the model adjusts the log-odds of readmission within 30 days of discharge for age and selected clinical covariates. At the hospital level, the approach models the hospital-specific intercepts as arising from a normal distribution. The hospital intercept represents the underlying risk of readmission at the hospital, after accounting for patient risk. If there were no differences among hospitals, then after adjusting for patient risk, the hospital intercepts should be identical across all hospitals.

We use a fixed, common set of variables in all our models for simplicity and ease of data collection and analysis. However, we estimate a hierarchical logistic regression model for each specialty cohort separately, and the coefficients associated with each variable may vary across specialty cohorts.

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

The model adjusts for case-mix differences based on the clinical status of patients at the time of admission. We use condition categories (CCs), which are clinically meaningful groupings of more than 15,000 ICD-9-CM diagnosis codes (Pope et al., 2000). A file that contains a list of the ICD-9-CM codes and their groupings into CCs is attached in data field S.2b (Data Dictionary or Code Table). In addition, only comorbidities that convey information about the patient at admission or in the 12 months prior, and not complications that arise during the course of the index hospitalization, are included in the risk adjustment. Hence, we do not risk adjust for CCs that may represent adverse events of care when they are only recorded in the index admission. The models also include a condition-specific indicator for all AHRQ CCS categories with sufficient volume (defined as those with more than 1,000 admissions nationally each year for Medicare FFS data) as well as a single indicator for conditions with insufficient volume in each model.

The final set of risk adjustment variables are listed in the attached Data Dictionary.

Demographics

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

Comorbidities

Metastatic cancer or acute leukemia (CC 7)

Severe cancer (CC 8-9)

Other cancers (CC 10-12)

Severe hematological disorders (CC 44)

Coagulation defects and other specified hematological disorders (CC 46)

Iron deficiency or other unspecified anemias and blood disease (CC 47)

End-stage liver disease (CC 25-26)

Pancreatic disease (CC 32)

Dialysis status (CC 130)

Renal failure (CC 131)

Transplants (CC 128, 174)

Severe infection (CC 1, 3-5)

Other infectious diseases and pneumonias (CC 6, 111-113)

Septicemia/shock (CC 2)

Congestive heart failure (CC 80)

Coronary atherosclerosis or angina, cerebrovascular disease (CC 81-84, 89, 98-99, 103-106)

Specified arrhythmias and other heart rhythm disorders (CC 92-93)

Cardio-respiratory failure or shock (CC 79)

Chronic obstructive pulmonary disease (COPD) (CC 108)

Fibrosis of lung or other chronic lung disorders (CC 109)

Protein-calorie malnutrition (CC 21)

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

Rheumatoid arthritis and inflammatory connective tissue disease (CC 38)

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

Decubitus ulcer or chronic skin ulcer (CC 148-149)

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

Seizure disorders and convulsions (CC 74)

Respirator dependence/tracheostomy status (CC 77)

Drug/alcohol psychosis or dependence (CC 51-52)

Psychiatric comorbidity (CC 54-56, 58, 60)

Hip fracture/dislocation (CC 158)

Principal Diagnoses

Refer to the 2015 Measure Updates and Specifications: Hospital-Wide All-Cause Unplanned Readmission - Version 4.0 referenced here for the full lists of principal diagnosis AHRQ CCS categories included in each specialty cohort risk adjustment model.

The ACR measure employs the same risk adjustment methodology and uses the same risk variables.

References:

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

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

Pope GC, et al. 2000. Principal Inpatient Diagnostic Cost Group Models for Medicare Risk Adjustment. Health Care Financing Review 21(3): 93-118.

Available in attached Excel or csv file at S.2b

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

Statistical risk model

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

Statistical risk model

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

Statistical risk model

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

Statistical risk model

0230 Hospital 30-day, all-cause, risk-standardized mortality rate (RSMR) following acute myocardial infarction (AMI) hospitalization

Statistical risk model

Stratification

3504 Claims-Only Hospital-Wide (All-Condition, All-Procedure) Risk-Standardized Mortality Measure

N/A

1789 Hospital-Wide All-Cause Unplanned Readmission Measure (HWR)

N/A

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

N/A

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

N/A

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

N/A

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

N/A

0230 Hospital 30-day, all-cause, risk-standardized mortality rate (RSMR) following acute myocardial infarction (AMI) hospitalization

N/A

Type Score

3504 Claims-Only Hospital-Wide (All-Condition, All-Procedure) Risk-Standardized Mortality Measure

Rate/proportion better quality = lower score

1789 Hospital-Wide All-Cause Unplanned Readmission Measure (HWR)

Rate/proportion better quality = lower score

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

Rate/proportion better quality = lower score

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

Rate/proportion better quality = lower score

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

Rate/proportion better quality = lower 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

0230 Hospital 30-day, all-cause, risk-standardized mortality rate (RSMR) following acute myocardial infarction (AMI) hospitalization

Rate/proportion better quality = lower score

Algorithm

3504 Claims-Only Hospital-Wide (All-Condition, All-Procedure) Risk-Standardized Mortality Measure

The measure estimates hospital-level, risk-standardized mortality rates (RSMRs) within 30 days of hospital admission using hierarchical logistical regression models through a Bayesian Markov Chain Monte Carlo (MCMC) procedure. In brief, we used hierarchical logistic regression to model the log-odds of mortality for each of the 15 service-line divisions. Death within 30 days was modeled as a function of patient-level demographic and clinical characteristics and a random hospital-level intercept. This model specification accounts for within-hospital correlation of the observed outcomes and models the assumption that underlying differences in quality among the health care facilities being evaluated lead to systematic differences in outcomes. We estimated a separate hierarchical logistic regression model for each service-line division. In order to obtain the variance and interval estimates, we fit the hierarchical model under the Bayesian framework along with the Markov Chain Monte Carlo (MCMC) technique.

Admissions are assigned to one of 15 mutually exclusive divisions (groups of discharge condition categories and procedure categories). For each division and each hospital with patients in that division, the standardized mortality ratio (SMR) is calculated as the ratio of the number of “predicted” deaths to the number of “expected” deaths at a given hospital. The predicted number of deaths is based on the hospital’s performance with its observed case mix and service mix, and 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 for each cohort is added to the sum of the estimated regression coefficients multiplied by patient characteristics. The results are transformed via an inverse logit function and summed over all patients attributed to a hospital to get a predicted value. The expected number of deaths is based on the nation’s performance with that hospital’s case mix and service mix and 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 transformed via an inverse logit function and summed over all patients in the hospital to get an expected value. This approach is analogous to a ratio of "observed" to "expected" used in other types of statistical analyses. It conceptually allows a particular hospital's performance, given its case mix and service mix, to be compared to an average hospital's performance with the same case mix and service mix. Thus, a lower ratio indicates lower-than-expected mortality rates or better quality, while a higher ratio indicates higher-than-expected mortality rates or worse quality.

To assess hospital performance for each reporting period, the measure re-estimates the model coefficients using the data in that period.

The division-level SMRs are then pooled for each hospital using an inverse variance-weighted geometric mean to create a hospital-wide composite SMR. The hospital-wide SMR is then multiplied by the national observed mortality rate to produce the RSMR.

1789 Hospital-Wide All-Cause Unplanned Readmission Measure (HWR)

This measure estimates a hospital-level 30-day all-cause RSRR using hierarchical logistic regression models. In brief, the approach simultaneously models data at the patient, and hospital levels to account for variance in patient outcomes within and between hospitals (Normand et al., 2007). At the patient level, it models the log-odds of readmission within 30 days of discharge using age, selected clinical covariates, and a hospital -specific effect. At the hospital level, the approach models the hospital- specific effects as arising from a normal distribution. The hospital effect represents the underlying risk of a readmission, after accounting for patient risk. The hospital-specific effects are given a distribution to account for the clustering (non-independence) of patients within the same hospital (Normand et al., 2007). If there were no differences among hospitals, then after adjusting for patient risk, the hospital effects should be identical across all hospitals.

Admissions are assigned to one of five mutually exclusive specialty cohort groups consisting of related conditions or procedures. For each specialty cohort group, the standardized readmission ratio (SRR) is calculated as the ratio of the number of "predicted" readmissions to the number of "expected" readmissions at a given hospital. For each hospital, the numerator of the ratio is the number of readmissions within 30 days predicted based on the hospital's performance with its observed case mix and service mix, and the denominator is the number of readmissions expected based on the nation's performance with that hospital's case mix and service mix. This approach is analogous to a ratio of "observed" to "expected" used in other types of statistical analyses. It conceptually allows a particular hospital's performance, given its case mix and service mix, to be compared to an average hospital's performance with the same case mix and service mix. Thus, a lower ratio indicates lower-than-expected readmission rates or better quality, while a higher ratio indicates higher-than-expected readmission rates or worse quality.

For each specialty cohort, the "predicted" number of readmissions (the numerator) is calculated by using the coefficients estimated by regressing the risk factors (found in Table D.9) and the hospital-specific effect on the risk of readmission. The estimated hospital-specific effect for each cohort is added to the sum of the estimated regression coefficients multiplied by patient characteristics. The results are log transformed and summed over all patients attributed to a hospital to get a predicted value. The "expected" number of readmissions (the denominator) is obtained in the same manner, but a common effect using all hospitals in our sample is added in place of the hospital-specific effect. The results are log transformed and summed over all patients in the hospital to get an expected value.

To assess hospital performance for each reporting period, we re-estimate the model coefficients using the data in that period.

The specialty cohort SRRs are then pooled for each hospital using a volume-weighted geometric mean to create a hospital-wide composite SRR. The composite SRR is multiplied by the national observed readmission rate to produce the RSRR. The statistical modeling approach is described fully in Appendix A and in the original methodology report (Horwitz et al., 2012).

The ACR quality measure was adapted from the HWR quality measure. The unit of analysis was changed from the hospital to the ACO. This was possible because both the HWR and ACR measures assess readmission performance for a population that clusters patients together (either in hospitals or in ACOs). The goal is to isolate the effects of beneficiary characteristics on the probability that a patient will be readmitted from the effects of being in a specific hospital or ACO. In addition, planned readmissions are excluded for the ACR quality measure in the same way that they are excluded for the HWR measure. The ACR measure is calculated identically to what is described above for the HWR measure.

References:

Horwitz L, Partovian C, Lin Z, et al. Hospital-Wide All-Cause Unplanned Readmission Measure: Final Technical Report. 2012; http://www.qualitynet.org/dcs/BlobServer?blobkey=id&blobnocache=true&blobwhere=1228889825199&blobheader=multipart%2Foctet-stream&blobheadername1=Content-Disposition&blobheadervalue1=attachment%3Bfilename%3DDryRun_HWR_TechReport_081012.pdf&blobcol=urldata&blobtable=MungoBlobs. Accessed 30 April, 2014.

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

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

The measure estimates hospital-level RSCRs following elective primary THA/TKA using hierarchical logistic regression models. In brief, the approach simultaneously models data at the patient and hospital levels to account for variance in patient outcomes within and between hospitals (Normand and Shahian, 2007). At the patient level, it models the log-odds of a complication occurring within 90 days of the index admission using age, sex, selected clinical covariates, and a hospital-specific intercept. At the hospital level, it models the hospital-specific intercepts as arising from a normal distribution. The hospital intercept represents the underlying risk of a complication at the hospital, after accounting for patient risk. The hospital-specific intercepts are given a distribution to account for the clustering (non-independence) of patients within the same hospital. If there were no differences among hospitals, then after adjusting for patient risk, the hospital intercepts should be identical across all hospitals.

The RSCR is calculated as the ratio of the number of “predicted” to the number of “expected” admissions with a complication at a given hospital, multiplied by the national observed complication rate. For each hospital, the numerator of the ratio is the number of complications within 90 days predicted on the basis of the hospital’s performance with its observed case mix, and the denominator is the number of complications expected based on the nation’s performance with that hospital’s case mix. This approach is analogous to a ratio of “observed” to “expected” used in other types of statistical analyses. It conceptually allows for a comparison of a particular hospital’s performance given its case mix to an

average hospital's performance with the same case mix. Thus, a lower ratio indicates lower-than-expected complication rates or better quality, and a higher ratio indicates higher-than-expected complication rates or worse quality.

The "predicted" number of admissions with a complication (the numerator) is calculated by using the coefficients estimated by regressing the risk factors and the hospital-specific intercept on the risk of having an admission with a complication. The estimated hospital-specific intercept is added to the sum of the estimated regression coefficients multiplied by the patient characteristics. The results are log transformed and summed over all patients attributed to a hospital to get a predicted value. The "expected" number of admissions with a complication (the denominator) is obtained in the same manner, but a common intercept using all hospitals in our sample is added in place of the hospital-specific effect. The results are log transformed and summed over all patients in the hospital to get an expected value. To assess hospital performance for each reporting period, we re-estimate the model coefficients using the years of data in that period.

This calculation transforms the ratio of predicted over expected into a rate that is compared to the national observed complication rate. The hierarchical logistic regression models are described fully in the original methodology report (Grosso et al., 2012).

References:

Grosso L, Curtis J, Geary L, et al. Hospital-level Risk-Standardized Complication Rate Following Elective Primary Total Hip Arthroplasty (THA) And/Or Total Knee Arthroplasty (TKA) Measure Methodology Report. 2012.

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

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

The measure estimates hospital-level 30-day all-cause RSMRs following hospitalization for pneumonia using hierarchical logistic regression models. In brief, the approach simultaneously models data at the patient and hospital levels to account for variance in patient outcomes within and between hospitals (Normand and Shahian, 2007). At the patient level, it models the log-odds of mortality within 30 days of index admission using age, sex, selected clinical covariates, and a hospital-specific intercept. At the hospital level, it models the hospital-specific intercepts as arising from a normal distribution. The hospital intercept represents the underlying risk of a mortality at the hospital, after accounting for patient risk. The hospital-specific intercepts are given a distribution to account for the clustering (non-independence) of patients within the same hospital. If there were no differences among hospitals, then after adjusting for patient risk, the hospital intercepts should be identical across all hospitals.

The RSMR is calculated as the ratio of the number of "predicted" 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 on the basis of 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 for a comparison of a particular hospital's performance given its case mix to an average hospital's performance with the same case mix. Thus, a lower ratio indicates lower-than-expected mortality rates

or better quality, and 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 intercept 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 intercept using all hospitals in our sample is added in place of the hospital-specific intercept. 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 readmission rate. The hierarchical logistic regression models are described fully in the original methodology report (Krumholz et al., 2005).

References:

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

2. Krumholz H, Normand S, Galusha D, et al. 2005. Risk-Adjustment Models for AMI and HF 30-Day Mortality Methodology.

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

The measure estimates hospital-level 30-day all-cause RSMRs following hospitalization for COPD using hierarchical logistic regression models. In brief, the approach simultaneously models data at the patient and hospital levels to account for variance in patient outcomes within and between hospitals (Normand and Shahian, 2007). At the patient level, it models the log-odds of mortality within 30 days of index admission using age, sex, selected clinical covariates, and a hospital-specific intercept. At the hospital level, it models the hospital-specific intercepts as arising from a normal distribution. The hospital intercept represents the underlying risk of a mortality at the hospital, after accounting for patient risk. The hospital-specific intercepts are given a distribution to account for the clustering (non-independence) of patients within the same hospital. If there were no differences among hospitals, then after adjusting for patient risk, the hospital intercepts should be identical across all hospitals.

The RSMR is calculated as the ratio of the number of "predicted" 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 on the basis of 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 for a comparison of a particular hospital's performance given its case mix to an average hospital's performance with the same case mix. Thus, a lower ratio indicates lower-than-expected mortality rates or better quality, and 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 intercept 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 intercept using all hospitals in our sample is added in place of the hospital-specific intercept. 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 readmission rate. The hierarchical logistic regression models are described fully in the original methodology report (Krumholz et al., 2005).

References:

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

2. Krumholz H, Normand S, Galusha D, et al. 2005. Risk-Adjustment Models for AMI and HF 30-Day Mortality Methodology.

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

0230 Hospital 30-day, all-cause, risk-standardized mortality rate (RSMR) following acute myocardial infarction (AMI) hospitalization

The measure estimates hospital-level 30-day all-cause RSMRs following hospitalization for AMI using hierarchical logistic regression models. In brief, the approach simultaneously models data at the patient and hospital levels to account for variance in patient outcomes within and between hospitals (Normand and Shahian, 2007). At the patient level, it models the log-odds of mortality within 30 days of discharge using age, sex, selected clinical covariates, and a hospital-specific intercept. At the hospital level, it models the hospital-specific intercepts as arising from a normal distribution. The hospital intercept represents the underlying risk of mortality at the hospital, after accounting for patient risk. The hospital-specific intercepts are given a distribution to account for the clustering (non-independence) of patients within the same hospital. If there were no differences among hospitals, then after adjusting for patient risk, the hospital intercepts should be identical across all hospitals.

The RSMR is calculated as the ratio of the number of “predicted” to the number of “expected” deaths, multiplied by the national unadjusted mortality rate. For each hospital, the numerator of the ratio (“predicted”) is the number of deaths within 30 days predicted on the basis of the hospital’s performance with its observed case mix, and the denominator (“expected”) is the number of deaths expected on the basis of the nation’s performance with that hospital’s case mix. This approach is analogous to a ratio of “observed” to “expected” used in other types of statistical analyses. It conceptually allows for a comparison of a particular hospital’s performance given its case mix to an average hospital’s performance with the same case mix. Thus, a lower ratio indicates lower- than-expected mortality or better quality and a higher ratio indicates higher-than-expected mortality 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 intercept 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 intercept using all hospitals in our sample is added in place of the hospital specific intercept. 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 readmission rate. The hierarchical logistic regression models are described fully in the original methodology report (Krumholz et al., 2005).

References:

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

2. Krumholz H, Normand S, Galusha D, et al. Risk-Adjustment Models for AMI and HF 30-Day Mortality Methodology. 2005.

Submission items

3504 Claims-Only Hospital-Wide (All-Condition, All-Procedure) Risk-Standardized Mortality Measure

5.1 Identified measures:

5a.1 Are specs completely harmonized? Yes

5a.2 If not completely harmonized, identify difference, rationale, impact: This claims-only hospital-wide mortality (HWM) measure is intended to complement the existing CMS Hospital-Wide All-Cause Risk-Standardized Readmission Measure (NQF #1789) to allow assessment of trends in hospital performance for both readmission and mortality outcomes, similar to other complementary pairs of readmission and mortality measures for specific conditions and procedures. By measuring mortality outcomes across almost all hospitalized patients, this measure will provide an important additional performance assessment that will complement condition- and procedure-specific or other more narrowly defined mortality measures and allow a greater number of patients and hospitals to be evaluated. This HWM measure captures a similarly broad cohort to the CMS Hospital-Wide All-Cause Risk-Standardized Readmission Measure (NQF #1789), and a broader cohort than those of other CMS condition-specific measures. Because the mortality measure is focused on a different outcome, it differs from the existing CMS Hospital-Wide All-Cause Risk Standardized Readmission Measure (NQF #1789) in a couple of ways. First, this HWM measure includes patients with a principal discharge diagnosis of cancer (with some exceptions), whereas those patients are not included in the readmission measure. Cancer patients are appropriate to include in the HWM measure as many have survival as their primary goal; however due to cancer treatment plans, readmissions are frequently part of the plan and expected and therefore, are not a reasonable signal of quality. Another difference between the two measures is the number of divisions or specialty cohorts the patients are divided into, to more accurately risk adjust for case-mix and service-mix. The readmission measure divides patients into five categories, or “specialty cohorts”, while the mortality measure uses 15. This is because the risk of mortality is much more closely related to patient factors than readmission is related to patient factors. PSI-02 (NQF #0357) is another complementary mortality measure, which captures a different patient population and a different outcome compared with the HWM measure submitted with this application. PSI-02 captures patients 18 years of age or older, or obstetric

patients, whereas the HWM measure captures patients between the ages of 65 and 94. PSI-02 captures DRGs with less than 0.5% mortality rate, whereas the HWM measure captures all patients within all CCSs, regardless of mortality rate. Hospital-wide mortality captures mortality up to 30 days past admission, where AHRQ PSI-02 only captures in-hospital mortality. IQI 90 (NQF #0530) is another complimentary mortality measure, which is a composite measure of the number of in-hospital deaths for a narrow range of conditions (CHF, stroke, hip fracture, pneumonia, acute myocardial infarction and GI hemorrhage). The HWM measure presented in this application captures all deaths after 30 days of admission, for all conditions and procedures.

5b.1 If competing, why superior or rationale for additive value: There are no competing NQF-endorsed measures.

1789 Hospital-Wide All-Cause Unplanned Readmission Measure (HWR)

5.1 Identified measures: 1768 : Plan All-Cause Readmissions (PCR)

1891 : Hospital 30-day, all-cause, risk-standardized readmission rate (RSRR) following chronic obstructive pulmonary disease (COPD) hospitalization

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

0695 : Hospital 30-Day Risk-Standardized Readmission Rates following Percutaneous Coronary Intervention (PCI)

0329 : Risk-Adjusted 30-Day All-Cause Readmission Rate

0330 : Hospital 30-day, all-cause, risk-standardized readmission rate (RSRR) following heart failure (HF) hospitalization

0505 : Hospital 30-day all-cause risk-standardized readmission rate (RSRR) following acute myocardial infarction (AMI) hospitalization.

0506 : Hospital 30-day, all-cause, risk-standardized readmission rate (RSRR) following pneumonia hospitalization

5a.1 Are specs completely harmonized? No

5a.2 If not completely harmonized, identify difference, rationale, impact: This measure and the National Committee for Quality Assurance (NCQA) Plan All-Cause Readmissions (PCR) Measure #1768 are related measures, but are not competing because they don't have the same measure focus and same target population. In addition, both have been previously harmonized to the extent possible under the guidance of the National Quality Forum Steering Committee in 2011. Each of these measures has different specifications. NCQA's Measure #1768 counts the number of inpatient stays for patients aged 18 and older during a measurement year that were followed by an acute readmission for any diagnosis to any hospital within 30 days. It contrasts this count with a calculation of the predicted probability of an acute readmission. NCQA's measure is intended for quality monitoring and accountability at the health plan level. This measure estimates the risk-standardized rate of unplanned, all-cause readmissions to a hospital or ACO for any eligible condition within 30 days of hospital discharge for patients aged 18 and older. The measure will result in a single summary risk-adjusted readmission rate for conditions or procedures that fall under five specialties: surgery/gynecology, general medicine, cardiorespiratory, cardiovascular, and neurology. This measure is specified for evaluating hospital or ACO performance. However, despite these differences in cohort specifications, both measures under NQF guidance have been harmonized to the extent possible through modifications

such as exclusion of planned readmissions. We did not include in our list of related measures any non-outcome (e.g., process) measures with the same target population as our measure. Because this is an outcome measure, clinical coherence of the cohort takes precedence over alignment with related non-outcome measures. Furthermore, non-outcome measures are limited due to broader patient exclusions. This is because they typically only include a specific subset of patients who are eligible for that measure (for example, patients who receive a specific medication or undergo a specific procedure).

5b.1 If competing, why superior or rationale for additive value: N/A

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

5.1 Identified measures: 0534 : Hospital specific risk-adjusted measure of mortality or one or more major complications within 30 days of a lower extremity bypass (LEB).

0564 : Cataracts: Complications within 30 Days Following Cataract Surgery Requiring Additional Surgical Procedures

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

2052 : Reduction of Complications through the use of Cystoscopy during Surgery for Stress Urinary Incontinence

5a.1 Are specs completely harmonized? Yes

5a.2 If not completely harmonized, identify difference, rationale, impact: We did not include in our list of related measures any non-outcome measures (for example, process measures) with the same target population as our measure. Because this is an outcome measure, clinical coherence of the cohort takes precedence over alignment with related non-outcome measures. Furthermore, non-outcome measures are limited due to broader patient exclusions. This is because they typically only include a specific subset of patients who are eligible for that measure (for example, patients who receive a specific medication or undergo a specific procedure).

5b.1 If competing, why superior or rationale for additive value: N/A

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

5.1 Identified measures: 0708 : Proportion of Patients with Pneumonia that have a Potentially Avoidable Complication (during the episode time window)

0231 : Pneumonia Mortality Rate (IQI #20)

0506 : Hospital 30-day, all-cause, risk-standardized readmission rate (RSRR) following pneumonia hospitalization

0279 : Community Acquired Pneumonia Admission Rate (PQI 11)

2579 : Hospital-level, risk-standardized payment associated with a 30-day episode of care for pneumonia (PN)

5a.1 Are specs completely harmonized? No

5a.2 If not completely harmonized, identify difference, rationale, impact: The pneumonia mortality measure cohort, version 9.0, is harmonized with the hospital-level, risk-standardized payment associated with a 30-day episode of care for pneumonia cohort. Version 9.2 of the pneumonia mortality measure cohort is, however, not harmonized with

the pneumonia payment measure cohort. There is intention to harmonize the pneumonia mortality and payment measure cohorts in the future. We did not include in our list of related measures any non-outcome (for example, process) measures with the same target population as our measure. Because this is an outcome measure, clinical coherence of the cohort takes precedence over alignment with related non-outcome measures. Furthermore, non-outcome measures are limited due to broader patient 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). Lastly, this measure and the NQF Inpatient Pneumonia Mortality (AHRQ) Measure #0231 are complementary rather than competing measures. Although they both assess mortality for patients admitted to acute care hospitals with a principal discharge diagnosis of pneumonia, the specified outcomes are different. This measure assesses 30-day mortality while #0231 assesses inpatient mortality. Assessment of 30-day and inpatient mortality outcomes have distinct advantages and uses which make them complementary as opposed to competing. For example the 30-day period provides a broader perspective on hospital care and utilizes standard time period to examine hospital performance to avoid bias by differences in length of stay among hospitals. However, in some settings it may not be feasible to capture post-discharge mortality making the inpatient measure more useable. We have previously consulted with AHRQ to examine harmonization of complementary measures of mortality for patients with AMI and stroke. We have found that the measures are harmonized to the extent possible given that small differences in cohort inclusion and exclusion criteria are warranted on the basis of the use of different outcomes. However, this current measure has been modified from the last endorsed version to include patients with a principal discharge diagnosis of sepsis and a secondary discharge diagnosis of pneumonia that is present on admission. The cohort was also expanded to include patients with a principal discharge diagnosis of aspiration pneumonia. Thus the current measure cohort is no longer harmonized with measure #0231.

5b.1 If competing, why superior or rationale for additive value: N/A

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

5.1 Identified measures: 0701 : Functional Capacity in COPD patients before and after Pulmonary Rehabilitation

0700 : Health-related Quality of Life in COPD patients before and after Pulmonary Rehabilitation

0275 : Chronic Obstructive Pulmonary Disease (COPD) or Asthma in Older Adults Admission Rate (PQI 05)

1891 : Hospital 30-day, all-cause, risk-standardized readmission rate (RSRR) following chronic obstructive pulmonary disease (COPD) hospitalization

5a.1 Are specs completely harmonized? Yes

5a.2 If not completely harmonized, identify difference, rationale, impact: We did not include in our list of related measures any non-outcome (for example, process) measures with the same target population as our measure. Our measure cohort was heavily vetted by clinical experts, a technical expert panel, and a public comment period. Additionally, the measure, with the specified cohort, has been publicly reported since December 2014. Because this is an outcome measure, clinical coherence of the cohort takes precedence

over alignment with related non-outcome measures. Furthermore, non-outcome measures are limited due to broader patient exclusions. This is because they typically only include a specific subset of patients who are eligible for that measure (for example, patients who receive a specific medication or undergo a specific procedure).

5b.1 If competing, why superior or rationale for additive value: N/A

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

5.1 Identified measures: 0114 : Risk-Adjusted Postoperative Renal Failure

0115 : Risk-Adjusted Surgical Re-exploration

0119 : Risk-Adjusted Operative Mortality for CABG

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

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

0129 : Risk-Adjusted Postoperative Prolonged Intubation (Ventilation)

0130 : Risk-Adjusted Deep Sternal Wound Infection

0131 : Risk-Adjusted Stroke/Cerebrovascular Accident

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

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

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.

0230 Hospital 30-day, all-cause, risk-standardized mortality rate (RSMR) following acute myocardial infarction (AMI) hospitalization

5.1 Identified measures: 2431 : Hospital-level, risk-standardized payment associated with a 30-day episode-of-care for Acute Myocardial Infarction (AMI)

1789 : Hospital-Wide All-Cause Unplanned Readmission Measure (HWR)

1891 : Hospital 30-day, all-cause, risk-standardized readmission rate (RSRR) following chronic obstructive pulmonary disease (COPD) hospitalization

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

0506 : Hospital 30-day, all-cause, risk-standardized readmission rate (RSRR) following pneumonia hospitalization

0330 : Hospital 30-day, all-cause, risk-standardized readmission rate (RSRR) following heart failure (HF) hospitalization

0505 : Hospital 30-day all-cause risk-standardized readmission rate (RSRR) following acute myocardial infarction (AMI) hospitalization.

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

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

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

5a.1 Are specs completely harmonized? Yes

5a.2 If not completely harmonized, identify difference, rationale, impact: We did not include in our list of related measures any non-outcome (e.g., process) measures with the

same target population as our measure. Our measure cohort was heavily vetted by clinical experts. Additionally, the measure, with the specified cohort, has been publicly reported since 2008. Because this is an outcome measure, clinical coherence of the cohort takes precedence over alignment with related non-outcome measures. Furthermore, non-outcome measures are limited due to broader patient exclusions. This is because they typically only include a specific subset of patients who are eligible for that measure (for example, patients who receive a specific medication or undergo a specific procedure).

5b.1 If competing, why superior or rationale for additive value: N/A

Comparison of NQF 3504, 1789, 1550, 0468, 1893, 2558, 0230, 0229, 2876, 0347 and 0530 continued…

3504 Claims-Only Hospital-Wide (All-Condition, All-Procedure) Risk-Standardized Mortality Measure
0229 Hospital 30-day, all-cause, risk-standardized mortality rate (RSMR) following heart failure (HF) hospitalization
2876 Hospital 30-day, all-cause, risk-standardized mortality rate (RSMR) following acute ischemic stroke hospitalization with claims-based risk adjustment for stroke severity
0347 Death Rate in Low-Mortality Diagnosis Related Groups (PSI02)
0530 Mortality for Selected Conditions

Steward

3504 Claims-Only Hospital-Wide (All-Condition, All-Procedure) Risk-Standardized Mortality Measure

Centers for Medicare & Medicaid Services (CMS)

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

Centers for Medicare & Medicaid Services

2876 Hospital 30-day, all-cause, risk-standardized mortality rate (RSMR) following acute ischemic stroke hospitalization with claims-based risk adjustment for stroke severity

Centers for Medicare & Medicaid Services (CMS)

0347 Death Rate in Low-Mortality Diagnosis Related Groups (PSI02)

Agency for Healthcare Research and Quality

0530 Mortality for Selected Conditions

Agency for Healthcare Research and Quality

Description

3504 Claims-Only Hospital-Wide (All-Condition, All-Procedure) Risk-Standardized Mortality Measure

The measure estimates a hospital-level 30-day hospital-wide risk-standardized mortality rate (RSMR), defined as death from any cause within 30 days after the index admission date, for Medicare fee-for-service (FFS) patients who are between the ages of 65 and 94.

Please note that in parallel with the claims-only HWM measure, we are submitting a hybrid HWM measure. Note that ultimately the claims and hybrid measures will be harmonized and use the same exact cohort specifications. The intent is that prior to implementation, the two measures will be exactly the same, with the exception of the additional risk adjustment added by the CCDE in the hybrid measure. This is analogous to the currently endorsed and implemented hybrid hospital-wide readmissions measure (NQF 1789 and NQF 2879e).

Because of the homology between the claims and hybrid HWM measures, there is no reason to suspect that the results of analyses done for the claims-only measure would differ in any significant way from results of analyses for a nationally representative hybrid measure.

Below we highlight the differences between the two measures, including specifications, data used, and testing which reflect limitations of data availability, as well as actual intended differences in the measure (risk adjustment).

Differences in the measure, data, and testing that reflect limitations in data availability

1. Dataset used for development, some testing (see below for differences), and measure results:

a. The claims-only measure uses nation-wide Medicare FFS claims and the enrollment database.

b. The hybrid measure uses an electronic health record (EHR) database from 21 hospitals in the Kaiser Permanente network which includes inpatient claims data information.

2. Age of patients in cohort:

a. The claims-only measure includes Medicare FFS patients, age 65-94.

b. The hybrid measure includes all patients age 50-94 (see later discussion for justification)

3. External empiric validity testing

a. Not possible for the hybrid measure, due to limited data availability. We provide results from the claims-only measure within the hybrid testing form.

4. Socioeconomic risk factor analyses

a. Not possible for the hybrid measure, due to limited data availability. We provide results from the claims-only measure within the hybrid testing form.

5. Exclusion analyses

a. To be representative of what we expect the impact would be of the measures' exclusions in a nation-wide sample, we provide the results from the claims-only measure.

6. Meaningful differences

a. To be representative of what we expect the range of performance would be in a nation-wide sample, we provide the distribution results from the claims-only measure.

Difference between the two measures when fully harmonized, prior to implementation:

1. Risk adjustment:

a. The claims-only measure uses administrative claims data only for risk adjustment

b. The hybrid measure adds 10 clinical risk variables, derived from a set of core clinical data elements (CCDE) extracted from the EHR.

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

The measure estimates a hospital-level 30-day risk-standardized mortality rate (RSMR). Mortality is defined as death for any cause within 30 days after the admission date for the index admission, for patients 18 and older discharged from the hospital with a principal diagnosis of heart failure (HF). The Centers for Medicare & Medicaid Services (CMS) annually reports the measure for patients who are 65 years or older and are either Medicare fee-for-service (FFS) beneficiaries and hospitalized in non-federal hospitals or patients hospitalized in Veterans Health Administration (VA) facilities.

2876 Hospital 30-day, all-cause, risk-standardized mortality rate (RSMR) following acute ischemic stroke hospitalization with claims-based risk adjustment for stroke severity

This stroke mortality measure estimates the hospital-level, risk-standardized mortality rate (RSMR) for patients discharged from the hospital with a principal discharge diagnosis of acute ischemic stroke. The outcome is all-cause 30-day mortality, defined as death from any cause within 30 days of the index admission date, including in-hospital death, for stroke patients. This is a newly developed measure with a cohort and outcome that is harmonized with the CMS's current publicly reported claims-based stroke mortality measure and includes the National Institutes of Health (NIH) Stroke Scale as an assessment of stroke severity in the risk-adjustment model. This measure uses Medicare fee-for-service (FFS) administrative claims for the cohort derivation, outcome, and risk adjustment.

0347 Death Rate in Low-Mortality Diagnosis Related Groups (PSI02)

In-hospital deaths per 1,000 discharges for low mortality (< 0.5%) Diagnosis Related Groups (DRGs) among patients ages 18 years and older or obstetric patients. Excludes cases with trauma, cases with cancer, cases with an immunocompromised state, and transfers to an acute care facility.

[NOTE: The software provides the rate per hospital discharge. However, common practice reports the measure as per 1,000 discharges. The user must multiply the rate obtained from the software by 1,000 to report in-hospital deaths per 1,000 hospital discharges.]

0530 Mortality for Selected Conditions

A composite measure of in-hospital mortality indicators for selected conditions.

Type

3504 Claims-Only Hospital-Wide (All-Condition, All-Procedure) Risk-Standardized Mortality Measure

Outcome

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

Outcome

2876 Hospital 30-day, all-cause, risk-standardized mortality rate (RSMR) following acute ischemic stroke hospitalization with claims-based risk adjustment for stroke severity

Outcome

0347 Death Rate in Low-Mortality Diagnosis Related Groups (PSI02)

Outcome

0530 Mortality for Selected Conditions

Composite

Data Source

3504 Claims-Only Hospital-Wide (All-Condition, All-Procedure) Risk-Standardized Mortality Measure

Claims, Enrollment Data, Other Data sources for the Medicare FFS measure:

1. Medicare Part A Inpatient: The index dataset contains administrative inpatient hospitalization data for Medicare FFS beneficiaries, aged 65-94 on admission, hospitalized

from July 1, 2016-June 30, 2017. The history dataset includes administrative inpatient hospitalization data on each patient for the 12 months prior to the index admission.

2. Medicare Enrollment Database (EDB): This database contains Medicare beneficiary demographic, benefit/coverage, and vital status information. This data source was used to obtain information on several inclusion/exclusion indicators such as Medicare status on admission as well as vital status. It was also used to determine hospice enrollment.

No data collection instrument provided Attachment Del18b1HOP5HWMClaimsDataDictionary01072019.xlsx

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

Claims, Other, Paper Medical Records Data sources for the Medicare FFS measure:

1. Medicare Part A inpatient and Part B outpatient claims: This data source contains claims data for FFS inpatient and outpatient services including: Medicare inpatient hospital care, outpatient hospital services, skilled nursing facility care, some home health agency services, as well as inpatient and outpatient physician claims for the 12 months prior to an index admission.

2. Medicare Enrollment Database (EDB): This database contains Medicare beneficiary demographic, benefit/coverage, and vital status information. This data source was used to obtain information on several inclusion/exclusion indicators such as Medicare status on admission as well as vital status. These data have previously been shown to accurately reflect patient vital status (Fleming et al., 1992).

3. Veterans Health Administration (VA) Data: This data source contains claims data for VA inpatient and outpatient services including: inpatient hospital care, outpatient hospital services, skilled nursing facility care, some home health agency services, as well as inpatient and outpatient physician claims for the 12 months prior to and including each index admission. Unlike Medicare FFS patients, VA patients are not required to have been enrolled in Part A and Part B Medicare for the 12 months prior to the date of admission.

All-payer data sources:

For our analyses to examine use in all-payer data, we used all-payer data from California in addition to CMS data for Medicare FFS 65+ patients in California hospitals. California is a diverse state, and, with more than 37 million residents, California represents 12% of the US population. We used the California Patient Discharge Data, a large, linked database of patient hospital admissions. 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 as well as CMS Medicare FFS data for California hospitals, we performed analyses to determine whether the HF mortality measure can be applied to all adult patients, including not only FFS Medicare patients aged 65+ but also non-FFS Medicare patients aged 18-64 years at the time of admission.

Reference:

Fleming C, Fisher ES, Chang CH, Bubolz TA, Malenka DJ. 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_0229_S2b_HF_Mortality_Data_Dictionary_v1.0_Final-636973301131111819.xlsx

2876 Hospital 30-day, all-cause, risk-standardized mortality rate (RSMR) following acute ischemic stroke hospitalization with claims-based risk adjustment for stroke severity

Claims (Only), Other, Registry For measure implementation the data sources will be:

1. Medicare Part A inpatient and Part B outpatient claims: This data source contains claims data for fee-for service inpatient and outpatient services including: Medicare inpatient hospital care, outpatient hospital services, skilled nursing facility care, some home health agency services, as well as inpatient and outpatient physician claims for the 12 months prior to an index admission.

2. Medicare Enrollment Database (EDB): This database contains Medicare beneficiary demographic, benefit/coverage, and vital status information. This data source was used to obtain information on several inclusion/exclusion indicators such as Medicare status on admission, as well as vital status. These data have previously been shown to accurately reflect patient vital status (Fleming et al., 1992).

3. For measure development purposes only, we linked the data sources above with data from the AHA/ASA GWTG-Stroke Registry. The registry data were used to obtain the National Institutes of Health (NIH) Stroke Scale scores and clinical risk variables. When this measure is implemented NIH Stroke Scale scores will be derived from ICD-10 codes in Medicare claims.

Reference:

Fleming C, Fisher ES, Chang CH, Bubolz TA, Malenka DJ. 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. Data sources for the all-payer update

No data collection instrument provided Attachment NQF_2876_Claims-Only_Stroke_Mortality_S2b_Mortality_Data_Dictionary_v1.0-635884757617681755.xlsx

0347 Death Rate in Low-Mortality Diagnosis Related Groups (PSI02)

Claims While the measure is tested and specified using data from the Healthcare Cost and Utilization Project (HCUP) (see section 1.1 and 1.2 of the measure testing form), the measure specifications and software are specified to be used with any ICD-9-CM-coded administrative billing/claims/discharge dataset with Present on Admission (POA) information. Note that in Version 5.0 (April 2015), the AHRQ QI software will no longer support prediction of POA status using an embedded prediction module. Users are expected to provide POA data.

Available at measure-specific web page URL identified in S.1 Attachment PSI_02_Death_Rate_in_Low-Mortality_Diagnosis_Related_Groups_-DRGs-_-_Editable.xlsx

0530 Mortality for Selected Conditions

Electronic administrative data/claims

Level

3504 Claims-Only Hospital-Wide (All-Condition, All-Procedure) Risk-Standardized Mortality Measure

Facility

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

Facility

2876 Hospital 30-day, all-cause, risk-standardized mortality rate (RSMR) following acute ischemic stroke hospitalization with claims-based risk adjustment for stroke severity

Facility

0347 Death Rate in Low-Mortality Diagnosis Related Groups (PSI02)

Facility

0530 Mortality for Selected Conditions

Facility/Agency

Setting

3504 Claims-Only Hospital-Wide (All-Condition, All-Procedure) Risk-Standardized Mortality Measure

Inpatient/Hospital

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

Inpatient/Hospital, Other Hospital & Hospital: Acute Care Facility

2876 Hospital 30-day, all-cause, risk-standardized mortality rate (RSMR) following acute ischemic stroke hospitalization with claims-based risk adjustment for stroke severity

Hospital

0347 Death Rate in Low-Mortality Diagnosis Related Groups (PSI02)

Inpatient/Hospital

0530 Mortality for Selected Conditions

Hospital

Numerator Statement

3504 Claims-Only Hospital-Wide (All-Condition, All-Procedure) Risk-Standardized Mortality Measure

The outcome for this measure is 30-day, all-cause mortality. Mortality is defined as death from any cause, either during or after admission, within 30 days of the index admission date.

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

The outcome for this measure is 30-day all-cause mortality. We define mortality as death from any cause within 30 days of the index admission date for patients 65 and older discharged from the hospital with a principal diagnosis of HF.

Additional details are provided in S.5 Numerator Details.

2876 Hospital 30-day, all-cause, risk-standardized mortality rate (RSMR) following acute ischemic stroke hospitalization with claims-based risk adjustment for stroke severity

The outcome for this measure is 30-day, all-cause mortality. We define mortality as death from any cause within 30 days of the index admission for patients with a principal discharge diagnosis of acute ischemic stroke.

0347 Death Rate in Low-Mortality Diagnosis Related Groups (PSI02)

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

0530 Mortality for Selected Conditions

Number of in-hospital deaths

Numerator Details

3504 Claims-Only Hospital-Wide (All-Condition, All-Procedure) Risk-Standardized Mortality Measure

The measure outcome is death from any cause within 30 days of the admission date of the index admission, for Medicare FFS patients identified using the Medicare Enrollment Database (EDB). The numerator is a binary variable (1=yes/0=no) that indicates whether the patient died within 30 days of the index admission date.

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

Outcome Definition

The measure counts deaths for any cause within 30 days of the date of admission of the index HF hospitalization.

Rationale: From a patient perspective, death is a critical outcome regardless of cause. Outcomes occurring within 30 days of the start of the admission can be influenced by hospital care and early transition to the non-acute care setting. The 30-day time frame is a clinically meaningful period for hospitals to collaborate with their communities to reduce mortality (Simoes et al., 2017; Dharmarajan et al., 2015).

Identifying deaths in the FFS measure

As currently reported, we identify deaths for FFS Medicare patients 65 years and older in the Medicare Enrollment Database (EDB).

Identifying deaths in the all-payer measure

For the purposes of development of an all-payer measure, deaths were identified using the California vital statistics data file. Nationally, post-discharge deaths can be identified using an external source of vital status, such as the Social Security Administration's Death Master File (DMF) or the Centers for Disease Control and Prevention's National Death Index (NDI).

Reference:

1. Simoes J, Grady J, DeBuhr J, et al. 2017 Condition-Specific Measures Updates and Specifications Report Hospital-Level 30-Day Risk-Standardized Mortality Measures. http://www.qualitynet.org/dcs/ContentServer?c=Page&pagename=QnetPublic/Page/QnetTier3&cid=1163010421830. Accessed June 7, 2017.

2. Dharmarajan K, Hsieh AF, Kulkarni VT, et al. 2015 Trajectories of risk after hospitalization for heart failure, acute myocardial infarction, or pneumonia: retrospective cohort study. BMJ (Clinical researched);350:h411

2876 Hospital 30-day, all-cause, risk-standardized mortality rate (RSMR) following acute ischemic stroke hospitalization with claims-based risk adjustment for stroke severity

The measure outcome is death from any cause within 30 days of the index admission date. As currently specified, we identify deaths for FFS Medicare patients, age 65 years and older, in the Medicare Enrollment Database (EDB).

0347 Death Rate in Low-Mortality Diagnosis Related Groups (PSI02)

Not applicable

0530 Mortality for Selected Conditions

Number of in-hospital deaths for CHF, stroke, hip fracture, pneumonia, acute myocardial infarction and GI

hemorrhage (separately). See Inpatient Quality Indicators: Technical Specifications for additional details (http://www.qualityindicators.ahrq.gov/Modules/IQI_TechSpec.aspx).

Denominator Statement

3504 Claims-Only Hospital-Wide (All-Condition, All-Procedure) Risk-Standardized Mortality Measure

The cohort includes inpatient admissions for a wide variety of conditions for Medicare FFS patients aged between 65 and 94 years old who were admitted to short-term acute care hospitals. If a patient has more than one admission during the measurement year, one admission is randomly selected for inclusion in the measure. Additional details are provided in S.7 Denominator Details.

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

This claims-based measure can be used in either of two patient cohorts: (1) patients aged 65 years or older or (2) patients aged 18 years or older. We have explicitly tested the measure in both age groups.

The cohort for the publically reported measure includes admissions for patients aged 65 years and older discharged from the hospital with a principal discharge diagnosis of HF and with a complete claims history for the 12 months prior to admission. The measure is currently publicly reported by CMS for those patients 65 years and older who are either Medicare FFS beneficiaries admitted to non-federal hospitals or patients admitted to VA hospitals.

Additional details are provided in S.7 Denominator Details.

2876 Hospital 30-day, all-cause, risk-standardized mortality rate (RSMR) following acute ischemic stroke hospitalization with claims-based risk adjustment for stroke severity

The cohort includes inpatient admissions to all non-federal, short-term, acute care hospitals for Medicare FFS patients age 65 years and older with a principal discharge diagnosis of acute ischemic stroke.

Additional details are provided in S.9 Denominator Details.

0347 Death Rate in Low-Mortality Diagnosis Related Groups (PSI02)

Discharges, for patients ages 18 years and older or MDC 14 (pregnancy, childbirth, and puerperium), with a low-mortality (less than 0.5% mortality) MS-DRG code (LOWMODR). If an MS-DRG is divided into "without/with (major) complications and comorbidities," both codes without complications/comorbidities and codes with (major) complications/comorbidities must have mortality rates below 0.5% in the reference population to qualify for inclusion.

0530 Mortality for Selected Conditions

Number of eligible discharges (all indicators are limited to the adult population)

Denominator Details

3504 Claims-Only Hospital-Wide (All-Condition, All-Procedure) Risk-Standardized Mortality Measure

An index admission is the hospitalization to which the mortality outcome is attributed and includes admissions for patients:

1. Enrolled in Medicare FFS Part A for at least 12 months prior to the date of admission and during the index admission

Rationale: Claims data are consistently available only for Medicare FFS beneficiaries. The 12-month prior enrollment criterion ensures a full year of administrative data is available for risk adjustment.

2. Not transferred from another acute care facility

Rationale: Admissions to an acute cate hospital within one day of discharge from another acute care hospital are considered transfers. Transferred patients are included in the measure cohort, but it is the initial hospitalization rather than any "transfer-in" hospitalization(s), that is included as the hospitalization to which the mortality outcome is attributed (the index admission).

3. Aged between 65 and 94 years

Rationale: Medicare patients younger than 65 are not included in the measure because they usually qualify for the program due to severe disability and are considered to be clinically distinct from Medicare patients 65 and over. Patients over age 94 are not included to avoid holding hospitals responsible for the survival of the very elderly patients, who may be less likely to have survival as a primary goal.

Note that the hybrid measure (submitted for NQF endorsement in parallel with the claims-only measure) differs from the claims-only measure in terms of the age range of included admissions; the hybrid measure includes all inpatient admissions for patients aged 50-94 years old. The intention is to fully harmonize the cohort definitions for the two measures, so that both measures will capture admissions for patients age 65-94. We deviated from that definition during development and testing for the hybrid measure due to the limited dataset available that included the EHR data elements needed to calculate the hybrid measure. Note that the risk model already includes age in years, as a risk variable.)

4. Not admitted for primary psychiatric diagnoses

Rationale: Patients admitted for psychiatric treatment are typically cared for in separate psychiatric facilities that are not comparable to short-term acute care hospitals (see data dictionary, HWM Non-Acute Care Inclusion tab).

5. Not admitted for rehabilitation

Rationale: These admissions are not typically to a short-term acute care hospital and are not for acute care (see data dictionary, HWM Non-Acute Care Inclusion tab).

6. Not enrolled in hospice at the time of, or 12 months prior to, their index admission

Rationale: Patients enrolled in hospice in the prior 12 months or at the time of admission are unlikely to have 30-day survival as a primary goal.

7. Not enrolled in hospice within two days of admission

Rationale: There is not a single, correct approach regarding patients enrolled in hospice during admission or upon discharge – mortality may or may not represent a quality signal for this group of patients and hospice enrollment is inadequate to differentiate this issue. However, for most patients and/or families who had the discussion and agreed to enroll in hospice within two days of admission, 30-day survival is not likely the primary goal due to their condition and not the quality of care received.

8. Not with a principal diagnosis of cancer and enrolled in hospice during their index admission

Rationale: Patients admitted primarily for cancer who are enrolled in hospice during admission are unlikely to have 30-day survival as a primary goal of care. (see data dictionary, HWM Cancer Inclusion tab).

9. Without any diagnosis of metastatic cancer

Rationale: Although some patients admitted with a diagnosis of metastatic cancer will have 30-day survival as a primary goal of care, for many such patients admitted to the hospital, death may be a clinically reasonable and patient-centered outcome. (see data dictionary, HWM Metastatic Cancer Inclusion tab).

10. Not with a principal discharge diagnosis, or a secondary diagnosis that is present on admission (POA) for a condition which hospitals have limited ability to influence survival

Rationale: Hospitals have little ability to impact mortality for some conditions. This list of conditions (see data dictionary, HWM ICD-10 Inclusion tab) was determined through independent review, by several clinicians, of conditions associated with high mortality. The decisions were also reviewed with our Technical Expert Panel (TEP) and Technical Work Group. Admissions are not included in the cohort if the patient had a principal diagnosis code that is on this list, or a secondary code with POA that is on the list.

In addition, for patients with multiple admissions, the measure selects only one admission, at random, for inclusion. There is no practical statistical modeling approach that can account or adjust for the complex relationship between the number of admissions and risk of mortality in the context of a hospital-wide mortality measure. Random selection ensures that providers are not penalized for a “last” admission during the measurement period; selecting the last admission would not be as accurate a reflection of the risk of death as random selection, as the last admission is inherently associated with a higher mortality risk. Random selection is also used in CMS’s condition-specific mortality measures. Note that random selection reduces the number of admissions, but does not exclude any patients from the measure.

The cohort is defined using ICD-10 Clinical Modification codes identified in Medicare Part A Inpatient claims data. The measure aggregates the ICD-10 principal diagnosis and all procedure codes of the index admission into clinically coherent groups of conditions and procedures (condition categories or procedure categories) using the Agency for Healthcare

Research and Quality (AHRQ) Clinical Classifications System (CCS). There is a total of 285 mutually exclusive AHRQ condition categories, most of which are single, homogenous diseases such as pneumonia or acute myocardial infarction. Some are aggregates of conditions, such as “other bacterial infections”. There is a total of 231 mutually exclusive procedure categories. Using the AHRQ CCS procedure and condition categories, the measure assigns each index hospitalization to one of 15 mutually exclusive divisions. The divisions were created based upon clinical coherence, consistency of mortality risk, adequate patient and hospital case volume for stable results reporting, and input from clinicians, patients, and patient caregivers on usability.

The measure first assigns admissions with qualifying AHRQ procedure categories to one of six surgery divisions by identifying a defining surgical procedure. The defining surgical procedure is identified using the following algorithm: 1) if a patient only has one major surgical procedure then that procedure is the defining surgical procedure; 2) if a patient has more than one major surgical procedure, the first dated procedure performed during the index admission is the defining surgical procedure; 3) if there is more than one major surgical procedure on that earliest date, the procedure with the highest mortality rate is the defining surgical procedure. These divisions include admissions likely cared for by surgical teams.

The surgical divisions are: Surgical Cancer (see note below), Cardiothoracic Surgery, General Surgery, Neurosurgery, Orthopedic Surgery, and Other Surgical Procedures.

For the Surgical Cancer division, any admission that includes a surgical procedure and a principal discharge diagnosis code of cancer is assigned to the Surgical Cancer division. This division and the logic behind it was implemented in response to feedback from our Technical Expert Panel.

The measure then assigns the remaining admissions into one of the nine non-surgical divisions based on the AHRQ diagnostic CCS of the principal discharge diagnosis. The non-surgical divisions are: Cancer, Cardiac, Gastrointestinal, Infectious Disease, Neurology, Orthopedic, Pulmonary, Renal, Other Conditions.

The full list of the specific diagnosis and procedure AHRQ CCS categories used to define the divisions are attached in the Data Dictionary.

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

To be included in the HF measure cohort used in public reporting, patients must meet the following additional inclusion criteria:

1. Have a principal discharge diagnosis of heart failure (HF);

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 Part A during the index admission, or those who are VA beneficiaries (in the cases of the AMI, HF, and pneumonia measures);

3. Aged 65 or over; and,

4. Not transferred from another acute care facility.

VA beneficiaries are eligible for inclusion in the AMI, HF, and pneumonia measure cohorts regardless of Medicare FFS enrollment or whether they were hospitalized in a VA or non-VA short-term acute care hospital.

This measure can also be used for an all-payer population aged 18 years and older. We have explicitly tested the measure in both patients aged 18+ years and those aged 65+ years.

ICD-9 and ICD-10 cohort codes are included in the attached Data Dictionary.

2876 Hospital 30-day, all-cause, risk-standardized mortality rate (RSMR) following acute ischemic stroke hospitalization with claims-based risk adjustment for stroke severity

The denominator includes all Medicare FFS beneficiaries, age 65 and over, with a principal discharge diagnosis of acute ischemic stroke. To be included in the measure cohort used in public reporting, patients must meet the following additional inclusion criteria:

1. Enrolled in Medicare fee-for-service (FFS) during the index admission;

2. Not transferred from another acute care facility; and

3. Enrolled in Part A and Part B Medicare for the 12 months prior to the date of index admission.

ICD-9-CM codes that define the patient cohort:

433.01 Occlusion and stenosis of basilar artery with cerebral infarction

433.11 Occlusion and stenosis of carotid artery with cerebral infarction

433.21 Occlusion and stenosis of vertebral artery with cerebral infarction

433.31 Occlusion and stenosis of multiple and bilateral precerebral arteries with cerebral infarction

433.81 Occlusion and stenosis of other specified precerebral artery with cerebral infarction

433.91 Occlusion and stenosis of unspecified precerebral artery with cerebral infarction

434.01 Cerebral thrombosis with cerebral infarction

434.11 Cerebral embolism with cerebral infarction

434.91 Cerebral artery occlusion, unspecified with cerebral infarction

436 Acute, but ill-defined, cerebrovascular disease

ICD-10 codes that define the patient cohort:

I63.22 Cerebral infarction due to unspecified occlusion or stenosis of basilar arteries

I63.139 Cerebral infarction due to embolism of unspecified carotid artery

I63.239 Cerebral infarction due to unspecified occlusion or stenosis of unspecified carotid arteries

I63.019 Cerebral infarction due to thrombosis of unspecified vertebral artery

I63.119 Cerebral infarction due to embolism of unspecified vertebral artery

I63.219 Cerebral infarction due to unspecified occlusion or stenosis of unspecified vertebral arteries

I63.59 Cerebral infarction due to unspecified occlusion or stenosis of other cerebral artery

I63.20 Cerebral infarction due to unspecified occlusion or stenosis of unspecified precerebral arteries

I63.30 Cerebral infarction due to thrombosis of unspecified cerebral artery

I63.40 Cerebral infarction due to embolism of unspecified cerebral artery

I63.50 Cerebral infarction due to unspecified occlusion or stenosis of unspecified cerebral artery

I67.8 Other specified cerebrovascular diseases

I67.89 Other cerebrovascular diseases

An ICD-9 to ICD-10 crosswalk is attached in field S.2b. (Data Dictionary or Code Table).

0347 Death Rate in Low-Mortality Diagnosis Related Groups (PSI02)

LOWMODR: Low-mortality (less than 0.5%) MS-DRG codes

(See attached technical specifications for detailed list of codes.)

0530 Mortality for Selected Conditions

Number of eligible adult discharges for CHF, stroke, hip fracture, pneumonia, acute myocardial infarction and GI

hemorrhage (separately).

See Inpatient Quality Indicators: Technical Specifications for additional details (http://www.qualityindicators.ahrq.gov/Modules/IQI_TechSpec.aspx).

Exclusions

3504 Claims-Only Hospital-Wide (All-Condition, All-Procedure) Risk-Standardized Mortality Measure

The measure excludes index admissions for patients:

1. With inconsistent or unknown vital status (from claims data) or other unreliable claims data;

2. Discharged against medical advice (AMA);

3. With an admission for spinal cord injury (CCS 227), skull and face fractures (CCS 228), Intracranial Injury (CCS 233), Crushing injury or internal injury (CCS 234), Open wounds of head/neck/trunk (CCS 235), and burns (CCS 240); and

4. With a principal discharge diagnosis within a CCS with fewer than 100 admissions within the measurement year.

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

The HF mortality measure excludes index hospitalizations that meet any of the following exclusion criteria:

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

2. Enrolled in the Medicare hospice program or used VA hospice services any time in the 12 months prior to the index admission, including the first day of the index admission; or,

3. Discharged against medical advice.

4. Discharged alive on the day of admission or the following day who were not transferred to another acute care facility; or

5. With a procedure code for LVAD implantation or heart transplantation either during the index admission or in the 12 months prior to the index admission.

For patients with more than one admission for a given condition in a given year, only one index admission for that condition is randomly selected for inclusion in the cohort.

2876 Hospital 30-day, all-cause, risk-standardized mortality rate (RSMR) following acute ischemic stroke hospitalization with claims-based risk adjustment for stroke severity

The measure excludes admissions for patients:

1. With inconsistent or unknown vital status or other unreliable data;

2. Enrolled in the Medicare hospice program at any time in the 12 months prior to the index admission, including the first day of the index admission; and

3. Discharged against medical advice (AMA).

For patients with more than one admission for stroke in a given year, only one index admission for that condition is randomly selected for inclusion in the cohort.

0347 Death Rate in Low-Mortality Diagnosis Related Groups (PSI02)

Exclude cases:

• with any listed ICD-10-CM diagnosis codes for trauma (Appendix G: TRAUMID)

• with any listed ICD-10-CM diagnosis codes for cancer (Appendix H: CANCEID)

• with any listed ICD-10-CM diagnosis codes for immunocompromised state (Appendix I: IMMUNID)

• with any listed ICD-10-PCS procedure codes for immunocompromised state (Appendix I: IMMUNIP)

• transfer to an acute care facility (DISP=2)

• with missing discharge disposition (DISP=missing), gender (SEX=missing), age (AGE=missing), quarter (DQTR=missing), year (YEAR=missing), or principal diagnosis (DX1=missing)

0530 Mortality for Selected Conditions

Indicator specific

Exclusion Details

3504 Claims-Only Hospital-Wide (All-Condition, All-Procedure) Risk-Standardized Mortality Measure

1. With inconsistent or unknown vital status (from claims data) or other unreliable claims data

Rationale: The measure does not include stays for patients where the admission date is after the date of death in the Medicare Enrollment Database, or where the date of death occurs before the date of discharge but the patient was discharged alive because these are likely errors in the data.

2. Discharged against medical advice (AMA)

Rationale: Providers did not have the opportunity to deliver full care and prepare the patient for discharge.

3. With an admission for spinal cord injury (CCS 227), skull and face fractures (CCS 228), Intracranial Injury (CCS 233), Crushing injury or internal injury (CCS 234), Open wounds of head/neck/trunk (CCS 235), and burns (CCS 240)

Rationale: Even though a hospital likely can influence the outcome of some of these conditions, in many cases death events are not a signal of poor quality of care when patients present with these conditions. These conditions are also infrequent events that are unlikely to be uniformly distributed across hospitals.

4. With a principal discharge diagnosis within a CCS with fewer than 100 admissions in that division within the measurement year.

Rationale: To calculate a stable and precise risk model, there are a minimum number of admissions that are needed. In addition, a minimum number of admissions and/or outcome events are required to inform grouping admissions into larger categories. These admissions present challenges to both accurate risk prediction and coherent risk grouping and are therefore excluded.

Note: During measure development we analyzed different volume cut-offs (25, 50 and 100). Using cut-off values below 100 resulted in too many CCS codes in some of the divisions (the CCS category codes are used in risk adjustment) which resulted in non-convergence of those division-level risk models. The total number of patients excluded is very small (13,597 or 0.21% of admissions for a cut off of 100). During measure development we also explored the option of pooling low-volume CCS codes (CCS<100 patients) into one group, however, the heterogeneity in mortality rates for the individual ICD-10 codes in those groups would preclude adequate risk adjustment. The TEP supported excluding these admissions.

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

1. Inconsistent or unknown vital status or other unreliable demographic data

Inconsistent vital status or unreliable data are identified if any of the following conditions are met 1) the patient's age is greater than 115 years: 2) if the discharge date for a hospitalization is before the admission date; 3) if the patient has a sex other than 'male'

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

2. Enrolled in the Medicare hospice program any time in the 12 months prior to the index admission, including the first day of the index admission

Rationale: Hospice enrollment in the 12 months prior to or on the index admission is identified using hospice data and the Inpatient standard analytic file (SAF). This exclusion applies when the measure is used in Medicare FFS patients only.

Rationale: These patients are likely continuing to seek comfort measures only; thus, mortality is not necessarily an adverse outcome or signal of poor quality care.

3. Discharged against medical advice

Discharges against medical advice are identified using the discharge disposition indicator.

Rationale: Providers did not have the opportunity to deliver full care and prepare the patient for discharge.

4. Discharged alive on the day of admission or the following day who were not transferred to another acute care facility. The discharge disposition indicator is used to identify patients alive at discharge. Transfers are identified in the claims when a patient with a qualifying admission is discharged from an acute care hospital and admitted to another acute care hospital on the same day or next day.

Rationale: It is unlikely that these patients had clinically significant HF.

5. With a procedure code for LVAD implantation or heart transplantation either during the index admission or in the 12 months prior to the index admission

Patients with LVAD implantation or heart transplantation during an index admission or in the previous 12 months are identified by the corresponding codes for these procedures included in claims data.

Rationale: These patients represent a clinically distinct group (ICD-10-PCS code list).

The data sources for these analyses are Medicare administrative claims and enrollment information for patients with hospitalizations between July 1, 2013 and June 30, 2016.

After exclusions #1-5 are applied, the measure randomly selects one index admission per patient per year for inclusion in the cohort so that each episode of care is mutually independent with the same probability of the outcome. Additional admissions within that year are excluded. For each patient, the probability of death increases with each subsequent admission and therefore the episodes of care are not mutually independent. For the three-year combined data, when index admissions occur during the transition between measure reporting periods (June and July of each year) and both are randomly selected for inclusion in the measure, the measure includes only the June admission. The July admissions are excluded to avoid assigning a single death to two admissions.

2876 Hospital 30-day, all-cause, risk-standardized mortality rate (RSMR) following acute ischemic stroke hospitalization with claims-based risk adjustment for stroke severity

1. Inconsistent vital status or unreliable data: We do not include stays for patients where the age is greater than 115, where the gender is neither male nor female, where the admission date is after the date of death in the Medicare Enrollment Database, or where the date of death occurs before the date of discharge but the patient was discharged alive.

2. Hospice enrollment in the 12 months prior to or on the index admission is identified using hospice data and the Inpatient Standard Analytic File (SAF). These patients are likely continuing to seek comfort measures only; thus, mortality is not necessarily an adverse outcome or signal of poor quality care for these patients.

3. Discharges against medical advice (AMA) are identified using the discharge disposition indicator. After all exclusions are applied, the measure randomly selects one index admission per patient per year for inclusion in the cohort so that each episode of care is mutually independent with the same probability of the outcome. For each patient, the probability of death increases with each subsequent admission, and therefore, the episodes of care are not mutually independent. Similarly, for the three year combined data, when index admissions occur during the transition between measure reporting periods (June and July of each year) and both are randomly selected for inclusion in the measure, the measure includes only the June admission. The July admissions are excluded to avoid assigning a single death to two admissions.

0347 Death Rate in Low-Mortality Diagnosis Related Groups (PSI02)

Appendix G: Trauma Diagnosis Codes

Appendix H: Cancer Diagnosis Codes

Appendix I: Immunocompromised State Diagnosis and Procedure Codes

(See attached Appendix G, Appendix H, and Appendix I for detailed list of codes.)

0530 Mortality for Selected Conditions

See Inpatient Quality Indicators: Technical Specifications for additional details (available at

http://www.qualityindicators.ahrq.gov/Modules/IQI_TechSpec.aspx).

Risk Adjustment

3504 Claims-Only Hospital-Wide (All-Condition, All-Procedure) Risk-Standardized Mortality Measure

Statistical risk model

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

Statistical risk model

2876 Hospital 30-day, all-cause, risk-standardized mortality rate (RSMR) following acute ischemic stroke hospitalization with claims-based risk adjustment for stroke severity

Statistical risk model

0347 Death Rate in Low-Mortality Diagnosis Related Groups (PSI02)

No risk adjustment or risk stratification

0530 Mortality for Selected Conditions

No risk adjustment or risk stratification

Stratification

3504 Claims-Only Hospital-Wide (All-Condition, All-Procedure) Risk-Standardized Mortality Measure

N/A

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

N/A

2876 Hospital 30-day, all-cause, risk-standardized mortality rate (RSMR) following acute ischemic stroke hospitalization with claims-based risk adjustment for stroke severity

N/A

0347 Death Rate in Low-Mortality Diagnosis Related Groups (PSI02)

Not applicable

0530 Mortality for Selected Conditions

Type Score

3504 Claims-Only Hospital-Wide (All-Condition, All-Procedure) Risk-Standardized Mortality Measure

Rate/proportion better quality = lower score

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

Rate/proportion better quality = lower score

2876 Hospital 30-day, all-cause, risk-standardized mortality rate (RSMR) following acute ischemic stroke hospitalization with claims-based risk adjustment for stroke severity

Rate/proportion better quality = lower score

0347 Death Rate in Low-Mortality Diagnosis Related Groups (PSI02)

Rate/proportion better quality = lower score

0530 Mortality for Selected Conditions

Algorithm

3504 Claims-Only Hospital-Wide (All-Condition, All-Procedure) Risk-Standardized Mortality Measure

The measure estimates hospital-level, risk-standardized mortality rates (RSMRs) within 30 days of hospital admission using hierarchical logistical regression models through a Bayesian Markov Chain Monte Carlo (MCMC) procedure. In brief, we used hierarchical logistic regression to model the log-odds of mortality for each of the 15 service-line divisions. Death within 30 days was modeled as a function of patient-level demographic and clinical characteristics and a random hospital-level intercept. This model specification accounts for within-hospital correlation of the observed outcomes and models the assumption that underlying differences in quality among the health care facilities being evaluated lead to systematic differences in outcomes. We estimated a separate hierarchical logistic regression model for each service-line division. In order to obtain the variance and interval estimates, we fit the hierarchical model under the Bayesian framework along with the Markov Chain Monte Carlo (MCMC) technique.

Admissions are assigned to one of 15 mutually exclusive divisions (groups of discharge condition categories and procedure categories). For each division and each hospital with patients in that division, the standardized mortality ratio (SMR) is calculated as the ratio of the number of “predicted” deaths to the number of “expected” deaths at a given hospital. The predicted number of deaths is based on the hospital’s performance with its observed case mix and service mix, and 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 for each cohort is added to the sum of the estimated regression coefficients multiplied by patient characteristics. The results are transformed via an inverse logit function and summed over all patients attributed to a hospital to get a predicted value. The expected number of deaths is based on the nation’s performance with that hospital’s case mix and service mix and 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 transformed via an inverse logit function and summed over all patients in the hospital to get an expected value. This approach is analogous to a ratio of “observed” to “expected” used in other types of statistical analyses. It conceptually allows a particular hospital’s performance, given its case mix and service mix, to be compared to an average hospital’s performance with the same case mix and service mix. Thus, a lower ratio indicates lower-than-expected mortality rates or better quality, while a higher ratio indicates higher-than-expected mortality rates or worse quality.

To assess hospital performance for each reporting period, the measure re-estimates the model coefficients using the data in that period.

The division-level SMRs are then pooled for each hospital using an inverse variance-weighted geometric mean to create a hospital-wide composite SMR. The hospital-wide SMR is then multiplied by the national observed mortality rate to produce the RSMR.

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

The measure estimates hospital-level 30-day all-cause RSMRs following hospitalization for HF using hierarchical logistic regression models. In brief, the approach simultaneously models data at the patient and hospital levels to account for variance in patient outcomes within and between hospitals (Normand and Shahian, 2007). At the patient level, it models the log-odds of mortality within 30 days of index admission using age, sex, selected clinical covariates, and a hospital-specific intercept. At the hospital level, it models the hospital-specific intercepts as arising from a normal distribution. The hospital intercept represents the underlying risk of a mortality at the hospital, after accounting for patient risk. The hospital-specific intercepts are given a distribution to account for the clustering (non-independence) of patients within the same hospital. If there were no differences among hospitals, then after adjusting for patient risk, the hospital intercepts should be identical across all hospitals.

The RSMR is calculated as the ratio of the number of “predicted” 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 on the basis of 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 for a comparison of a particular hospital’s performance given its case mix to an average hospital’s performance with the same case mix. Thus, a lower ratio indicates lower-than-expected mortality rates or better quality, and 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 intercept 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 intercept using all hospitals in our sample is added in place of the hospital-specific intercept. 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 (Krumholz et al., 2005).

References:

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

2. Krumholz H, Normand S, Galusha D, et al. 2005. Risk-Adjustment Models for AMI and HF 30-Day Mortality Methodology.

2876 Hospital 30-day, all-cause, risk-standardized mortality rate (RSMR) following acute ischemic stroke hospitalization with claims-based risk adjustment for stroke severity

The measure estimates hospital-level, 30-day, all-cause RSMRs following hospitalization for stroke using hierarchical logistic regression models. In brief, the approach simultaneously models data at the patient and hospital levels to account for variance in patient outcomes within and between hospitals (Normand and Shahian, 2007). At the patient level, it models the log-odds of mortality within 30 days of index admission using age, selected clinical covariates, and a hospital-specific intercept. At the hospital level, it models the hospital-specific intercepts as arising from a normal distribution. The hospital intercept represents the underlying risk of a mortality at the hospital, after accounting for patient risk. The hospital-specific intercepts are given a distribution to account for the clustering (non-independence) of patients within the same hospital. If there were no differences among hospitals, then after adjusting for patient risk, the hospital intercepts should be identical across all hospitals.

The RSMR is calculated as the ratio of the number of "predicted" 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 on the basis of 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 for a comparison of a particular hospital's performance given its case mix to an average hospital's performance with the same case mix. Thus, a lower ratio indicates lower-than-expected mortality rates or better quality, and 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 intercept on the risk of mortality. The estimated hospital-specific intercept is added to the sum of the estimated regression coefficients multiplied by the patient characteristics. The results are transformed and summed over all patients attributed to a hospital to get a predicted value. The "expected" number of deaths (the denominator) is obtained in the same manner, but a common intercept using all hospitals in our sample is added in place of the hospital-specific intercept. The results are transformed and summed over all patients in the hospital to get an expected value. To assess hospital performance for each reporting period, we re-estimate the model coefficients using the years of data in that period.

This calculation transforms the ratio of predicted over expected into a rate that is compared to the national observed mortality rate. The hierarchical logistic regression models are described fully in the original methodology report (Grosso et al., 2011).

References:

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

0347 Death Rate in Low-Mortality Diagnosis Related Groups (PSI02)

Risk adjustment is not currently included in the ICD-10-CM/PCS v2018 of the AHRQ QI specifications, due to the transition to ICD-10-CM/PCS (October 1, 2015). At least one full year of data coded in ICD-10-CM/PCS is needed in order to develop robust risk adjustment

models. A full year of ICD-10-CM/PCS coded all-payer data will not be available until mid-2019. AHRQ will announce an anticipated date as soon as one is known.

0530 Mortality for Selected Conditions

Submission items

3504 Claims-Only Hospital-Wide (All-Condition, All-Procedure) Risk-Standardized Mortality Measure

5.1 Identified measures:

5a.1 Are specs completely harmonized? Yes

5a.2 If not completely harmonized, identify difference, rationale, impact: This claims-only hospital-wide mortality (HWM) measure is intended to complement the existing CMS Hospital-Wide All-Cause Risk-Standardized Readmission Measure (NQF #1789) to allow assessment of trends in hospital performance for both readmission and mortality outcomes, similar to other complementary pairs of readmission and mortality measures for specific conditions and procedures. By measuring mortality outcomes across almost all hospitalized patients, this measure will provide an important additional performance assessment that will complement condition- and procedure-specific or other more narrowly defined mortality measures and allow a greater number of patients and hospitals to be evaluated. This HWM measure captures a similarly broad cohort to the CMS Hospital-Wide All-Cause Risk-Standardized Readmission Measure (NQF #1789), and a broader cohort than those of other CMS condition-specific measures. Because the mortality measure is focused on a different outcome, it differs from the existing CMS Hospital-Wide All-Cause Risk Standardized Readmission Measure (NQF #1789) in a couple of ways. First, this HWM measure includes patients with a principal discharge diagnosis of cancer (with some exceptions), whereas those patients are not included in the readmission measure. Cancer patients are appropriate to include in the HWM measure as many have survival as their primary goal; however due to cancer treatment plans, readmissions are frequently part of the plan and expected and therefore, are not a reasonable signal of quality. Another difference between the two measures is the number of divisions or specialty cohorts the patients are divided into, to more accurately risk adjust for case-mix and service-mix. The readmission measure divides patients into five categories, or “specialty cohorts”, while the mortality measure uses 15. This is because the risk of mortality is much more closely related to patient factors than readmission is related to patient factors. PSI-02 (NQF #0357) is another complementary mortality measure, which captures a different patient population and a different outcome compared with the HWM measure submitted with this application. PSI-02 captures patients 18 years of age or older, or obstetric patients, whereas the HWM measure captures patients between the ages of 65 and 94. PSI-02 captures DRGs with less than 0.5% mortality rate, whereas the HWM measure captures all patients within all CCSs, regardless of mortality rate. Hospital-wide mortality captures mortality up to 30 days past admission, where AHRQ PSI-02 only captures in-hospital mortality. IQI 90 (NQF #0530) is another complimentary mortality measure, which is a composite measure of the number of in-hospital deaths for a narrow range of conditions (CHF, stroke, hip fracture, pneumonia, acute myocardial infarction and GI hemorrhage). The HWM measure presented in this application captures all deaths after 30 days of admission, for all conditions and procedures.

5b.1 If competing, why superior or rationale for additive value: There are no competing NQF-endorsed measures.

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

5.1 Identified measures: 0358 : Heart Failure Mortality Rate (IQI 16)

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

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

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

1891 : Hospital 30-day, all-cause, risk-standardized readmission rate (RSRR) following chronic obstructive pulmonary disease (COPD) hospitalization

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

0506 : Hospital 30-day, all-cause, risk-standardized readmission rate (RSRR) following pneumonia hospitalization

0330 : Hospital 30-day, all-cause, risk-standardized readmission rate (RSRR) following heart failure (HF) hospitalization

0505 : Hospital 30-day all-cause risk-standardized readmission rate (RSRR) following acute myocardial infarction (AMI) hospitalization.

1789 : Hospital-Wide All-Cause Unplanned Readmission Measure (HWR)

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. Additionally, the measure, with the specified cohort, has been publicly reported since 2008. Because this is an outcome measure, clinical coherence of the cohort takes precedence over alignment with related non-outcome measures. Furthermore, non-outcome measures are limited due to broader patient exclusions. This is because they typically only include a specific subset of patients who are eligible for that measure (for example, patients who receive a specific medication or undergo a specific procedure).

5b.1 If competing, why superior or rationale for additive value: N/A

2876 Hospital 30-day, all-cause, risk-standardized mortality rate (RSMR) following acute ischemic stroke hospitalization with claims-based risk adjustment for stroke severity

5.1 Identified measures: 0467 : Acute Stroke Mortality Rate (IQI 17)

5a.1 Are specs completely harmonized? No

5a.2 If not completely harmonized, identify difference, rationale, impact: We did not include in our list of related measures any non-outcome (such as process) measures with the same target population as our measure. Because this is an outcome measure, clinical coherence of the cohort takes precedence over alignment with related non-outcome measures. Furthermore, non-outcome measures are limited due to broader patient

exclusions. This is because they typically only include a specific subset of patients who are eligible for that measure (for example, patients who receive a specific medication or undergo a specific procedure). Additionally, this measure and the NQF endorsed Acute Stroke Mortality Rate (IQI 17) (AHRQ) Measure #0467 are complementary and related rather than competing measures. Although they both assess mortality for patients admitted to acute care hospitals with a principal discharge diagnosis of acute ischemic stroke, the specified outcomes are different. Our measure assesses 30-day mortality, while #0467 assesses inpatient mortality. The 30-day mortality and inpatient mortality outcomes each have distinct advantages and uses, which make them complementary (and related) as opposed to competing. For example the 30-day period provides a broader perspective on hospital care and utilizes a standard time period to examine hospital performance to avoid bias by differences in length of stay among hospitals. However, in some settings it may not be feasible to capture post-discharge mortality, making the inpatient measure more useable. We have previously consulted with AHRQ to examine harmonization of the measures' cohort. As a result of that collaboration, we have found that the measures' cohorts are harmonized to the extent possible and that the small differences in cohort inclusion and exclusion criteria are appropriate because the measures assess different outcomes.

5b.1 If competing, why superior or rationale for additive value: This measure looks at a longer outcome time frame (30-days versus in-hospital) and incorporates stroke severity into the risk-model.

The current publicly reported measure, Hospital 30-Day Mortality Following Acute Ischemic Stroke Hospitalization Measure, is a potentially competing measure. It is CMS intent to replace the current measure in any given program with this newly developed measure, which includes stroke severity in the risk model.

The Hybrid Hospital 30-Day, All-Cause, Risk-Standardized Mortality Rate (RSMR) Following Acute Ischemic Stroke with Risk Adjustment for Stroke Severity measure is also being submitted to NQF for endorsement. This measure uses a combination of claims and electronic health records (EHR) data for risk adjustment but is otherwise harmonized with the new claims-only measure. It is CMS intent to implement only one of the new stroke mortality measures (this claims-only measure or the hybrid measure) in any given program.

0347 Death Rate in Low-Mortality Diagnosis Related Groups (PSI02)

5.1 Identified measures:

5a.1 Are specs completely harmonized?

5a.2 If not completely harmonized, identify difference, rationale, impact: not applicable

5b.1 If competing, why superior or rationale for additive value: Not applicable

0530 Mortality for Selected Conditions

5.1 Identified measures:

5a.1 Are specs completely harmonized?

5a.2 If not completely harmonized, identify difference, rationale, impact:

5b.1 If competing, why superior or rationale for additive value:

Appendix F: Pre-Evaluation Comments

Comments received as of June 5, 2019.

0138: National Healthcare Safety Network (NHSN) Catheter-associated Urinary Tract Infection (CAUTI) Outcome Measure

Submitted by Jelena Svircev, Physician

The NQF is to be commended for this medication to Quality Improvement in health care, as well as a strong commitment to patient–centeredness, consensus–building, and protection of vulnerable populations. Foley catheter removal in patients with neurogenic bladder due to Spinal Cord Injury (SCI) can have extremely negative consequences on genitourinary system health and function, and places patient's an undue risk of life–threatening outcomes such as renal failure and autonomic dysreflexia. Additionally, Foley removal carries important implications regarding independence, quality of life, and transition from hospital to home. Furthermore, the benefit of reducing Foley–related UTIs is tempered by increased risk of UTIs due to intermittent catheterization, which go unmeasured.

These complexities are acknowledged in clinical practice guidelines from the Consortium for Spinal Cord Medicine, the American Urological Association, and the CDC. Given these guidelines–driven principles, it is unreasonable to require the healthcare providers for this small patient population produce definitive proof of harm from a quality measure for a careful analysis of risk and benefits is done.

As a healthcare professional who cares for patients with SCI, I'm requesting that the NQF work to create better alignment between the financial incentives and SCI–specific recommendations in evidence–based clinical practice guidelines.

0138: National Healthcare Safety Network (NHSN) Catheter-associated Urinary Tract Infection (CAUTI) Outcome Measure

Submitted by Ms. Sarah Nichelson, JD, Association of Rehabilitation Nurses

ARN has previously commented the CAUTI Outcome Measure, joining with the American Spinal Injury Association, United Spinal Association, and Academy of Spinal Cord Injury Professionals, in a December 11, 2017 letter requesting additional studies from acute care hospitals in bladder management in SCI. ARN expressed concern that non-specialty hospitals would not have the requisite competency in dealing with conditions like neurogenic bladder.

ARN is still in agreement with the December 11, 2017 letter we submitted. We respectfully request additional data collection from SCI centers with direct oversight from the NQF in order to continue to study the CAUTI Outcome Measure.

0138: National Healthcare Safety Network (NHSN) Catheter-associated Urinary Tract Infection (CAUTI) Outcome Measure

Submitted by Jeffrey Craig Berliner

I am both supportive and applaud Matt Davis for his efforts and advocacy to exclude the diagnosis of spinal cord injury/Neurogenic bladder from Quality Measure 0138 to allow for the proper care of spinal cord injured patients. I have been involved in the care of patients with spinal cord injury both in the ICU and acute rehabilitation settings for over a decade, and after the “pay for performance” model arrived I have noticed an increase in the inappropriate care of the bladder of persons with spinal cord injury in

efforts to comply with guidelines. I believe that this is diametrically opposite to best practices and best patient care as outlined below in SCI guidelines. I have witnessed the deleterious results and damage to the urological system when physicians directly try to keep to this guideline without understanding the ramifications on the patient and patient population. The benefit of earlier catheter withdrawal has merits in many patient populations but I am hopeful that the NQF will see that a one size fits all policy may not only be ineffective for the neurogenic bladder but does cause harm for this specific patient population.

0138: National Healthcare Safety Network (NHSN) Catheter-associated Urinary Tract Infection (CAUTI) Outcome Measure

Submitted by Dr. Matthew Davis, MD, American Spinal Injury Association, Academy of SCI Professionals

I am submitting this letter electronically in order to remind the Committee of the letter we sent last year. This letter was signed by representatives from professional societies of virtually every healthcare discipline that works with SCI, and we have asked for a thorough, transparent review of the risks and benefits of including them in this current form of surveillance. You will see that 7 of the 10 organizations represented here are also institutional members of the NQF.

RE: NQF Measure 0138 and patients with Spinal Cord Injury

Dear Dr. Agrawal and Ms. Munthali:

On behalf of the undersigned interdisciplinary organizations representing individuals with spinal cord injuries (SCI) and the professionals (physicians, researchers, nurses, therapists and mental health professionals) who care for them, we are requesting that the NQF conduct a review of the risks and benefits of Quality Measure 0138 for SCI patients and consider downgrading it to conditional endorsement status.

In the spring of 2014, care providers of patients with SCI reported a surge in unsafe bladder management practices soon after the transition toward “Pay for Performance” status of the National Healthcare Safety Network (NHSN) Catheter-associated Urinary Tract Infection (CAUTI) Outcome Measure. These practices include indiscriminate removal of Foley catheters in non-specialty hospitals, with little understanding of the importance of intermittent catheterization volumes, patient independence, bladder compliance, and overflow incontinence in SCI patients. This incomplete understanding has led to undiagnosed Autonomic Dysreflexia (AD) and UTIs related to bladder overdistension and retained urine. Bladder overdistension is the leading cause of AD,[1] which leads to hypertensive emergency and potentially life-threatening consequences. Understanding of the recognition and treatment of AD has been shown to be quite limited among non-specialty healthcare providers,[2,3,4] and we have data from a Level I trauma center demonstrating 57% of intermittent catheterization volumes exceeding the maximum recommended by published guidelines. These patients demonstrated blood pressures consistent with AD.

SCI providers also raised concerns about the validity of this measure’s definition of UTI for these patients. The NHSN definition of UTI includes symptoms of suprapubic tenderness, flank pain, and fever. SCI patients typically have impaired sensation in the suprapubic and flank areas, and thermoregulation is altered in this patient group.[5] Hence, we have reason to believe that the benefits of this particular type of surveillance have been overestimated for SCI, as demonstrated by a poor sensitivity (42%) and a high false-positive rate (58%) for the NHSN definition of UTI in SCI patients seen in data from an SCI center. This unpublished data corroborates the findings of previous published work.[6,7]

It is well established that the duration of indwelling catheterization is directly related to risk for developing UTI. Therefore, expeditious Foley removal is a mainstay of CAUTI prevention,[8,9] and is one of the most evidence-based strategies hospitals can use to reduce their CAUTI Standardized Infection Ratio. Since Quality Measure 0138 is included in Medicare's Quality Reporting and Value-Based Purchasing programs, and is subject to public reporting through Medicare's Hospital Compare website, non-specialty hospitals now have financial and public reporting incentives to remove Foleys and assume care over neurogenic bladder in SCI – a competency which is not widely taught outside of SCI centers.

Soon after we raised our concerns in 2014, the NQF connected us with the measure developers, for which we are grateful. We arranged for two separate informal phone conferences between the measure developers and some highly-respected members of the SCI academic community. These discussions did not occur with NQF oversight, and we did not reach any mutually satisfactory conclusions. To our knowledge, no minutes were taken at these meetings. Furthermore, subsequent Measure Summaries submitted to the NQF by the measure developers contained no mention of our concerns in section 4c – the section concerning "unintended consequences to individuals or populations." This informal process lacked the organized structure, transparency, and accountability that is characteristic of the NQF.

When SCI providers approached the Joint Commission with similar concerns regarding their CAUTI National Patient Safety Goal (NPSG), the Joint Commission assigned two people to conduct an investigation, meet with SCI experts, and produce a written report. The findings of this investigation culminated in changes to the CAUTI NPSG that acknowledge these safety concerns and recognize the important role that indwelling catheters play in safely managing SCI neurogenic bladder.

Despite the changes to the CAUTI NPSG that took effect last January, the problems our members are seeing in acute care hospitals continue unabated, and financial incentives remain unchanged. We believe this issue is worth revisiting – this time with data that has been collected from SCI centers. This time, however, we are requesting the direct oversight and wisdom of the NQF, along with its characteristic organization, transparency, and accountability.

We hope that you agree that this situation merits a more structured approach. We are open to any intervention that

addresses our concerns about patient safety, that conforms with Clinical Practice Guidelines regarding selection of

bladder management method,[10] and that has a reasonable chance of success. This could include the development of an alternative quality measure that more specifically addresses quality of care in bladder management in SCI. If you have further questions or wish to reply to this letter, please feel free to reach out to Dr. Matthew Davis, who serves as the chair of the advocacy committees of ASIA and ASCIP and who has been involved in this issue from the beginning.

Sincerely, [co-signers listed below]

Keith Tansey, MD, PhD

President

American Spinal Injury Association

Jeffrey Johns, MD

President

Academy of Spinal Cord Injury Professionals

Matthew Davis, MD

Chair, ASIA HPAC Vice President, Government Relations

Chair, ASCIP Advocacy Committee United Spinal Association

Alexandra Bennewith, MPA

Vice President, Government Relations

Supporting Organizations:

William J. Maloney, MD

President

American Academy of Orthopaedic Surgeons

Scott Laker, MD

Chair, Quality, Practice, Policy and Research Committee

American Academy of Physical Medicine & Rehabilitation

Neil Harvison, PhD, OTR/L, FAOTA

Chief Professional Affairs Officer

American Occupational Therapy Association

Katy Neas, APTA

Executive Vice President of Public Affairs

American Physical Therapy Association

J. Stuart Wolf, MD

Chair, Science & Quality Council

American Urological Association

John Chae, MD

President

Association of Academic Physiatrists

Karion Gray Waites, DNP FNP-BC MSN RN CRRN

President

Association of Rehabilitation Nurses

REFERENCES:

1) The Consortium for Spinal Cord Medicine Clinical Practice Guideline. Acute management of autonomic dysreflexia: individuals with spinal cord injury presenting to health-care facilities. J. of Spinal Cord Medicine, 2002, volume 25, supplement 1, pages S68-S88.

2) Wan D, Krassioukov AV. Life-threatening outcomes associated with autonomic dysreflexia: a clinical review. J Spinal Cord Med 2014;37(1):2–10.

3) Jackson CR, Acland R. Knowledge of autonomic dysreflexia in the emergency department. Emerg Med J 2011;28(10):866–9.

4) Krassioukov A, Tomasone J, Pak M, Craven C, Ghoti M, Ethans K, Ginis K, Ford M, Krassioukov-Enns D. “The ABCs of AD”: A prospective evaluation of the efficacy of an educational intervention to increase knowledge of autonomic dysreflexia management among emergency health care professionals. J Spinal Cord Med 2016;39(2):190-196.

5) Trbovich M, Li C, Lee S. Does the CDC Definition of Fever Accurately Predict Inflammation and Infection in Persons With SCI? Topics in Spinal Cord Injury Rehabilitation: Fall 2016, Vol. 22, No. 4, pp. 260-268.

6) Massa L, Hoffman J, Cardenas D. Validity, Accuracy, and Predictive Value of Urinary Tract Infection Signs and Symptoms in Individuals With Spinal Cord Injury on Intermittent Catheterization. The Journal of Spinal Cord Medicine, 32:5, 568-573.

7) National Institute on Disability and Rehabilitation Research Statement. The prevention and management of urinary tract infections among people with spinal cord injuries. J Am Paraplegia Soc 1992; 15:194–204.

8) Gould, C.V., Umscheid C.A., Agarwal, R.K., Kuntz, G., Pegues, D.A., & HICPAC. (2009). Guideline for prevention of catheterassociated urinary tract infections. CDC.

9) Centers for Disease Control and Prevention - TAP Catheter-Associated Urinary Tract Infection (CAUTI) Toolkit

Implementation Guide: Links to Example Resources. (2017, December 1). Retrieved from

https://www.cdc.gov/hai/prevent/tap/resources.html

10) Consortium for Spinal Cord Medicine. Bladder management for adults with spinal cord injury: a clinical practice guideline for health care providers. J Spinal Cord Med. 2006; 29(5): 537-73.

0138: National Healthcare Safety Network (NHSN) Catheter-associated Urinary Tract Infection (CAUTI) Outcome Measure

Submitted by Stephen Burns

Based on my experience practicing as an SCI Medicine physician for 23 years, providing care to patients with acute and chronic SCI, I have concerns about inappropriate discontinuation of indwelling urinary catheters. An indwelling catheter is sometimes the most appropriate option for long-term management of neurogenic bladder. This is particularly true when a patient with tetraplegia and limited hand function would be dependent on others to perform intermittent catheterization. This adds an extra burden of caregiver assistance that must be available at various times throughout the day and night. This need for care is a potential barrier to employment or school, whereas most patients with indwelling catheters can be independent for 8 or more hours before needing to empty a urinary collection bag. In the SCI population with neurogenic bladder dysfunction, the benefits of intermittent catheterization over indwelling catheters are minimal at best (urethral complications), and intermittent catheterization introduces other risks and greatly increases the chances of urinary incontinence which negatively affects quality of life. Research performed by myself and colleagues at the University of Washington demonstrates that 20% of individuals with SCI who use intermittent catheterization experience urinary incontinence weekly or more frequently (Stillman M, Hoffman J, Barber J, Williams S, Burns SP. Bladder management and related complications after spinal cord injury over the first year after discharge from inpatient rehabilitation. Spinal Cord Case Series 2019 [in press; accepted 28 sept 2019]). Incontinence is frequently a barrier to participation in community activities. Intermittent catheterization in this population has not been demonstrated to have a lower risk of urinary tract infections, and a large percentage of people with SCI who perform intermittent catherization have chronic colonization of the bladder with bacteria. Risks of renal stones and bladder cancer are also not significantly different between patients with SCI using indwelling vs. intermittent catheterization. The big push to discontinue

indwelling catheters, leaving patients with inadequate bladder drainage, has negatively affected patients with acute and chronic SCI who I have treated. There is potential to cause renal failure when catheters are inappropriately removed. Due to the high prevalence of asymptomatic bacteriuria in this population, plus the potential for negative consequences on health and quality of life if a catheter is inappropriately removed, it would be most appropriate for patients with SCI and neurogenic bladder dysfunction to be excluded from any quality measure involving indwelling catheters. These statements are in alignment with clinical practice guidelines from the Consortium for Spinal Cord Medicine, the American Urological Association, and the CDC. As a healthcare professional who treats patients with acute and chronic SCI, I am requesting that NQF work to create better alignment between the financial incentives and SCI-specific recommendations in evidence-based clinical practice guidelines.

0138: National Healthcare Safety Network (NHSN) Catheter-associated Urinary Tract Infection (CAUTI) Outcome Measure

Submitted by Rita G. Hamilton

as an SCI physician in a freestanding rehab facility affiliated with a level 1 trauma center we see a number of acute SCI injuries admitted to our facility - unfortunately the ones with acute renal failure as an additional diagnosis - due to the Foley being removed in the acute hospital are upsetting to all of us that practice SCI medicine - as I type this we have one such example currently in our hospital now - and this is not uncommon to this population with the CAUTI measures as they are written currently - while I agree with removing indwelling catheters to prevent infections etc.- I would strongly urge you to reconsider the Spinal Cord Injury population - - the neurogenic bladder is a special diagnosis - and should be treated as such - I applaud Dr. Matt Davis and his efforts addressing this issue.

0138: National Healthcare Safety Network (NHSN) Catheter-associated Urinary Tract Infection (CAUTI) Outcome Measure

Submitted by Malorie Heinen

Our hospital is very adament about removing indwelling catheters early in-patient care and do not want to have them if possible due to the risk of having a CAUTI and a documented CAUTI at that. As a nurse that works primarily with patients with a spinal cord injury, I witness many issues in the acute phase of care with the catheter being removed. Patient's with neurogenic bladder should not be under the same umbrella of care as those with temporary retention issues or non-neurogenic needs.

The current issue that I run into is that the catheters are removed very early in care due to the CAUTI outcome measure tracking but most of our services are not familiar enough with neurogenic bladder in order to have a proper management plan in place to follow the removal. We have a new urinary catheter removal protocol and algorithm, but it is still new and requires that a "plan" be made at the 24 hr. mark post removal. Most times an adequate bladder management plan is not made or catheters are being replaced and then removed again, or an intermittent straight catheter schedule may be started but not written appropriately.

I try to advocate for these patients to keep their catheters in place if they are not going to be able to be independent in their own bladder management plan, if they are still in the acute phase of recovery (on the vent, in ICU with fluids being given, etc.) and if they are just not mentally ready to tackle this new life change so early in a traumatic injury. Patients with higher levels of injury are also at risk for Autonomic Dysreflexia and by removing these catheters in patients who cannot manage their own bladders, we are

putting them at significant risk for harm. The biggest argument I receive for removing catheters is the risk of CAUTI's. This patient population should not be in the same outcome measure bundle as the rest of the population. I believe we do these patient's more harm than good by having them in this bundle.

0138: National Healthcare Safety Network (NHSN) Catheter-associated Urinary Tract Infection (CAUTI) Outcome Measure

Submitted by Ms. Heather Smith, PT, MPH, American Physical Therapy Association

APTA does support this measure, however, we believe that NQF and the CDC should modify this measure to exclude patients with spinal cord injury. Foley catheter removal in patients with neurogenic bladder due to Spinal Cord Injury (SCI) can have extremely negative consequences on genitourinary system health and function, and place patients at undue risk of life-threatening outcomes such as renal failure and autonomic dysreflexia. Additionally, Foley removal carries important implications regarding independence, quality of life, and transition from hospital to home. Furthermore, the benefit of reducing Foley-related UTIs is tempered by increased risk of UTIs due to intermittent catheterization, which go unmeasured.

These complexities are acknowledged in clinical practice guidelines from the Consortium for Spinal Cord Medicine, the American Urological Association, and the CDC. Given these guideline-driven principles, it is unreasonable to require that healthcare providers for small patient populations produce definitive proof of harm from a quality measure before a careful analysis of risks and benefits is done.

As a healthcare profession who cares for patients with SCI, we are requesting that the NQF work to create better alignment between the financial incentives and SCI-specific recommendations in evidence-based clinical practice guidelines.

0138: National Healthcare Safety Network (NHSN) Catheter-associated Urinary Tract Infection (CAUTI) Outcome Measure

Submitted by Dr. E. Clarke Ross, DPA

The American Association on Health and Disability and the Lakeshore Foundation encourage the NQF to review the risks and benefits of existing and proposed modifications to the CAUTI measure #0138. There appears to be consensus among the three national associations focused on persons with spinal cord injury regarding the approach to CAUTI. Matt Davis, M.D., University of Texas Health Science Center at Houston works closely with these 3 national associations as well as numerous rehabilitation professionals, and has previously submitted comments. Thank you for your consideration. Clarke Ross for both AAHD & Lakeshore Foundation

0138: National Healthcare Safety Network (NHSN) Catheter-associated Urinary Tract Infection (CAUTI) Outcome Measure

Submitted by Stephen McKenna, M.D.

The CDC has a straight forward mechanism to improve the CAUTI standard by removing Spinal Cord Injury (SCI) from aggregated data. There is precedent for this improvement in that the CAUTI accreditation standards for the Joint Commission have removed SCI from aggregate reporting. I would encourage the CDC to be open to input from that community of clinicians who have witnessed specific harm arising from the CAUTI standard in the subset of patients with SCI.

The failure of the CDC is to recognize that CAUTI data does not quantify the danger of urinary catheters equally across all populations. This is particularly concerning for rare diseases with different pathophysiology such as Spinal Cord Injury. The CDC has created an unfunded mandate to adopt an objectively dangerous standard for patients with rare neuromuscular diseases. Hospitals are forced to disclose aggregated CAUTI cases for disease conditions such as SCI which they may encounter less than once per year in a specific acute trauma unit. For the individual hospital, the resources required to appropriately manage patients with SCI related neurogenic bladder do not rise to the level of significance necessary to drive universal competency. However, for the individual with SCI removal of the catheter often spells acute renal insufficiency and occasionally death. The CDC should acknowledge that aggregated reporting of CAUDI is causing harm to patients with SCI and remove this condition from the current CAUTI reporting requirements.

0138: National Healthcare Safety Network (NHSN) Catheter-associated Urinary Tract Infection (CAUTI) Outcome Measure

Submitted by Kathy Hulse, Craig Hospital

As a social worker in the outpatient setting, I focus on helping patients adapt to life outside of the hospital. Before they can return to work or school, they need to be able to independently manage their bladder. Intermittent catheterization is not practical in some circumstances due to clothing management, hand function, availability of attendant care or financial resources. Removal of the Foley can force dependence on patients when we are trying to teach them independence in the community.

I have several co-workers and patients working in the community that would be unable to maintain their current jobs without the use of an indwelling catheter in the workplace setting. They are tax-paying members of society, rather than being reliant on Social Security.

Our goal in rehabilitation is to support the transition to the next phase of their "new normal". Quality of life includes being able to independently manage your bladder as much as possible.

0138: National Healthcare Safety Network (NHSN) Catheter-associated Urinary Tract Infection (CAUTI) Outcome Measure

Submitted by James Crew, Jr.

Thank you, Dr. Davis, for your efforts in this area, and for your commitment to advocating for those with Spinal Cord Injury (SCI). As someone who practices at a tertiary care center, I routinely consult on acute SCI patients in the ICU and admit patients with SCI to our inpatient rehabilitation facility. I am quite sympathetic to this issue. Since CAUTIs have become a quality metric for inpatient care, I have noticed a trend toward the use of condom catheters for patients with SCI and neurogenic bladder who are transferred to our hospital. We have seen cases of autonomic dysreflexia and renal insufficiency from this practice. While it is important to minimize UTI risk, I would advocate for a more sophisticated approach in the care of SCI patients without volitional bladder control who are subsequently at high risk for bladder spasticity, autonomic dysreflexia, and renal deterioration if Foleys are removed without an appropriate bladder management strategy such as intermittent bladder catheterization (which is often not practical given high urine output volumes acutely after SCI, as well as a lack of feasibility for RN staff at most hospitals to perform intermittent caths every 4 hours). Hopefully, the CAUTI dilemma in SCI can be seen as an opportunity for policy-makers to guide appropriate clinical practice.

0138: National Healthcare Safety Network (NHSN) Catheter-associated Urinary Tract Infection (CAUTI) Outcome Measure

Submitted by Dr. Lance Goetz

Based on my 23 years as a spinal cord injury (SCI) medicine physician and my 35 years as a person with SCI, I concur with the comments from other SCI professionals. Indwelling catheters, while not our first choice, are sometimes the only viable option for certain subgroups of persons with SCI and some other causes of neurogenic bladder dysfunction. Removal of an indwelling catheter and placement of an external or "condom" catheter can put such persons at risk for a number of serious complications, including vesicoureteral reflux due to bladder outlet obstruction, leading to renal stone disease and/or kidney and upper urinary tract structural damage.

The SCI literature does not demonstrate evidence of superiority of intermittent catheterization in persons who require a caregiver to perform the technique. In fact, outcomes may be worse in this scenario, and quality of life, freedom and mobility can be hampered.

Further, insistence on intermittent catheterization could cause persons with SCI to be denied admission to health care facilities.

I recommend allowing justification of indwelling catheter use or making other accommodations for these persons.

0138: National Healthcare Safety Network (NHSN) Catheter-associated Urinary Tract Infection (CAUTI) Outcome Measure

Submitted by Jennifer Villacorta

I have been fortunate enough to be recruited and serve in a facility that provides the only acute inpatient rehab for catastrophic diagnoses as SCI in the state of MS. It has not been uncommon to receive referrals and admissions for SCI patients who have been told and felt that they have been voiding on their own since their indwelling had been removed in acute care, only to realize that their 'spontaneous void' is the the result of overflow -- retaining a significant amount of urien that may eventually transform into frequent infections, pain (with bladder distention), and as stated in our advocacy statement, RENAL FAILURE. It is certainly scary to realize that many more patient have probably been sent home with the same perception and come back re-hospitalized as a result of inadequate screening (bladder scan or at least a referral to urology) prior to discharge clearance.

I full heartedly support this advocacy program for more education and re-considerations for practices of a more inclusive bladder management practice for our spinal cord population patients.

0138: National Healthcare Safety Network (NHSN) Catheter-associated Urinary Tract Infection (CAUTI) Outcome Measure

Submitted by Ms. Beth Radtke, AAPMR

The NQF is to be commended for its dedication to Quality Improvement in healthcare, as well as its strong commitment to patient-centeredness, consensus-building, and protection of vulnerable populations. Foley catheter removal in patients with neurogenic bladder due to Spinal Cord Injury (SCI) can have extremely negative consequences on genitourinary system health and function, and place patients at undue risk of life-threatening outcomes such as renal failure and autonomic dysreflexia. Additionally, Foley removal carries important implications regarding independence, quality of life, and

transition from hospital to home. Furthermore, the benefit of reducing Foley-related UTIs is tempered by increased risk of UTIs due to intermittent catheterization, which go unmeasured.

These complexities are acknowledged in clinical practice guidelines from the Consortium for Spinal Cord Medicine, the American Urological Association, and the CDC. Given these guideline-driven principles, it is unreasonable to require that healthcare providers for small patient populations produce definitive proof of harm from a quality measure before a careful analysis of risks and benefits is done.

0138: National Healthcare Safety Network (NHSN) Catheter-associated Urinary Tract Infection (CAUTI) Outcome Measure

Submitted by Malorie Heinen

Our hospital is very adamant about removing indwelling catheters early in patient care and do not want to have them if possible due to the risk of having a CAUTI and a documented CAUTI at that. As a nurse that works primarily with patients with a spinal cord injury, I witness many issues in the acute phase of care with the catheter being removed. Patient's with neurogenic bladder should not be under the same umbrella of care as those with temporary retention issues or non-neurogenic needs.

The current issue that I run into is that the catheters are removed very early in care due to the CAUTI outcome measure tracking but most of our services are not familiar enough with neurogenic bladder in order to have a proper management plan in place to follow the removal. We have a new urinary catheter removal protocol and algorithm, but it is still new and requires that a "plan" be made at the 24 hr. mark post removal. Most times an adequate bladder management plan is not made or catheters are being replaced and then removed again, or an intermittent straight catheter schedule may be started but not written appropriately.

I try to advocate for these patients to keep their catheters in place if they are not going to be able to be independent in their own bladder management plan, if they are still in the acute phase of recovery (on the vent, in ICU with fluids being given, etc.) and if they are just not mentally ready to tackle this new life change so early in a traumatic injury. Patients with higher levels of injury are also at risk for Autonomic Dysreflexia and by removing these catheters in patients who cannot manage their own bladders, we are putting them at significant risk for harm. The biggest argument I receive for removing catheters is the risk of CAUTI's. This patient population should not be in the same outcome measure bundle as the rest of the population. I believe we do these patient's more harm than good by having them in this bundle.

0138: National Healthcare Safety Network (NHSN) Catheter-associated Urinary Tract Infection (CAUTI) Outcome Measure

Submitted by Chloe Slocum, Physician

I support NQF's efforts to hold health care providers and health systems accountable for patient outcomes, but respectfully recommend the NQF include spinal cord injury consumers, providers, and professional organizations in the guideline development and revision process to identify whether this population may contain legitimate sub-groups that would qualify for an exception based upon best practice guidelines used in the field currently that are based upon the best possible medical knowledge of this unique population. For instance, some individuals who have selected a suprapubic catheter for bladder management may have to wait as an inpatient until this procedure is performed due to issues of access, scheduling, or medical stability (e.g. anticoagulation adjustment). An indwelling urethral catheter would be clinically appropriate until a suprapubic catheter could be placed for an individual who has had

impaired kidney function and/or refractory autonomic dysreflexia caused by bladder distension in order to avoid elevated hydrostatic pressures in the bladder that may trigger autonomic dysreflexia or kidney injury. Yet, such a clear algorithmic approach based on an individual's clinical needs may be abrogated by the incentives created with broad application of the NQF measure across clinically diverse populations that currently include people with spinal cord injury. Thank you for the opportunity to comment and contribute to the NQF Outcome Measure process.

0138: National Healthcare Safety Network (NHSN) Catheter-associated Urinary Tract Infection (CAUTI) Outcome Measure

Submitted by Adele Henry, Physical Therapist

The management of the neurogenic bladder following spinal cord injury has significant impact to the overall patient's health, quality of life, and functional independence. Achieving the best clinical and functional outcome should be paramount when clinical decision making in this area occurs. Patient outcomes should be the primary consideration for medical management of the neurogenic bladder - not generalized rules that do not focus on the unique clinical needs of patients with neurogenic bladder following spinal cord injury. Spinal Cord Injured patients must have their bladders managed with a holistic approach. Often, the Foley is removed without consideration related to caregiver availability, functional independence, and risk of secondary complications including autonomic dysreflexia. I like to say that spinal cord injuries are like snowflakes - no 2 are alike. In the same way - no two neurogenic bladders are alike. Please allow medical professionals to utilize their specialized training to ensure appropriate medical management of the neurogenic bladder. Please do not encourage facilities to discontinue the use of a Foley catheter when they do not have a plan to manage the neurogenic bladder effectively. Patient's deserve the opportunity to make informed decisions after consulting with their primary medical team. Often times, a Foley catheter provides increased independence, ability to be away from the home for >4 hours, allows return to work or school.

0138: National Healthcare Safety Network (NHSN) Catheter-associated Urinary Tract Infection (CAUTI) Outcome Measure

Submitted by Marcie Kern

Foley catheter removal in patients with neurogenic bladder due to spinal cord injury can have extremely negative consequences on genitourinary system health and function and place individuals at undue risk of life threatening outcomes such as renal failure and autonomic dysreflexia. Additionally, Foley removal carries important implications regarding independence, quality of life and transition from hospital to home. Furthermore, the benefit of reducing Foley-related UTIs is tempered by increased risk of UTIs due to intermittent catheterization, which go unmeasured.

These complexities are acknowledged in clinical practice guidelines from the Consortium for Spinal Cord Medicine, the American Urological Association, and the CDC. Given these guideline driven principles, it is unreasonable to require healthcare providers for small patient populations to produce definitive proof of harm from a quality measure before a careful analysis of risks and benefits is done.

As a healthcare professional who works daily with individuals with spinal cord injury I have seen the impact on quality of life when we allow for bladder management solutions that work for the individual. For example, the teenager who doesn't have the hand function and trunk control to perform clothing management and self-intermittent catheterization who has a Foley and is now able to independently go

off to college because they do not need mom or caregiver to assist them to the bathroom and perform intermittent catheterization throughout the day. Or the mom or whose pair shape and short weak arms limits her independence with transfers and clothing management to be able to perform self-catheterization who, with a Foley, is able to independently stay at home and care for her toddler since she doesn't need a caregiver to assist her with toileting every 4 hours. Or the individual who did not have resources to hire a caregiver who was able to stay home safely and independently during the day while their spouse went to work to support the family because they had a Foley to manage their bladder. Or the patient with a high-level spinal cord injury who had no hand function or ability to manage their bladder and who relied on a caregiver (their spouse) to perform 100% of their self-care needs. Having a Foley reduced the burden on the caregiver to allow for more time to perform other daily care needs and allowed them the freedom to more easily leave their home and not be tied to a 4-hour catheterization schedule. And the list goes on. Every person with a spinal cord injury has a unique situation. And removal of a Foley is not always the best bladder management method. For some, removal of the Foley increases the burden of care, cost of care, risk of autonomic dysreflexia and even death.

I and my colleagues and our patients are requesting the NQF work to create better alignment between the financial incentives and spinal cord injury specific recommendations in evidence based clinical practice guidelines.

0138: National Healthcare Safety Network (NHSN) Catheter-associated Urinary Tract Infection (CAUTI) Outcome Measure

Submitted by Kathryn Nedley

Monitoring of CAUTI outcomes is vital to the overall health and well-being of all patients currently served by our medical system, and the NQF is a leader in developing patient-centered practices. While developing these patient-centered practices, it is imperative to consider multiple populations, while maintaining awareness that some populations have more at stake than others. As an occupational therapist I work daily with patients on skills to increase their independence and quality of life, as well as ways they can maintain good health practices. For individuals with hand dexterity impairments, Foley catheter removal in patients with neurogenic bladder due to Spinal Cord Injury (SCI) can have extremely negative consequences on genitourinary system health and function, and place patients at undue risk of life-threatening outcomes such as renal failure and autonomic dysreflexia. Additionally, Foley removal carries important implications regarding independence, quality of life, and transition from hospital to home. For individuals who are learning to complete "in and out" catheterization, there is increased difficulty maintaining a sterile environment, and therefore increasing risk of CAUTI which could be reduced by continuation of use of a Foley. One patient in particular has been injured for 3 years, learned to complete intermittent catherization, and whose health care needs have been managed through outpatient appointments. This gentleman has limited use of his hands, and while he completes intermittent catheterization, he has experienced a period longer than 6 weeks without UTI. During times where he has had a Foley catheter temporarily placed, his incidence of CAUTI was significantly reduced. This man's experience is an example of how the benefit of reducing Foley-related UTIs is tempered by increased risk of UTIs due to intermittent catheterization, which go unmeasured.

These complexities are acknowledged in clinical practice guidelines from the Consortium for Spinal Cord Medicine, the American Urological Association, and the CDC. Given these guideline-driven principles, it is unreasonable to require that healthcare providers for small patient populations produce definitive proof of harm from a quality measure before a careful analysis of risks and benefits is done.

As a healthcare professional who cares for patients with SCI, I am requesting that the NQF work to create better alignment between the financial incentives and SCI-specific recommendations in evidence-based clinical practice guidelines.

0138: National Healthcare Safety Network (NHSN) Catheter-associated Urinary Tract Infection (CAUTI) Outcome Measure

Submitted by Ellia Ciammaichella, DO, JD

I applaud the NQF's desire to encourage accountability and incentivize internal quality improvement efforts to reduce the number of hospital-acquired UTIs. This is done by applying measures through federal programs that affect funding and ultimately incentivize facilities to optimize their "bladder bundles."

Since measure #0138 is a voluntary consensus standard that is implemented into federal programs, the National Technology Transfer and Advancement Act of 1995 (NTTAA), Executive Orders 13563 and 12866, and the OMB Circular A-119: Federal Participation in the Development and Use of Voluntary Consensus Standards and in Conformity Assessment Activities, revised 2016, apply. These documents outline: (1) the process of review and (2) the criteria of a voluntary consensus standards that are incorporated into federal programs (i.e. measure #0138).

In terms of the process of review:

1. Procedures should provide meaningful opportunity and involvement of stakeholders, including "experts in relevant disciplines," to participate in standards development; and

2. The decision-making process should be transparent, including disclosures of the "agency's interactions with technical committees and/or technical advisory groups involved."

In terms of criteria, measure developers must consider:

1. "Best available science" and reasonably obtainable information;

2. Maximizing benefits and minimizing risks (both quantitative and qualitative); and

3. Logical reasoning with quantitative and qualitative information, recognizing that some benefits and risks are difficult to quantify.

Unfortunately, the processes and criteria listed above may have fallen short for the spinal cord injury population. People with spinal cord injury (SCI) are a unique and small proportion of our population that suffer from neurogenic bladder, resulting in unique needs for chronic alternative bladder management strategies. The National Spinal Cord Injury Statistical Center recognizes the annual incidence of SCI as approximately 54 cases per million population in the U.S. with approximately 282,000 persons alive in 2016 who have SCI. (National Spinal Cord Injury Statistical Center, Facts and Figures at a Glance. Birmingham, AL: University of Alabama at Birmingham, 2016.) Thus, although a small proportion, the SCI population is particularly affected by the incorporation of measure #0138 into federal programs, but their needs have not been adequately considered in the measure development process.

First, the SCI community is not meaningfully represented in the process of review of measure #0138. I did not see any physiatrist, spinal cord injury specialist, or neuro-urologist included in Healthcare Infection Control Practices Advisory Committee (HICPAC), the Ex-officio Members, Liaisons, or expert reviewers. However, this could be rectified by including specialists of neurogenic bladder as expert reviewers such as physiatrists, spinal cord injury (SCI) specialists, and/or neuro-urologists. These specialists are intimately familiar with the nuances of neurogenic bladder and bladder of people with disabilities as they manage this on a regular basis. Moreover, the spinal cord injury specialty has long been studying the management of neurogenic bladder with eight English language clinical practical

guidelines throughout the world that are “robust in stating their scope and clearly presenting recommendations,” with three scoring over 70% in methodological rigor. (Bragge P, Guy S, Boulet M, et. al. A systematic review of the content and quality of clinical practice guidelines for management of the neurogenic bladder following spinal cord injury. Spinal Cord. April 10, 2019. https://doi.org/10.1038/s41393-019-0278-0). Physiatrists, SCI specialists, and neuro-urologists have the expertise to provide information on best available science as well as quantitative and qualitative information on the benefits and risks of measure #0138 as it applies neurogenic bladder management in SCI. Incorporating these specialists as expert reviewers is in line with both federal rules and NQF policy to gather all stakeholder groups.

Second, disclosure as it relates to how measure #0138 affects the SCI community has been limited. The American Spinal Injury Association, Academy of Spinal Cord Injury Professional, and the United Spinal Association submitted a joint letter on December 11, 2017, but there is no mention of the agency’s interaction with these associations. Furthermore, in the most recent iteration of measure #0138,there is no explanation as to how considering the “proportion of admissions with traumatic and non-traumatic spinal cord dysfunction” in the denominator will minimize any unintended consequences. Therefore, I recommend including disclosures of the agency’s interactions with the above associations and clearly explaining how these changes in the denominator statement will limit unintended consequences.

Third, I am unsure that this measure maximizes net benefits and minimizes risks (both quantitative and qualitative.) Executive Order 13563 and 12866 both require quantitative and qualitative review of the costs and benefits of the measure. This includes both inclusions and exclusions to the measure. The CDC acknowledged that, “for patients with spinal cord injury, very low-quality evidence suggested a benefit of avoiding indwelling urinary catheters.” (2009 Guideline for Prevention of Catheter-Associated Urinary Tract Infections, p. 34). Had they been confident that the benefits of avoiding indwelling catheters in SCI outweighed the risks, a “Category IB” recommendation would be appropriate. (p10) Instead, this was assigned “Category II” recommendation, acknowledging the “tradeoff between clinical benefits and harms,” and indicating a lack of certainty of net benefit. Category II recommendations are “not intended to be enforced.” (p32). Thus, in using the Category II designation, it seems clear that in 2009 the CDC lacked confidence of a favorable risk/benefit ratio in avoiding indwelling catheters in the SCI population. Therefore, it seems it violates federal law and rules to implement measure #0138 into federal programs in its current form.

Furthermore, to minimize risks and to understand the qualitative costs, the unintended consequences must be tracked. This is a significant concern especially in SCI as urinary stasis and overdistended bladders have significant and sometimes irreparable damage to our patient population. Because of the uniqueness of the SCI population, I emphasize the need to include specialists in physiatry, SCI, and/or neuro-urology to participate as expert reviewers to provide further information about any possible unintended consequences that should be tracked. These side effects are the qualitative costs of implementing measure #0138 and should be measured.

Finally, in considering the potential risks posed to SCI patients, Executive Orders 13563 and 12866 require consideration of qualitative input. This recognizes that some costs are difficult to quantify or not reasonably obtainable. Many unsafe conditions because of early removal of indwelling catheters are not expected to manifest as adverse events until after hospital discharge, so it is unreasonable to limit measures of unintended consequences to only harm manifested during hospitalization. On the other hand, it may be costly for long range data collection on unintended consequences and thus, excluding SCI patients from measure #0138 may be practical. Likewise, patient-centered considerations about quality of life should be included in qualitative analysis. Furthermore, anecdotal reports of harm, near-misses, and strong potential for harm should carry weight in the decision-making process.

In conclusion, measure #0138 does not meet the required processes of review and criteria of NTTAA, Executive Orders 13563 and 12866, and the OMB Circular A-119. This would eliminate measure #0138 from incorporation into federal programs. This is unfortunate, as the goal to reduce the number of hospital acquired UTI is important. To ensure that federal laws and rules are followed such that measure #0138 can be incorporated into federal programs and to improve our joint effort to maximize our patients' health, I recommend the following:

1. Include physiatrists, spinal cord injury (SCI) specialists, and/or neuro-urologists as expert reviewers;

2. Thoroughly and transparently review both the costs and benefits of excluding SCI patients from measure #0138 as has been done for pediatric cases and provide this information to the public so that stakeholders have an opportunity to meaningfully participate in the voluntary standard development process;

3. Thoroughly and transparently evaluate the costs and benefits of incentivizing the reduction of hospital-acquired symptomatic UTIs for all alternative bladder management strategies, including indwelling catheters, suprapubic catheters, condom catheters, and "in and out" catheterizations, with input from stakeholders and experts in the field so that stakeholders have an opportunity to meaningfully participate in the standard development process;

4. Include spinal cord injury as an example of an appropriate indication for indwelling urethral catheter; and

5. Monitor and study qualitative costs of any unintended consequences of measure #0138.

0138: National Healthcare Safety Network (NHSN) Catheter-associated Urinary Tract Infection (CAUTI) Outcome Measure

Submitted by Daniel Luigi Santa Maira, Physician

The NQF is to be commended for its dedication to Quality Improvement in healthcare, as well as its strong commitment to patient-centeredness, consensus-building, and protection of vulnerable populations. Foley catheter removal in patients with neurogenic bladder due to Spinal Cord Injury (SCI) can have extremely negative consequences on genitourinary system health and function, and place patients at undue risk of life-threatening outcomes such as renal failure and autonomic dysreflexia. Additionally, Foley removal carries important implications regarding independence, quality of life, and transition from hospital to home. Furthermore, the benefit of reducing Foley-related UTIs is tempered by increased risk of UTIs due to intermittent catheterization, which go unmeasured.

These complexities are acknowledged in clinical practice guidelines from the Consortium for Spinal Cord Medicine, the American Urological Association, and the CDC. Given these guideline-driven principles, it is unreasonable to require that healthcare providers for small patient populations produce definitive proof of harm from a quality measure before a careful analysis of risks and benefits is done.

0138: National Healthcare Safety Network (NHSN) Catheter-associated Urinary Tract Infection (CAUTI) Outcome Measure

Submitted by Ramiro Martinez

The NQF is to be commended for its dedication to Quality Improvement in healthcare, as well as its strong commitment to patient-centeredness, consensus-building, and protection of vulnerable populations. Foley catheter removal in patients with neurogenic bladder due to Spinal Cord Injury (SCI) can have extremely negative consequences on genitourinary system health and function, and place patients at undue risk of life-threatening outcomes such as renal failure and autonomic dysreflexia.

Additionally, Foley removal carries important implications regarding independence, quality of life, and transition from hospital to home. Furthermore, the benefit of reducing Foley-related UTIs is tempered by increased risk of UTIs due to intermittent catheterization, which go unmeasured.

These complexities are acknowledged in clinical practice guidelines from the Consortium for Spinal Cord Medicine, the American Urological Association, and the CDC. Given these guideline-driven principles, it is unreasonable to require that healthcare providers for small patient populations produce definitive proof of harm from a quality measure before a careful analysis of risks and benefits is done.

As a healthcare professional who cares for patients with SCI, I am requesting that the NQF work to create better alignment between the financial incentives and SCI-specific recommendations in evidence-based clinical practice guidelines.

0138: National Healthcare Safety Network (NHSN) Catheter-associated Urinary Tract Infection (CAUTI) Outcome Measure

Submitted by Michelle Brand Trbovich

The NQF is to be commended for its dedication to Quality Improvement in healthcare, as well as its strong commitment to patient-centeredness, consensus-building, and protection of vulnerable populations. Foley catheter removal in patients with neurogenic bladder due to Spinal Cord Injury (SCI) can have extremely negative consequences on genitourinary system health and function, and place patients at undue risk of life-threatening outcomes such as renal failure and autonomic dysreflexia. Additionally, Foley removal carries important implications regarding independence, quality of life, and transition from hospital to home. Furthermore, the benefit of reducing Foley-related UTIs is tempered by increased risk of UTIs due to intermittent catheterization, which go unmeasured.

These complexities are acknowledged in clinical practice guidelines from the Consortium for Spinal Cord Medicine, the American Urological Association, and the CDC. Given these guideline-driven principles, it is unreasonable to require that healthcare providers for small patient populations produce definitive proof of harm from a quality measure before a careful analysis of risks and benefits is done.

As a healthcare professional who cares for patients with SCI, I am requesting that the NQF work to create better alignment between the financial incentives and SCI-specific recommendations in evidence-based clinical practice guidelines.

0138: National Healthcare Safety Network (NHSN) Catheter-associated Urinary Tract Infection (CAUTI) Outcome Measure

Submitted by Ms. Suzanne Pope, MBA

The American Urological Association (AUA) is a globally-engaged organization with more than 22,000 members practicing in the United States and worldwide. AUA members represent the world's largest collection of expertise and insight into the treatment of urologic disease and provide invaluable support to the urologic community by fostering the highest standards of urologic care through education, research and the formulation of health policy.

The AUA writes to express concern with the CAUTI outcome measure which encourages the removal of Foley catheters in patients with neurogenic bladder due to Spinal Cord Injury (SCI). SCI patients represent a unique population that should be excluded from the measure, due to the potential negative outcomes of catheter removal for these particular patients. The AUA's white paper on Catheter-Associated Urinary Tract Infections: Definitions and Significance in the Urologic Patient specifically

addresses the complexities associated with care for SCI patients and the risks regarding intermittent catheterization.

We are concerned about the quality of care for these vulnerable patients and recommend exclusion of these patients from the measure.

Thank you for the opportunity to provide feedback.

0138: National Healthcare Safety Network (NHSN) Catheter-associated Urinary Tract Infection (CAUTI) Outcome Measure

Submitted by Lisa A. Beck

The dedication of MQF's to quality healthcare is commended, especially during this interesting political times.

I am an advance practice registered nurse in the field of spinal cord injury. Indwelling catheterization is an important option for the management of the neurogenic bladder, especially if the individual has limited hand function or ability to perform self-intermittent catheterization from the wheelchair. In addition approximately to 40 to 60 % a persons with traumatic spinal cord injury, have a concurrent brain injury which can also make self-intermittent catheterization a difficult task to do efficiently to avoid complications such as missed catheterization resulting in urinary incontinence, skin integrity issues, and autonomic dysreflexia.

The CAUTI prevention initiative, including early removal of indwelling catheters, can cause detrimental healthcare issues for persons with spinal cord injury, especially those with levels T6 and above secondary to autonomic dysreflexia. If catheters are removed in settings where healthcare providers have minimal or no education regarding neurogenic bladder and spinal cord injury, person with spinal cord injury may experience bladder over distension if not placed on a timely intermittent catheterization regimen and fluid schedule. This requires consultation of spinal cord injury providers to assist in the management of the persons with spinal cord injury and neurogenic bladder to avoid long term complications such as renal failure, autonomic dysreflexia that can cause stroke or death.

Systematic guidelines have been produced by the Paralyzed Veteran's Association, written by specialists in the field of spinal cord injury and urology. I, as a healthcare worker in the field of spinal cord injury, recommend that NQF work to create better alignment between the financial incentives and SCI-specific recommendations available in the evidence-based clinical practice guidelines.

0138: National Healthcare Safety Network (NHSN) Catheter-associated Urinary Tract Infection (CAUTI) Outcome Measure

Submitted by Suzanne Groah

First, let me commend NQF's dedication to quality improvement in healthcare.

The purpose of this comment is to support changes suggested by Dr Matthew Davis (with support from the American Spinal Injury Association, Advocacy Committee). As a clinician caring for people with spinal cord injury and a researcher studying urinary tract infection among people with spinal cord injury, it is important to consider the very different needs of this unique population. Because people with spinal cord injury largely have some degree of neurogenic bladder that requires some form of catheterization, indwelling urethral or suprapubic catheterization have a very important role. This is especially important for those with limited hand function and/or caregiver support, which may limit or preclude the use of intermittent catheterization, those with body habitus or other injuries that makes intermittent catheterization difficult or impossible, skin breakdown such that maintenance of dry/incontinence-free

skin is of utmost importance for healing, and other factors. In these (and other) situations, indwelling catheterization has an important role for these patients.

Moreover, a systematic review (with expert consensus), of which I was a lead author (Paralyzed Veterans of America Consortium Guideline) did NOT confirm that the risk of UTI is necessarily higher for a particular type of bladder management of neurogenic bladder (indwelling urethral versus intermittent urethral catheterization). Rather, our clinical experience supports this finding that innate factors and catheterization technique and care are important contributors to UTI risk.

In the past few years, with the CAUTI prevention initiatives leading to early removal of indwelling catheters, we (myself and colleagues) have seen detrimental effects in the SCI population. Very early urethral catheter removal in a patient with new neurogenic bladder requires significant time and attention to balance fluid intake with output, while avoiding incontinence (putting a patient at risk for skin breakdown), excessive urinary retention, and low pressures. I and others have seen firsthand the results of an inability to attend to ALL of the individual's genitourinary needs in this tenuous period, with resulting more frequent UTIs, kidney infections, renal failure and (potentially deadly) autonomic dysreflexia.

Due to the very unique and complex needs of patients with SCI (of whom the vast majority have neurogenic bladder), I recommend that NQF work to create better alignment between the financial incentives and SCI-specific recommendations available in the evidence-based clinical practice guidelines.

0138: National Healthcare Safety Network (NHSN) Catheter-associated Urinary Tract Infection (CAUTI) Outcome Measure

Submitted by Sushil Singla, MD

The NQF is to be commended for its dedication to Quality Improvement in healthcare, as well as its strong commitment to patient-centeredness, consensus-building, and protection of vulnerable populations. Foley catheter removal in patients with neurogenic bladder due to Spinal Cord Injury (SCI) can have extremely negative consequences on genitourinary system health and function, and place patients at undue risk of life-threatening outcomes such as renal failure and autonomic dysreflexia. Additionally, Foley removal carries important implications regarding independence, quality of life, and transition from hospital to home. Furthermore, the benefit of reducing Foley-related UTIs is tempered by increased risk of UTIs due to intermittent catheterization, which go unmeasured. These complexities are acknowledged in clinical practice guidelines from the Consortium for Spinal Cord Medicine, the American Urological Association, and the CDC. Given these guideline-driven principles, it is unreasonable to require that healthcare providers for small patient populations produce definitive proof of harm from a quality measure before a careful analysis of risks and benefits is done. As a healthcare professional who cares for patients with SCI, I am requesting that the NQF work to create better alignment between the financial incentives and SCI-specific recommendations in evidence-based clinical practice guidelines.

0138: National Healthcare Safety Network (NHSN) Catheter-associated Urinary Tract Infection (CAUTI) Outcome Measure

Submitted by Dr. Matthew Davis, MD

As our healthcare system transitions toward value-based care, the NQF has been charged with maintaining a difficult balance between patient safety, patient-centered care, consensus-building, and

protecting vulnerable populations. This is a prodigious undertaking, and the NQF has shown a strong commitment. Any worthwhile change will meet resistance, and this transition is no exception.

Among the various groups clamoring for special consideration, how do we differentiate between those who are merely resistant to change and those who truly merit unique consideration? If we open the door to special treatment for one group, how do we close that door to other, less-deserving groups? These are important concerns that should not be taken lightly.

Following the CAUTI measure's transition to "pay for performance" status, healthcare providers for patients with Spinal Cord Injury (SCI) began reporting Patient Safety Events related to aberrant bladder management practices in facilities that lack expertise in SCI – where most of these patients begin their medical journey. We have also raised concerns about patient-centered care, quality of life, and measure validity for this population.

As the Patient Safety Standing Committee reviews this measure for re-endorsement, I am requesting that you consider this specific population in discussing each of the 5 Measure Evaluation Criteria:

1) Importance: Is there a reliable way to reduce CAUTIs in SCI patients without also adding risk? Given that we are not tracking UTIs related to intermittent catheterization, how confident are we that we're reducing overall UTI rates at all? How much room for improvement is really available for this population? Is that improvement worth the risk?

2) Reliability/Validity: How accurate is this definition of "UTI" for a population of chronically-catheterized patients who have altered temperature regulation, lack sensation, and are susceptible to a variety of other infections? Would this definition of UTI be considered acceptable if we were considering using it in a study in to be published in an SCI journal?

3) Use: If SCI specialty-centers that exercise judicious, patient-centered catheter use are more likely to be penalized than hospitals that indiscriminately remove catheters, how accurately does this measure reflect Quality of Care and Accountability?

4) Usability: How do we track the effects of unintended consequences, the most serious of which would be expected to fully manifest after discharge? How confident are we that the benefits for this population outweigh the risks?

5) Comparison to Related Measures: The developers of NQF measure #686 excluded SCI patients due to concerns about patient safety and Autonomic Dysreflexia. Similarly, the CDC CAUTI guidelines contain special mention of SCI, acknowledge a trade-off between benefits and harms, and recommend non-enforcement in this population. How do we reconcile these differences with the incentives associated with the CAUTI measure in its current form?

There is no shortage of relevant, SCI-specific literature covering each of the above topics. We are eager to delve into this body of literature with you.

About Consensus: Last year, we submitted a letter requesting a review of Risks and Benefits of this current form of CAUTI surveillance for patients with SCI. This letter was cosigned by national organizations representing SCI patients and virtually every specialty healthcare discipline that cares for these patients clinically – including several organizational members of the NQF.

SCI presents unique challenges with bladder management, and the stakes are high if the bladder is not handled in a safe manner after the Foley is removed. Unfortunately, the non-specialty hospitals in which SCI patients begin their care are untrained in detecting, preventing, and treating these adverse events (no, a bladder scanner is not sufficient …). These hospitals now have an incentive to take ownership over a complex process but lack an appreciation of its complexity, patient safety hazards, or implications on independence and quality of life.

Imagine, for a moment, that you visited a family member in the hospital and discovered that a surgery resident had performed an aneurism repair without an attending Cardiovascular Surgeon present. Imagine that this occurred in an operating room that lacked appropriate equipment and specialty surgical staff experienced in monitoring and managing the complications unique to that surgery. You have no way of knowing if the surgery was done well, whether any sequelae that occur after discharge might have been related to inadequate training, whether the Informed Consent form provided an accurate description of risks, benefits, and alternatives to surgery.

- We see an analogous process occurring for SCI patients in many settings today.

- We have a quality measure that gives high scores to hospitals that indiscriminately remove catheters and penalizes the hospitals that have sufficient expertise to understand independence and quality of life for SCI patients.

Change is hard.

Review of the literature is time-consuming and often confusing.

It's intimidating to consider opening the door to the uncertainty that accompanies the type of policy change we are requesting.

If we choose not to delve deeply into these uncomfortable issues, how can we be confident that small, under-represented patient populations with complex needs won't see more harm than good from this system of Quality Measures?

0138: National Healthcare Safety Network (NHSN) Catheter-associated Urinary Tract Infection (CAUTI) Outcome Measure

Submitted by Dr. Jeremy Furniss, OTD, OTR/L, BCG

The American Occupational Therapy Association appreciates the opportunity to comment on Measure 0138. This measure has fueled improvement in care quality and processes achieving a rate of just 0.88 in 2017. The measure has seemingly prevented unneeded care and improved outcomes for many people who receive care.

As the incidence of CAUTIs get smaller, the potential for unintended consequences for small populations increases because facilities and organizations work to decrease already small numbers to achieve pay for performance targets. Therefore, AOTA encourages the committee to undertake a comprehensive discussion on potential unintended consequences of the measure as specified.

Maintaining an indwelling catheter can mean maintaining functional independence and control of one's life for some with a spinal cord injury. Being able to independently transfer in any given public restroom, complete toileting and hygiene, and manage clothing is out of reach for some. However, with the right adaptations, someone who is unable to independently toilet is often still able to engage in community mobility (drive or public transit), participate in work, and socialize. With an indwelling catheter, this person is able to participate in life. However, without an indwelling catheter, this person is dependent on a personal care aide, a friend, or even a colleague to participate in these daily activities. This reliance on others for such a personal task can mean the difference between full engagement and avoiding any extended time outside of their home at all costs.

In an effort to provide the best care possible, organizations without specialty spinal cord experience, may remove indwelling catheters to prevent potential CAUTIs. This well-meaning action may mean that after completing a hospital stay and recovering from the acute condition, this person is again home bound until they are able to get back to a specialist. In the worst cases, complications related to

neurogenic bladder may arise. AOTA believes that it is important to understand and have a meaningful discussion around the potential for unintended consequences. We appreciate the meaningful gains and improved quality of care that have resulted from Measure 0138. But as the measure performance approaches a rate of 0, the potential for unintended consequences in small populations should be considered thoroughly.

0138: National Healthcare Safety Network (NHSN) Catheter-associated Urinary Tract Infection (CAUTI) Outcome Measure

Submitted by Camilo Castillo

CAUTI issues in spinal cord injury (SCI) patients

SCI may result in severe impairment of motor, sensory, and autonomous functions. SCI does not affect only the bladder but also limits activities due to immobility and difficulty in self-care. Appropriate treatment for neurogenic bladder helps to protect the integrity of the upper urinary tract and the renal function. However, and due to participation restrictions influenced by environmental factors, e.g. accessibility and availability of adaptive equipment and support, bladder management for an individual with SCI must not be chosen based on one data alone without considering biopsychosocial factors that need be considered in every decision. Because dedicated SCI care achieves better outcomes than general, nonspecialized care, before removing a Foley catheter in a patient with SCI an integrative and comprehensive care involving multidisciplinary teams under the supervision of a physiatrist should be established. To illustrate this better, a patient with high cervical level of injury may need assistant with internment catheterization and they may not be suitable for returning to work, thus another type of bladder management may be selected. In conclusion, bladder management in SCI should be tailored to the patient's level of function and severity and not only based on generalizations and guidelines that may not be applicable to this population. thank you!

3498e: Hospital Harm - Pressure Injury

Janet Cuddigan, National Pressure Ulcer Advisory Panel; Submitted by Ana Mattson

The Public Policy Committee and the Board of Directors of the National Pressure Ulcer Advisory Panel (NPUAP), are reaching out to you in response to the open comment period for Measures #3498e titled "Hospital Harm Pressure Injury".

The NPUAP is an independent, not-for-profit professional organization dedicated to the prevention and management of pressure injuries. Formed in 1987, the NPUAP Board of Directors is composed of leading experts from diverse health care disciplines—all of whom share a commitment to the prevention and management of pressure injuries. The NPUAP serves as a resource to health care professionals, government, the public, and health care agencies. The NPUAP welcomes and encourages the participation of those interested in pressure injury issues through the utilization of NPUAP educational materials, participation at national conferences, and support of efforts in public policy, education and research.

The NPUAP suggests that further clarification, research and/or edits for this measure would be beneficial pertaining to the following points:

• Proposed 24-hour time frame from admission to declare a hospital acquired pressure injury is not consistent with current science. ◦As the science surrounding the evolution of a Deep Tissue Pressure Injury (DTPI) continues to advance, it has been postulated that the appearance of a DTPI can take up to

48 hours or longer to manifest and become visible to the clinician. Therefore, a 24-hour timeframe to declare a pressure injury (specifically a deep tissue pressure injury) as hospital acquired may erroneously penalize institutions for pressure injuries that may have developed prior to admission, but are not visible to clinicians within 24 hours of admission.

◦Moreover, current and emerging technologies such as the use of infrared thermographic devices, ultrasound and subepidermal moisture devices support that changes in tissues may be developing below the skin surface, and before visible signs are present to the clinician. Thus, there are some pressure injuries that may actually be present on admission, however not visible within the first 24 hours.

◦Similarly, in darker pigmented skin, it may be difficult to visualize a potential deep tissue injury or Stage 1 pressure injury in its early stages, which can also contribute to the erroneous labelling of a hospital acquired pressure injury in these individuals, as skin changes may not be readily detected within the first 24 hours of the hospital admission.

◦Based on these clinical concerns, the NPUAP strongly believes that reconsideration for this 24 hour timeframe should be undertaken. A suggestion might be to have an algorithm that states Stage 2, 3, 4 & unstageable pressure injuries should be documented within 24 hours of admission. In the case of a DTPI, a 48-hour time frame or longer could be proposed in which the clinician would document the presence of a DTPI.

• The proposed e-measure lacks clear guidance as to where in the EMR the pressure injury documentation will be extracted. ◦It is unclear from the proposed measure where the information on pressure injury development to support the label of a hospital acquired pressure injury would be obtained within the EMR. In many EMR systems, there are multiple places to document a similar finding, leading to confusion and inconsistencies. This concern was supported by comments from the Meditech users in your beta site testing, who stated “documented in the wound field, making it impossible to distinguish a pressure injury from another type of wound.”

◦ Furthermore, it is unclear if this information will be extracted from a nursing flowsheet, admission assessment or from the provider/midlevel practitioner in free texted notes. Caution has been recommended when interpreting data from an operational EMR, as data inaccuracy, incompleteness or missing data are all consequences of the use of an EMR. (Hersh et al., 2013). Varied descriptions of data elements across multiple EMR vendors, variability in documentation style and multiple locations within the EMR in which to document clinical events such as pressure injuries all contribute to ambiguity in data interpretation.

◦The proposed measure lacks clear direction as to the location in the EMR the stage of pressure injury will be pulled. Accurate staging of pressure injuries has been a concern for decades and this concern crosses all disciplines. Studies evaluating clinician knowledge of pressure injury staging using a standardized tool have found that nurses consistently score in the “C” to “C+” range with similar results for physicians. While some facilities allow RNs to stage pressure injuries, others do not. Lack of the availability of a wound care clinician to corroborate or assign a pressure injury stage can lead to erroneous staging, thus inaccurate documentation. Institutions that lack wound care clinicians will be placed at a clear disadvantage as a result of this proposed measure. These concerns are corroborated with your beta test sites as it was noted that there was difficulty determining pressure injury stage from the documentation and concerns were raised regarding the accuracy of the pressure injury staging, especially in hospitals that did not have the availability of a wound care clinician to determine the stage the pressure injury.

• The NPUAP has concerns related to the validity and reliability of the proposed measure based on the scorecard results provided and previous experiences in developing pressure injury e-measures (Warren & Dunton, 2014). ◦Overall, according to the summary scorecard, data accuracy for pressure injury date

and time was identified as 0% and pressure injury stage was identified at 33%. The reliability and validity of the information extracted for this proposed measure is therefore a concern. It is clear that there remains much work to be done across the United States with respect to the accuracy of pressure injury staging and documentation before an e-measure such as the one proposed can be initiated.

◦At the NPUAP, one of our primary goals is to provide pressure injury education to all disciplines, across all types of health care settings and perhaps this issue warrants more attention on a national level for which the NPUAP could be a lead partner.

The NPUAP would be happy to continue our ongoing collaboration with the NQF and CMS to support the educational needs associated with the full understanding of these terms and measures necessary for accurate clinical classification/staging. Thank you for the opportunity to comment.

Sincerely,

Sarah Holden-Mount, PT, CWS

Public Policy Chair

Janet Cuddigan, PhD, RN, CWCN, FAAN

President

3498e: Hospital Harm - Pressure Injury

Sarah Holden-Mount, National Pressure Ulcer Advisory Panel; Submitted by Ana Mattson

The Public Policy Committee and the Board of Directors of the National Pressure Ulcer Advisory Panel (NPUAP), are reaching out to you in response to the open comment period for Measures #3498e titled "Hospital Harm Pressure Injury".

The NPUAP is an independent, not-for-profit professional organization dedicated to the prevention and management of pressure injuries. Formed in 1987, the NPUAP Board of Directors is composed of leading experts from diverse health care disciplines—all of whom share a commitment to the prevention and management of pressure injuries. The NPUAP serves as a resource to health care professionals, government, the public, and health care agencies. The NPUAP welcomes and encourages the participation of those interested in pressure injury issues through the utilization of NPUAP educational materials, participation at national conferences, and support of efforts in public policy, education and research.

The NPUAP suggests that further clarification, research and/or edits for this measure would be beneficial pertaining to the following points:

• Proposed 24-hour time frame from admission to declare a hospital acquired pressure injury is not consistent with current science. ◦As the science surrounding the evolution of a Deep Tissue Pressure Injury (DTPI) continues to advance, it has been postulated that the appearance of a DTPI can take up to 48 hours or longer to manifest and become visible to the clinician. Therefore, a 24-hour timeframe to declare a pressure injury (specifically a deep tissue pressure injury) as hospital acquired may erroneously penalize institutions for pressure injuries that may have developed prior to admission, but are not visible to clinicians within 24 hours of admission.

◦Moreover, current and emerging technologies such as the use of infrared thermographic devices, ultrasound and subepidermal moisture devices support that changes in tissues may be developing below the skin surface, and before visible signs are present to the clinician. Thus, there are some pressure injuries that may actually be present on admission, however not visible within the first 24 hours.

◦Similarly, in darker pigmented skin, it may be difficult to visualize a potential deep tissue injury or Stage 1 pressure injury in its early stages, which can also contribute to the erroneous labelling of a hospital acquired pressure injury in these individuals, as skin changes may not be readily detected within the first 24 hours of the hospital admission.

◦Based on these clinical concerns, the NPUAP strongly believes that reconsideration for this 24 hour timeframe should be undertaken. A suggestion might be to have an algorithm that states Stage 2, 3, 4 & unstageable pressure injuries should be documented within 24 hours of admission. In the case of a DTPI, a 48-hour time frame or longer could be proposed in which the clinician would document the presence of a DTPI.

• The proposed e-measure lacks clear guidance as to where in the EMR the pressure injury documentation will be extracted. ◦It is unclear from the proposed measure where the information on pressure injury development to support the label of a hospital acquired pressure injury would be obtained within the EMR. In many EMR systems, there are multiple places to document a similar finding, leading to confusion and inconsistencies. This concern was supported by comments from the Meditech users in your beta site testing, who stated “documented in the wound field, making it impossible to distinguish a pressure injury from another type of wound.”

◦ Furthermore, it is unclear if this information will be extracted from a nursing flowsheet, admission assessment or from the provider/midlevel practitioner in free texted notes. Caution has been recommended when interpreting data from an operational EMR, as data inaccuracy, incompleteness or missing data are all consequences of the use of an EMR. (Hersh et al., 2013). Varied descriptions of data elements across multiple EMR vendors, variability in documentation style and multiple locations within the EMR in which to document clinical events such as pressure injuries all contribute to ambiguity in data interpretation.

◦The proposed measure lacks clear direction as to the location in the EMR the stage of pressure injury will be pulled. Accurate staging of pressure injuries has been a concern for decades and this concern crosses all disciplines. Studies evaluating clinician knowledge of pressure injury staging using a standardized tool have found that nurses consistently score in the “C” to “C+” range with similar results for physicians. While some facilities allow RNs to stage pressure injuries, others do not. Lack of the availability of a wound care clinician to corroborate or assign a pressure injury stage can lead to erroneous staging, thus inaccurate documentation. Institutions that lack wound care clinicians will be placed at a clear disadvantage as a result of this proposed measure. These concerns are corroborated with your beta test sites as it was noted that there was difficulty determining pressure injury stage from the documentation and concerns were raised regarding the accuracy of the pressure injury staging, especially in hospitals that did not have the availability of a wound care clinician to determine the stage the pressure injury.

• The NPUAP has concerns related to the validity and reliability of the proposed measure based on the scorecard results provided and previous experiences in developing pressure injury e-measures (Warren & Dunton, 2014). ◦Overall, according to the summary scorecard, data accuracy for pressure injury date and time was identified as 0% and pressure injury stage was identified at 33%. The reliability and validity of the information extracted for this proposed measure is therefore a concern. It is clear that there remains much work to be done across the United States with respect to the accuracy of pressure injury staging and documentation before an e-measure such as the one proposed can be initiated.

◦At the NPUAP, one of our primary goals is to provide pressure injury education to all disciplines, across all types of health care settings and perhaps this issue warrants more attention on a national level for which the NPUAP could be a lead partner.

The NPUAP would be happy to continue our ongoing collaboration with the NQF and CMS to support the educational needs associated with the full understanding of these terms and measures necessary for accurate clinical classification/staging. Thank you for the opportunity to comment.

3498e: Hospital Harm - Pressure Injury

Submitted by Dr. Kevin T. Kavanagh, MD, MS

Importance: According to AHRQ Partnership For Patients' Program, pressure injuries are the second most common adverse event behind drug events. Thus, having a usable metric for this patient safety event is imperative. It needs to be stressed this is an important "replacement metric" closing an important patient safety measurement "gap," since the impact of the current PSI-90 pressure injury metric (PSI 03) has been mitigated due to concerns regarding its use of administrative data and its validity.

Pressure Injury should be viewed as 100% preventable and aggressive preventative strategies should be implemented in all at-risk patients, not just those showing signs of impending ulcers. These include, mattress cushions, turning the patient every 2 hours and preemptively padding areas which are prone to form ulcers. Thus, whether or not a Stage I injury is present, prompt preventative strategies on all at-risk patients should prevent progression in the vast majority of patients.

Advantages of the Replacement Metric: One of the major advantages of the proposed metric is that it utilizes EMR and not Administrative Billing Data. The latter has long been held by the industry as having a low validity. In addition, the definition of the metric has been changed. It now measures injury with any skin breakdown (Stage II, III, and IV pressure injuries), avoiding a subjective judgement on the depth of the ulcer. Thus, when drainage is observed or when there is lack of skin integrity an event will be captured. (Note: Stage I injury is a discoloration of skin without skin breakdown).

The current PSI 03 metric only reports Stage III and IV pressure injuries, which when entering data into the EMR requires a subjective judgement on depth in the differentiation of Stage II and Stage III. Such a judgement would be expected to require additional training and the metric would be expected to have decreased validity and reliability. In addition, it does not measure all pressure ulcers, since Stage 2 ulcers are not captured.

Burden: There should be little burden on the facility, since the EMR systems can be used to captures the events. Thus, the burden should be similar to that of the original PSI 03 metric.

Disparities: Disparities is an important issue. In pressure injuries, healthcare resources and socioeconomic factors are of paramount importance and should not be mathematically negated but instead corrected. Stage II, III and IV pressure ulcers which are present on or develop within 24 hours of admission are captured. The 24-hour grace period will allow for identification of latent pressure injury. This should correct for preadmission ulcer formation caused by access and socioeconomic disparities. In a study of nursing home residents, Park Lee, et al, in a NCHS Data Brief reviewed over 159,000 nursing home residents and found that "Pressure ulcer prevalence varied by age, sex, and length of time since admission to the nursing home, but not by race." https://www.cdc.gov/nchs/data/databriefs/db14.pdf

National Quality Forum
1099 14th St NW, Suite 500
Washington, DC 20005
http://www.qualityforum.org