Memo



October 21, 2019

To: Consensus Standards Approval Committee (CSAC)

From: Patient Safety Project Team

Re: Patient Safety Spring 2019 Review Cycle

CSAC Action Required

The CSAC will review recommendations from the Patient Safety Standing Committee at its October 21-22 meeting and vote on whether to uphold the recommendations from the Committee.

This memo includes a summary of the project, measure recommendations, themes identified, responses to the public and member comments, and results from the NQF member expression of support. The following documents accompany this memo:

- Patient Safety Spring 2019 Cycle Draft Report. The draft report has been updated to
 reflect the changes made following the Standing Committee's discussion of public and
 member comments. The complete draft report and supplemental materials are available
 on the project webpage.
- 2. <u>Comment Table</u>. This table lists 19 comments received during the post-meeting comment period and the NQF/Standing Committee responses.

Background

During this review cycle, the Patient Safety Standing Committee reviewed 11 measures during the June/July 2019 measure evaluation meetings. Nine were recommended for endorsement, one was not recommended for endorsement, and one measure was withdrawn by the developer.

Draft Report

The Patient Safety Spring 2019 Cycle draft report presents the results of the evaluation of 11 measures considered under the Consensus Development Process (CDP). Ten measures were recommended for endorsement, and one measure was not recommended.

The measures were evaluated against the 2018 version of the measure evaluation criteria.

	Maintenance	New	Total
Measures under consideration	6	5	11
Measures recommended for endorsement	6	3	9

	Maintenance	New	Total
Measures not recommended for endorsement	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Measures withdrawn from consideration	0	1	1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 – N/A Competing Measure – N/A	Importance - 1 Scientific Acceptability - X Use - X Overall - X Competing Measure – X	

CSAC Action Required

Pursuant to the CDP, the CSAC is asked to consider endorsement of candidate consensus measures.

Measures Recommended for Endorsement

- 0138 National Healthcare Safety Network (NHSN) Catheter-associated Urinary Tract Infection (CAUTI) Outcome Measure (Centers for Disease Control and Prevention)
 Overall Suitability for Endorsement: Yes-13; No- 5
- 0139 National Healthcare Safety Network (NHSN) Central line-associated Bloodstream Infection (CLABSI) Outcome Measure (Centers for Disease Control and Prevention)
 Overall Suitability for Endorsement: Yes-20; No-0
- 0204 Skill mix (Registered Nurse [RN], Licensed Vocational/Practical Nurse [LVN/LPN], unlicensed assistive personnel [UAP], and contract) (American Nurses Association)
 Overall Suitability for Endorsement: Yes- 19; No- 1
- 0205 Nursing Hours per Patient Day (American Nurses Association)
 Overall Suitability for Endorsement: Yes- 18; No- 1
- 2720 National Healthcare Safety Network (NHSN) Antimicrobial Use Measure (Centers for Disease Control and Prevention)
 Overall Suitability for Endorsement: Yes- 15; No- 2
- 2726 Prevention of Central Venous Catheter (CVC)-Related Bloodstream Infections (American Society of Anesthesiologists)
 Overall Suitability for Endorsement: Yes-18; No-2
- 3502 Hybrid Hospital-Wide (All-Condition, All-Procedure) Risk-Standardized Mortality Measure (CMS/Yale-CORE)
 Overall Suitability for Endorsement: Yes- 16; No- 1

- 3503e Hospital Harm Severe Hypoglycemia (CMS/IMPAQ International)
 Overall Suitability for Endorsement: Yes- 19; No- 0
- 3504 Claims-Only Hospital-Wide (All-Condition, All-Procedure) Risk-Standardized Mortality Measure (CMS/Yale-CORE)
 Overall Suitability for Endorsement: Yes-17; No- 1

Measure Not Recommended for Endorsement

(See Appendix B for the Committee's votes and rationale)

• <u>3501e</u> Hospital Harm – Opioid-Related Adverse Events (CMS/IMPAQ International)

Measure Withdrawn from Consideration

3498e Hospital Harm – Pressure Injury (CMS/IMPAQ International)
 Overall Suitability for Endorsement: Yes- 19; No- 0

Comments and Their Disposition

NQF received 19 comments from 4 organizations (all were member organizations) and individuals pertaining to the draft report and measures under consideration.

A <u>table of comments</u> submitted during the comment period, with the responses to each comment and the actions taken by the Standing Committee and measure developers, is posted to the <u>Patient Safety project webpage</u>.

Comment Themes and Committee Responses

Comments about specific measure specifications and rationale were forwarded to the developers, who were invited to respond.

The Standing Committee reviewed all of the submitted comments and developer responses. Committee members focused their discussion on measures or topic areas with the most significant and recurring issues.

Measure-Specific Comments

The Committee discussion focused on measure #0138 during the September 18 post-comment call. The Committee reviewed the public comments submitted for the remaining measures but had no significant discussion or reconsideration of their previous recommendations.

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

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 reexamined 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.

Measure Steward/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.

Committee Response:

On its post-comment call, the Committee reviewed submitted comments and heard once more from the developer and representatives from the SCI community who had raised concerns about 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. After Committee discussion, the Committee re-voted on the validity criterion. The Committee passed the measure on the validity criterion and overall recommendation for NQF endorsement.

0139 National Healthcare Safety Network (NHSN) Central Line-Associated Bloodstream Infection (CLABSI) Outcome Measure

One commenter expressed the same concern about the validity testing for this measure as explained above 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.

Measure Steward/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.

Committee Response:

Thank you for your comment. The Committee reviewed this comment during its deliberations on the Post-Comment Call scheduled on September 18, 2019. The Committee overall was satisfied with the developers' written response and felt the Committee adequately discussed and addressed the concern in this public comment at the measure evaluation meetings in June/July 2019. The Committee did not elect to reconsider any of their previous decisions and recommended continued endorsement.

2720 National Healthcare Safety Network (NHSN) Antimicrobial Use Measure

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 feel the measure should maintain endorsement.

Measure Steward/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 interinstitutional 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 reendorsement 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.

Committee Response:

Thank you for your comments. The Committee reviewed these comments during its deliberations on the Post-Comment Call scheduled on September 18, 2019. The Committee overall were satisfied with the developers' written responses and felt the Committee adequately discussed and addressed the concerns in these public comments at the measure evaluation meetings in June/July 2019. The Committee did not elect to reconsider any of their previous decisions and recommended continued endorsement.

3498e Hospital Harm – Pressure Injury

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. Following the September 18 Post-Comment call, the developer decided to withdraw this measure from consideration.

Measure Steward/Developer Responses:

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.

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.

NQF Response:

Thank you for your comments. The developer has withdrawn this measure from endorsement consideration at this time.

3501e Hospital Harm – Opioid-Related Adverse Events

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.

Measure Steward/Developer Responses:

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.

Committee Response:

Thank you for your supportive comments. The Committee reviewed these comments during its deliberations on the Post-Comment Call scheduled on September 18, 2019. The Committee did not elect to reconsider any of their previous decisions and maintained their recommendation not to endorse this measure.

3502 Hybrid Hospital-wide (All-Condition, All-Procedure) Risk-standardized Mortality Measure and 3504: Claims-only Hospital-wide (All-Condition, All-Procedure) Risk-standardized Mortality Measure

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.

Measure Steward/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 conditionand 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 conditionand procedure-specific measures.

Committee Response:

Thank you for your comments. The Committee reviewed these comments during its deliberations on the Post-Comment Call scheduled on September 18, 2019. The Committee overall were satisfied with the developers' written responses and felt the Committee adequately discussed and addressed the concerns in these public comments at the measure evaluation meetings in June/July 2019. The Committee did not elect to reconsider any of their previous decisions and recommended these measures for endorsement.

3503e Hospital Harm – Severe Hypoglycemia

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.

Measure Steward/Developer Responses:

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.

Committee Response:

Thank you for your comments. The Committee reviewed these comments during its deliberations on the Post-Comment Call scheduled on September 18, 2019. The Committee overall were satisfied with the developers' written responses and felt the Committee adequately discussed and addressed the concerns in these public comments at the measure evaluation meetings in June/July 2019. The Committee did not elect to reconsider any of their previous decisions and recommended continued endorsement.

Member Expression of Support

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. Appendix C details the expression of support.

Appendix A: CSAC Checklist

The table below lists the key considerations to inform the CSAC's review of the measures submitted for endorsement consideration.

Key Consideration	Yes/No	Notes
Were there any process concerns raised during the CDP project? If so, briefly explain.	No	
Did the Standing Committee receive requests for reconsideration? If so, briefly explain.	No	There were no reconsideration requests. 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 anticipated substantive changes.
Did the Standing Committee overturn any of the Scientific Methods Panel's ratings of Scientific Acceptability? If so, state the measure and why the measure was overturned.	No	
If a recommended measure is a related and/or competing measure, was a rationale provided for the Standing Committee's recommendation? If not, briefly explain.	No	There were no competing measures. The related measures did not warrant further Committee discussion in regard to best-in-class.
Were any measurement gap areas addressed? If so, identify the areas.	No	
Are there additional concerns that require CSAC discussion? If so, briefly explain.	Yes	There was significant discussion and comments on measure 0138 National Healthcare Safety Network (NHSN) Catheter-associated Urinary Tract Infection (CAUTI) Outcome Measure. A number of representatives of the spinal cord injury (SCI) physician community submitted comments and/or attended the Committee meetings 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. The Committee

	originally did not reach consensus on validity at the measure evaluation meeting. After thoughtful review of the public comments and responses from the developer on the September 18 post-Comment call, the Committee passed the measure on validity and recommended the measure for overall endorsement.
--	--

Appendix B: Measures Not Recommended for Endorsement

The table below lists the Committee's vote and rationale for the measure not recommended for endorsement.

Legend: H = High; M = Moderate; L = Low; I = Insufficient

Measure	Voting Results	Standing Committee Rationale
3501 Hospital Harm-Opioid-Related Adverse Events (CMS/IMPAQ International)	Evidence Pass- 18; No Pass- 1 Gap H-1; M-5; L-4; I-9	The Committee raised several concerns with this measure. First was whether naloxone use is a good proxy for opioid-related harm for this measure. There was concern that naloxone can be used as empiric therapy 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 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 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.

Appendix C: NQF Member Expression of Support Results

Three NQF members provided their expressions of support/nonsupport. One of the eleven measures under consideration received support, while eight measures received an expression of "do not support." Results for each measure are provided below.

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

Member Council	Support	Do Not Support	Total
Health Professional	1	1	2
Provider Organization	0	1	1

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

Member Council	Support	Do Not Support	Total
Provider Organization	0	1	1

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

Member Council	Support	Do Not Support	Total
Provider Organization	0	1	1

3498e Hospital Harm – Pressure Injury (CMS/IMPAQ International) (*The developer has withdrawn this measure from consideration*)

Member Council	Support	Do Not Support	Total
Provider Organization	0	1	1

3501e Hospital Harm - Opioid-Related Adverse Events (CMS/IMPAQ International)

Member Council	Support	Do Not Support	Total
Provider Organization	0	1	1

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

Member Council	Support	Do Not Support	Total
Provider Organization	0	1	1

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

Member Council	Support	Do Not Support	Total
Provider Organization	0	1	1

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

Member Council	Support	Do Not Support	Total
Provider Organization	0	1	1

Appendix D: Details of Measure Evaluation

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

Measures Recommended

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. "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
 - o Proper techniques for urinary catheter insertion
 - o 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: <u>The measure meets the Scientific</u> 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

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 SCO 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
 - o 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: Y-X; N-X Rationale

7. Public and Member Comment

- e 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: Y-X; N-X

9. Appeals

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

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

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
 - o 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
 - o 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: <u>The measure meets the Scientific</u> 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
 - o 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: Y-20; N-0

<u>Rationale</u>

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: Y-X; N-X

9. Appeals

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: <u>The measure meets the Scientific</u> 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-1**9; **No Pass-1** 4b. Usability: **H-1**; **M-1**8; **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: Y-19; N-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: Y-X; N-X

9. Appeals

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: <u>The measure meets the Scientific Acceptability criteria</u>

(2a. Reliability - precise specifications, testing; 2b. Validity - testing, threats to validity) 2a. Reliability: H-3; M-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: Y-18; N-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: Y-X; N-X

9. Appeals

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</u> Acceptability criteria

(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**Rationale:

- 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)

Rationale:

- 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 Rationale:

- 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: Y-15; N-2 Rationale

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 feel 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: Y-X; N-X
- 9. Appeals

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</u> Acceptability criteria

(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**Rationale:

- 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)

Rationale:

- 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 Rationale:

• 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: Y-18; N-2 Rationale

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: Y-X; N-X

9. Appeals

3498e Hospital Harm - Pressure Injury (Withdrawn from Consideration)

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: Y-19; N-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 for consideration 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: Y-X; N-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 substantive anticipated changes. This measure will not move forward to CSAC.

9. Appeals

 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.
 This measure will not move forward to appeals period.

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

- 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:
 - 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;
- 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: <u>The measure meets the Scientific</u> 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.

(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)
 - o 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: Y-16; N-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 conditionand 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 conditionand procedure-specific measures.

8. Consensus Standards Approval Committee (CSAC) Vote: Y-X; N-X

9. Appeals

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 evidencebased 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: <u>The measure meets the Scientific</u> 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: Y-X; N-X

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: Y-X; N-X

9. Appeals

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: <u>The measure meets the Scientific</u> 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:
 - o 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)
 - o NQF 0530: AHRQ's Mortality for Select Conditions
- The developer states specification differences are justified.

6. Standing Committee Recommendation for Endorsement: Y-17; N-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: Y-X; N-X

9. Appeals

Measure Not Recommended

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 to begin with.
- 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 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 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**

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)

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

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 the 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.

9. Appeals



Patient Safety Spring 2019 Review Cycle

CSAC Review and Endorsement

October 21-22, 2019

Patient Safety Measures Portfolio

- 62 endorsed measures
 - 17 process measures
 - 3 structure measures
 - 37 outcome measures
 - 2 immediate outcome measures
 - 3 composite 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

Standing Committee Recommendations

- 9 measures recommended for endorsement
 - 3 new measures
 - 6 maintenance measures
- 1 new measure not recommended for endorsement
 - #3501e Hospital Harm Opioid-Related Adverse Events
- 1 new measure withdrawn by developer
 - #3498e Hospital Harm Pressure Injury
- 7 measures reviewed by the SMP

Overarching Issues

- The Importance of Unintended Consequences
- Ensuring Maintenance Measures Are in Use
- Focus on Feasibility of Novel eCQMs
- Transparency of Measure Results

Public and Member Comment and Member Expressions of Support

- 19 number of comments received
 - Eight public comments were received for measure #0138
 - The comments for the remaining ten measures addressed a wide variety of areas including:
 - » support of the Committee's recommendation;
 - » appropriateness of validity testing;
 - » suggested improvements in the risk adjustment or stratification approaches;
 - » concern if measure is capturing information in the electronic health record;
 - » and/or concern if measures are appropriate for accountability purposes
- Three NQF member of expressions of support received

Timeline and Next Steps

Process Step	Timeline
CSAC Review	October 21-22, 2019
Appeals Period (30 days)	October 30 - November 28, 2019

Questions?

- Project team:
 - Andrew Lyzenga, MPH, Senior Director
 - Nicolette Mehas, PharmD, Director
 - Hiral Dudhwala, RN, MSN/MPH, Project Manager
 - Desmirra Quinnonez, Project Analyst
- Project webpage:
 http://www.qualityforum.org/Patient Safety.aspx

Project email address :patientsafety@qualityforum.org

Patient Safety, Spring 2019 Review Cycle: CDP Report

DRAFT REPORT FOR CSAC REVIEW

October 21-22, 2019



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

Contents

Executive Summary	4
Introduction	6
NQF Portfolio of Performance Measures for Patient Safety Conditions	7
Table 1. NQF Patient Safety Portfolio of Measures	7
Patient Safety Measure Evaluation	7
Table 2. Patient Safety Measure Evaluation Summary	8
Comments Received Prior to Committee Evaluation	8
Comments Received After Committee Evaluation	8
Overarching Issues	9
Summary of Measure Evaluation	10
Measures Withdrawn from Consideration	19
Table 3. Measure Withdrawn from Consideration	19
References	20
Appendix A: Details of Measure Evaluation	21
Measures Recommended	21
0138 National Healthcare Safety Network (NHSN) Catheter-associated Urinary Tract Infection (CAUTI) Outcome Measure	21
0139 National Healthcare Safety Network (NHSN) Central line-associated Bloodstream Infection (CLABSI) Outcome Measure	26
0204 Skill mix (Registered Nurse [RN], Licensed Vocational/Practical Nurse [LVN/LPN], unlicensed assistive personnel [UAP], and contract)	29
0205 Nursing Hours per Patient Day	32
2720 National Healthcare Safety Network (NHSN) Antimicrobial Use Measure	35
2726 Prevention of Central Venous Catheter (CVC)-Related Bloodstream Infections	40
3498e Hospital Harm - Pressure Injury (Withdrawn from Consideration)	42
3502 Hybrid Hospital-Wide (All-Condition, All-Procedure) Risk-Standardized Mortality	4.0
Measure	
3504 Claims-Only Hospital-Wide (All-Condition, All-Procedure) Risk-Standardized Mortality	33
Measure	56
Measure Not Recommended	65
3501e Hospital Harm – Opioid-Related Adverse Events	65
Appendix B: Patient Safety Portfolio—Use in Federal Programs	68
Appendix C: Patient Safety Standing Committee and NQF Staff	71
Appendix D: Measure Specifications	74

Appendix F: Pre-E	valuation Comments	.356
Appendix E2: Rela	ated and Competing Measures (narrative format)	216
Appendix E1: Rela	ated and Competing Measures (tabular format)	126
	ims-Only Hospital-Wide (All-Condition, All-Procedure) Risk-Standardized Mortality	.119
3503e H	ospital Harm – Severe Hypoglycemia	.116
•	brid Hospital-Wide (All-Condition, All-Procedure) Risk-Standardized Mortality	.109
3498e H	ospital Harm - Pressure Injury	.107
2726 Pre	evention of Central Venous Catheter (CVC)-Related Bloodstream Infections	.104
2720 Na	tional Healthcare Safety Network (NHSN) Antimicrobial Use Measure	99
0205 Nu	rsing Hours per Patient Day	94
	ll mix (Registered Nurse [RN], Licensed Vocational/Practical Nurse [LVN/LPN], licensed assistive personnel [UAP], and contract)	88
	tional Healthcare Safety Network (NHSN) Central line-associated Bloodstream ection (CLABSI) Outcome Measure	79
	tional Healthcare Safety Network (NHSN) Catheter-associated Urinary Tract ection (CAUTI) Outcome Measure	74

Patient Safety, Spring 2019 Cycle

DRAFT REPORT FOR CSAC REVIEW

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, making them the third leading cause of death. 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 recommended nine measures for endorsement, did not recommend one measure, and one measure was withdrawn by the developer.

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

Introduction

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 AHRQ National Scorecard on Hospital-Acquired Conditions 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 reassessment of measures of nursing staffing, which 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 2015, 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 safety indicators followed.⁴ Another study found that most new nurses are working 12-hour shifts and approximately half work overtime, trends that have been fairly stable. 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. ^{5–8} These data demonstrate how quality measurement in the nursing working environment can drive improved safety.

NQF Portfolio of Performance Measures for Patient Safety Conditions

The Patient Safety Standing Committee (<u>Appendix C</u>) oversees NQF's portfolio of Patient Safety measures (<u>Appendix B</u>). 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 and outcomes 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 <u>standard measure</u> evaluation criteria.

Table 2. Patient Safety Measure Evaluation Summary

	Maintenance	New	Total
Measures under consideration	6	5	11
Measures recommended for endorsement	6	3	9
Measures where consensus is not yet reached	0	0	0
Measures not recommended for endorsement	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 <u>Quality Positioning System (QPS)</u>. 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 will close on August 26, 2019. As of June 5, 34 comments were submitted and shared with the Committee prior to the measure evaluation meetings (<u>Appendix F</u>). 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-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 <u>Appendix A</u>.

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 received support, while eight measures 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 for the CAUTI measure in a specific population: spinal cord injury patients. While there was agreement that the CAUTI 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 not passed by >60 percent of the Committee at the in-person meeting and will require subsequent discussion at the post-comment meeting in September.

Ensuring Maintenance Measures Are in Use

As the quality measurement enterprise has matured, scrutiny on maintenance measures has increased to ensure that they are in use and/or planned to be placed 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 regarding 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 scrutiny 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 <u>Appendix A</u>.

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

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 did not have 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): Recommended

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 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): Recommended

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): Recommended

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 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): Recommended

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): Recommended

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 stepdown 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 are 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): Recommended

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 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 their 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 eMeasure. 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): Recommended

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.

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): Recommended

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 represented a good assessment of quality of care, as this was seen as a preventable patient safety event when patients are on antihyperglycemics and have episodes of hypoglycemia. However, some were concerned that the measure did not apply to pediatric populations and 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 this measure. The Committee also discussed this measure's feasibility which was tested as an eMeasure in two separate EHRs and had few concerns. There are also recommendations by the Measure Applications Partnership (MAP) 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): Recommended

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 (starting with this measure). 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 patientrelated factors). The developer responded that the hospital-level effect is evident in the distribution rates across hospitals, and it 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.

Table 3. Measure Withdrawn from Consideration

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

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
 - o Proper techniques for urinary catheter insertion
 - o 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: <u>The measure meets the Scientific Acceptability</u> 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 SCO 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.

(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: Y-X; N-X

Rationale

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 reexamined 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: Y-X; N-X

9. Appeals

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

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

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
 - o 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: <u>The measure meets the Scientific Acceptability</u> 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: Y-20; N-0 Rationale

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.
 - O 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: Y-X; N-X

9. Appeals

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

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

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: <u>The measure meets the Scientific Acceptability</u> 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: Y-19; N-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: Y-X; N-X

9. Appeals

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 inpatient 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, perioperative 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: <u>The measure meets the Scientific Acceptability criteria</u>

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

2a. Reliability: H-3; M-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: Y-18; N-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: Y-X; N-X

9. Appeals

2720 National Healthcare Safety Network (NHSN) Antimicrobial Use Measure

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

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 stepdown 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

Rationale:

- 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)

Rationale:

- 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

Rationale:

- 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: Y-15; N-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: Y-X; N-X
- 9. Appeals

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

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.

^{**} Sterile ultrasound techniques require sterile gel and sterile probe covers

- 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

Rationale:

- 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)

Rationale:

- 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

Rationale:

• 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: Y-18; N-2

<u>Rationale</u>

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: Y-X; N-X
- 9. Appeals

3498e Hospital Harm - Pressure Injury (Withdrawn from Consideration)

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

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: Y-19; N-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 for consideration 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: Y-X; N-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 will not move forward to CSAC.

9. Appeals

 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. This measure will not move forward to appeals period.

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: <u>The measure meets the Scientific Acceptability</u> 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: Y-16; N-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: Y-X; N-X

9. Appeals

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: <u>The measure meets the Scientific Acceptability</u> 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: Y-X; N-X

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: Y-X; N-X

9. Appeals

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

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

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: <u>The measure meets the Scientific Acceptability</u> 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:
 - o 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: Y-17; N-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 conditionand 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 conditionand procedure-specific measures.

8. Consensus Standards Approval Committee (CSAC) Vote: Y-X; N-X

9. Appeals

Measure Not Recommended

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 to begin with.
- 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 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 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 the 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: Y-X; N-X

9. Appeals

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 (Proposed 2018)
0138	National Healthcare Safety Network (NHSN) Catheter-associated Urinary Tract	Hospital Acquired Condition Reduction Program (Implemented 2014)
	Infection (CAUTI) Outcome Measure	Inpatient Rehabilitation Facility Quality Reporting (Implemented 2014)
		Long-Term Care Hospital Quality Reporting (Implemented 2013)
0139	National Healthcare Safety Network (NHSN) Central line-associated	Hospital Acquired Condition Reduction Program (Implemented 2014)
	Bloodstream Infection (CLABSI) Outcome Measure	Hospital Inpatient Quality Reporting (Implemented 2013)
		Long-Term Care Hospital Quality Reporting (Implemented 2013)
0468	Hospital 30-Day, All-Cause, Risk-	Hospital Compare (Implemented 2010)
	Standardized Mortality Rate (RSMR) Following Pneumonia Hospitalization	Hospital Inpatient Quality Reporting (Implemented 2010/Scheduled Removal 2020)
		Hospital Value Base Purchasing (Implemented 2014)
0500	Severe Sepsis and Septic Shock:	Hospital Compare (Implemented 2016)
	Management Bundle	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)
0531	PSI 90: Patient Safety and Adverse Events Composite (Composite Measure)	Hospital Acquired Condition Reduction Program (Implemented 2017)
		Hospital Compare (Implemented 2014)
		Hospital Inpatient Quality Reporting (Implemented 2015/Scheduled Removal 2019)
		Hospital Value Base Purchasing (Implemented 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)

-

^a Per CMS Measures Inventory Tool as of 01/05/2019

NQF#	Title	Federal Programs: Implemented or Finalized
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 (Finalized 2016)
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 (Finalized 2016)
1365e	Child and Adolescent Major Depressive Disorder (MDD): Suicide Risk Assessment	Merit-Based Incentive Payment System (MIPS) Program (Finalized 2016)
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 (Finalized 2016)
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)

NQF#	Title	Federal Programs: Implemented or Finalized
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)
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 (Finalized 2016)
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 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 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
- 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

Copyright 2011, American Nurses Association. All Rights Reserved.

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, perioperative 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

Copyright 2011, American Nurses Association. All Rights Reserved.

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 Grampositive 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 hematologyoncology 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

COPYRIGHT:

The Measures are not clinical guidelines, do not establish a standard of medical care, and have not been tested for

all potential applications.

The Measures, while copyrighted, can be reproduced and distributed, without modification, for noncommercial purposes, eg, use by health care providers in connection with their practices. Commercial use is defined as the sale, license, or distribution of the Measures for commercial gain, or incorporation of the Measures into a product or service that is sold, licensed or distributed for commercial gain.

Commercial uses of the Measures require a license agreement between the user and the PCPI® Foundation (PCPI®) or ASA. Neither ASA, nor the American Medical Association (AMA), nor the

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. © 2017 PCPI® Foundation and American Society of Anesthesiologists. All Rights Reserved.

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.

CPT® contained in the Measures specifications is copyright 2004-2018 American Medical Association. LOINC® copyright 2004-2018 Regenstrief Institute, Inc. SNOMED CLINICAL TERMS (SNOMED CT®) copyright 2004-2018

The International Health Terminology Standards Development Organisation (IHTSDO). ICD-10 is copyright 2018 World Health Organization. All Rights Reserved.

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

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 CPT(R) contained in the Measure specifications is copyright 2004-2016 American Medical Association. LOINC(R) copyright 2004-2016 Regenstrief Institute, Inc. This material contains SNOMED Clinical Terms(R) (SNOMED CT[R]) copyright 2004-2016 International Health Terminology Standards Development Organisation. ICD-10 copyright 2016 World Health Organization. All Rights Reserved.

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.

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

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;
- 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.

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.

COPYRIGHT / DISCLAIMER

Limited proprietary coding is contained in the Measure specifications for user convenience. Users of proprietary code sets should obtain all necessary licenses from the owners of the code sets. CPT(R) contained in the Measure specifications is copyright 2004-2016 American Medical Association. LOINC(R) copyright 2004-2016 Regenstrief Institute, Inc. This material contains SNOMED Clinical Terms(R) (SNOMED CT[R]) copyright 2004-2016 International Health Terminology Standards Development Organisation. ICD-10 copyright 2016 World Health Organization. All Rights Reserved.

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.
- 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.

TYPF

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.
- 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.

COPYRIGHT / DISCLAIMER

Appendix E1: Related and Competing Measures (tabular format)

Comparison of NQF 3502, 1789, 1550, 0468, 1893, 2558, 0230, 0229, 2876, 0347 and 0530

		, ====, ====	, 2000, 0200, 0220,	, 2070, 0547 and 05.		
	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, including specifications, data used, and testing which reflect limitations of data availability, as well as actual intended differences in the measure, data, and testing that reflect limitations of data availability, as well as actual intended differences in the measure, data, and testing that reflect limitations in data availability 1. Dataset used for development, some testing (see	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 included in the measure cohort). A specified set of planned readmission outcome. CMS annually reports the measure for patients who are 65 years or older, are enrolled in fee-forservice (FFS) Medicare, and hospitalized pin non-federal hospitalized in non-federal hospit	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 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 feefor-service (FFS) beneficiaries and hospitalized in nonfederal 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 nonfederal 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.

NATIONAL QUALITY FORUM

NQF REVIEW DRAFT—Comments due by August 26, 2019 by 6:00 PM ET.

Differ for differences). An analysis of the control of the contro	below for differences, and the control of the contr	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	0468 Hospital 30-day, all-cause, risk- standardized mortality rate (RSMR) following pneumonia	1893 Hospital 30-Day, all-cause, risk- standardized mortality rate (RSMR) following chronic obstructive	2558 Hospital 30-Day, All- Cause, Risk-Standardized Mortality Rate (RSMR) Following Coronary Artery Bypass Graft
before for differencests.) and measure results. a. The casms first states were states. The states were states. First states were states. The hybrid electronic health record (sink) database from at negative states. The hybrid electronic health record (sink) database from at negative states. The hybrid results in the states of the states. The states of	below for differenced, and measure results. a. The calmission of the calmission of the appearance of the control of the calmission of the			and/or total knee	1103pitanzation	The state of the s	(CABG) Surgery
	when fully harmonized, prior to	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. Socioeconom ic 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 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 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 impact would be of the measures' exclusions in a nation-wide sample, we provide the claims-only measure. 6. Meaningful differences a. To be representative of what we expect the impact would sample, we provide the claims-only measure. 6. Meaningful differences between provide the claims-only measure.	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.	elective primary total hip arthroplasty (THA) and/or total knee		chronic obstructive pulmonary disease	

NATIONAL QUALITY FORUM

127

Northern California matched claims and deterronic health record (FIRH) data, admission dates from October 1, 2015 — December 30, 2016. This data source contains claims data for FS impatient and and their randomisy pile into was equal subsets (development amplied and walldation). This data source contains claims data for FS impatient and outpatient forms claims data for FS impatient and outpatient services including; Medicare Part A course of the first and part B outpatient claims. This data source contains claims data for FS impatient and outpatient services including; Medicare Part A course of the first and validation sample. Both was other to sample, Both variables claims data for FS impatient and outpatient to-price including; Medicare Part A course of the first and validation sample, and the first patients to any of their member hospitals between lanuary 1, 2009 and June 30, 2015 was used for measure development, as developm	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
Dits Source Claims, Ehrchronic Hab Records Obtation for the Medicare Para A claims data for administrative claims and record (ERR) (Italia administrative claims and record record (ERR) (Italia administrative claims and record (ERR) (Italia administrative claims administrative contains (ARR) (External and Para Italia administrative contains (ARR) (External and Para Italia administrative contains (ERR)) (EXTERNAL ARR) (EXTERNA	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					
Medical Records Data Sources for the Medicare FTS measures. Constructed using Maiser Permanente Morthern California mitched administrative claims and Jean Constructed with the Medicare Part A composite a contains data for measure testing (an earlier Raper of properties). This data source was used for measure testing (an earlier Raper of properties). This data source was used for measure testing (an earlier Raper of properties). This data source was used for measure development, as development and provided the member of measured development, as development and provided the member of measured development, as development and provided the member of measured development, as development and provided the member of measured development, as development and provided the member of measured development, as development and provided the member of measured development, as development and provided the member of measured development and provided the member of measured development and provided the member of						
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) Medicare beneficiaries over (65+) in California hospitals. (California is a diverse state, and, with more than 37 million residents, California residents, California admissions. In 2006, there were approximately 3 million adult discharges from used the California Patient Discharge Data, Database (EDB) Nationale (EDB)	 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 for Medicare FFS beneficiaries, aged 65- 94 on admission. The history dataset includes 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. The history dataset includes administrative inpatient hospitalization data on each patient for the 12 months prior to the ladaset contains administrative inpatient hospitalization data on each patient	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 Part A claims data for calendar years 2013, 2014, and 2015. 2. Medicare Part A claims data for calendar years 2013, 2014, and 2015. 2. Medicare Part A claims data for calendar years 2013, 2014, and 2015. 2. Medicare Part A claims data for calendar years 2013, 2014, and 2015. 2. Medicare Part A claims data for calendar years 2013, 2014, Bubolz D, Eleming C., Fisher ES, Chang CH, Bubolz D,	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 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 patient vital status (Fleming et al., 1992). During original model specification (original model specification) against a medical record data. 3. Data abstracted from medical records from eight patient vital status at discharge of the potential of the patient vital status (Fleming et al., 1992). During original model specification (original model specification) against a medical record data. 3. Data abstracted from medical records from eight patient vital status at discharge of the patient vital status of the patient vital status at discharge of the patient vital status of the patien	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, we used 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 hospitals. California hospitals. California in addition to CMS data for Medicare FFS patients aged 65 years or over (65+) in California hospitals. California hospitals. California patient Discharge Data, attent Discharge Data, attent Discharge Data, attent Discharge Data, attent Discharge Data,	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	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 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 linked by a unique patient

3502 Hybrid Hospital-1789 Hospital-Wide 1550 Hospital-level 0468 Hospital 30-day, 1893 Hospital 30-Day, 2558 Hospital 30-Day, All-Wide (All-Condition, All-Cause Unplanned Cause, Risk-Standardized all-cause, riskrisk-standardized all-cause, risk-All-Procedure) Risk-Readmission Measure complication rate standardized mortality standardized mortality Mortality Rate (RSMR) Standardized (HWR) rate (RSMR) following (RSCR) following rate (RSMR) following **Following Coronary** Mortality Measure elective primary total pneumonia chronic obstructive Artery Bypass Graft hospitalization hip arthroplasty (THA) pulmonary disease (CABG) Surgery and/or total knee (COPD) hospitalization arthroplasty (TKA) of patient hospital linked by a unique patient history from outcomes and hospital This database contains The measure was also Medicare beneficiary utilization in the specified and testing admissions. In 2009, patient identification previous hospitalizations demographic, elderly: The there were 3,193,904 number, allowing us to and to evaluate rates of using an all-payer benefit/coverage, and advantages of a claims dataset adult discharges from determine patient both readmission and merged data base for 446 non-Federal acute history from previous mortality (via linking with vital status although it is only hospitalizations and to Medicare and care hospitals. Records California vital statistics information. This data publically reported are linked by a unique source was used to **Veterans Affairs** using the data sources evaluate rates of both records). Hospitals. Medical patient identification readmission and obtain information on listed above Using all-payer data from number, allowing us to Care. 1992; 30(5): mortality (via linking with several 4. California Patient California, we performed California vital statistics 377-91. determine patient inclusion/exclusion Discharge Data is a analyses to determine history from previous records). indicators such as Available in attached whether the HF large, linked database hospitalizations and to Medicare status on Using all-payer data from of patient hospital appendix at A.1 readmission measure can evaluate rates of both admission as well as Attachment California, we performed be applied to all adult admissions in the readmission and vital status. It was also NQF_1789_NQF_Data state of California. analyses to determine patients, including not mortality (via linking used to determine _Dictionary_05-26whether the COPD only FFS Medicare Using all-payer data with California vital hospice enrollment. mortality measure can be from California, we patients aged 65 years or 17_v1.0.xlsx statistics records). No data collection applied to all adult older, but also non-FFS performed analyses to Using all-payer data patients, including not Medicare patients aged instrument provided determine whether from California as well Attachment the THA/TKA only FFS Medicare 18-64 years at the time of Del18b2HOP5HWMHy as CMS Medicare FFS patients aged 65 or over, admission. complication measure bridDataDictionary010 data for California but also non-FFS can be applied to all Reference: hospitals, we Medicare patients aged 72019.xlsx adult patients, Fleming C., Fisher ES, including not only FFS performed analyses to 18-64 years at the time Chang CH, Bubolz D, Medicare patients determine whether the of admission. Malenda J. Studying aged 65 years or over, pneumonia mortality Reference: outcomes and hospital measure can be applied but also non-FFS Fleming C., Fisher ES, utilization in the elderly: to all adult patients, Medicare patients Chang CH, Bubolz D, The advantages of a including not only FFS aged 18-64 years at Malenda J. Studying merged data base for the time of admission. Medicare patients aged outcomes and hospital Medicare and Veterans 65 or over, but also Additional Data source utilization in the elderly: Affairs Hospitals. Medical non-FFS Medicare used for analysis of The advantages of a Care. 1992; 30(5): 377-91. patients aged 18-64 the impact of SES merged data base for No data collection years at the time of variables on the Medicare and Veterans instrument provided admission. measure's risk model. Affairs Hospitals. Medical Attachment Reference: Note, the variables Care. 1992; 30(5): 377-NQF 2558 CABG Mortali derived from these Fleming C., Fisher ES, ty_Data_Dictionary_12data are not included Chang CH, Bubolz D, No data collection 30-16 v1.0.xlsx in the measure as Malenda J. Studying instrument provided specified outcomes and hospital Attachment utilization in the 5. The American NQF_1893_COPD_Mortal elderly: The advantages Community Survey ity_NQF_Data_Dictionary of a merged data base (2009-2013): The _v1.0_091818_kl.xlsx for Medicare and **American Community** Survey data is **Veterans Affairs** Hospitals. Medical collected annually and Care. 1992; 30(5): 377an aggregated 5-years data was used to calculate the AHRQ No data collection socioeconomic status instrument provided (SES) composite index Attachment score. NQF_0468_Pneumonia _Mortality_Data_Dictio Reference: nary_09-26-17_v1.0.xls 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_C omplication_Data_Dic tionary_v1.0.xlsx

NATIONAL QUALITY FORUM

129

	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
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 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 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.	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	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	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	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	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:

3502 Hybrid Hospital-1789 Hospital-Wide 1550 Hospital-level 0468 Hospital 30-day, 1893 Hospital 30-Day, 2558 Hospital 30-Day, All-Wide (All-Condition, all-cause, risk-Cause, Risk-Standardized All-Cause Unplanned all-cause, riskrisk-standardized standardized mortality All-Procedure) Risk-Readmission Measure complication rate standardized mortality Mortality Rate (RSMR) Standardized (HWR) rate (RSMR) following rate (RSMR) following (RSCR) following **Following Coronary** Mortality Measure elective primary total pneumonia chronic obstructive Artery Bypass Graft hospitalization pulmonary disease (CABG) Surgery hip arthroplasty (THA) (COPD) hospitalization and/or total knee arthroplasty (TKA) clinically meaningful planned among the on admission) or present on admission 1) If a patient undergoes general Medicare during a readmission. (POA). Mortality is period for hospitals to a CABG procedure in the population using defined as death from collaborate with their first hospital and is then The complications Medicare any cause within 30 communities to reduce transferred to a second captured in the administrative claims days of the index mortality (Simoes et al., hospital where there is no numerator are data. The algorithm admission date. The 2018; Dharmarajan et al., CABG procedure, the identified during the identifies admissions mortality outcome is Centers for Medicare & 2015). index admission OR that are typically attributed to the first **Medicaid Services** Identifying deaths in the associated with a planned and may hospital performing the readmission up to 90 (CMS) annually reports Medicare FFS population occur within 30 days index CABG procedure days post-date of the measure for As currently reported, we of discharge from the and the 30-day window index admission, patients who are 65 identify deaths for FFS hospital. starts with the date of depending on the years or older and are Medicare patients 65 index CABG procedure. The Planned complication. The either Medicare feeyears and older in the Readmission follow-up period for for-service (FFS) Rationale: A transfer Medicare Enrollment Algorithm has three complications from beneficiaries and following CABG is most Database (EDB). fundamental date of index likely due to a hospitalized in non-Reference: principles: admission is as federal acute care complication of the index 1. Simoes J, Grady J, follows: 1. A few specific, hospitals. procedure and that care Purvis D, et al. 2018 limited types of care The follow-up period provided by the hospital Condition-Specific performing the CABG are always considered for AMI, pneumonia, Measures Updates and planned (obstetric procedure likely and **Specifications Report** delivery, transplant sepsis/septicemia/sho dominates mortality risk Hospital-Level 30-Day surgery, maintenance ck is seven days from even among transferred Risk-Standardized chemotherapy/immun the date of index patients. Mortality Measures. admission because otherapy, 2) If a patient is admitted http://www.qualitynet.o rehabilitation); these conditions are to a first hospital but rg/dcs/ContentServer?c= does not receive a CABG more likely to be 2. Otherwise, a Page&pagename=QnetP attributable to the procedure there and is planned readmission ublic/Page/QnetTier3&ci procedure if they then transferred to a is defined as a nond=1163010421830. occur within the first acute readmission for second hospital where a Accessed June 6, 2018. week after the CABG is performed, the a scheduled 2. Dharmarajan K, Hsieh procedure. mortality outcome is procedure; and AF, Kulkarni VT, et al. Additionally, analyses attributed to the second 3. Admissions for 2015 Trajectories of risk indicated a sharp hospital performing the acute illness or for after hospitalization for decrease in the rate of index CABG procedure complications of care heart failure, acute these complications and the 30-day window are never planned. myocardial infarction, or after seven days. starts with the date of The algorithm was pneumonia: Death, surgical site index CABG procedure. developed in 2011 as retrospective cohort bleeding, and Rationale: Care provided part of the Hospitalstudy. BMJ (Clinical pulmonary embolism by the hospital Wide Readmission researched);350:h411 are followed for 30 performing the CABG measure. In 2013, days following procedure likely CMS applied the admission because dominates mortality risk. algorithm to its other clinical experts agree 3) If a patient undergoes readmission these complications measures. a CABG procedure in the are still likely first hospital and is The Planned attributable to the transferred to a second Readmission hospital performing hospital where another Algorithm and the procedure during CABG procedure is associated code tables this period and rates performed, the mortality are attached in data for these outcome is attributed to field S.2b (Data complications the first hospital Dictionary or Code remained elevated performing the index Table). until roughly 30 days (first) CABG procedure post admission. and the 30-day window The measure followstarts with the date of up period is 90 days index CABG procedure. after admission for Rationale: A transfer mechanical following CABG is most complications and likely due to a periprosthetic joint complication of the index infection/wound procedure, and care infection. Experts provided by the hospital agree that mechanical performing the index complications and CABG procedure likely periprosthetic joint dominates mortality risk infection/wound even among transferred infections due to the patients. 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 131

NATIONAL QUALITY FORUM

	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
Denominato r 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 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.	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 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". 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 Medicare FFS beneficiaries admitted to non-federal acute care hospitals. Additional details are provided in S.7	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.
Denominato r 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 JALITY FORUM	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;	To be included in the measure cohort used in public reporting, patients must meet the following additional inclusion criteria: 1. Enrolled in Medicare fee-forservice (FFS) Part A and Part B for the 12	Denominator Details. 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	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	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

3502 Hybrid Hospital-1789 Hospital-Wide 1550 Hospital-level 0468 Hospital 30-day, 1893 Hospital 30-Day, 2558 Hospital 30-Day, All-Wide (All-Condition, All-Cause Unplanned Cause, Risk-Standardized all-cause, riskall-cause, riskrisk-standardized All-Procedure) Risk-Readmission Measure complication rate standardized mortality standardized mortality Mortality Rate (RSMR) Standardized (HWR) rate (RSMR) following rate (RSMR) following (RSCR) following **Following Coronary** Mortality Measure elective primary total pneumonia chronic obstructive Artery Bypass Graft hospitalization pulmonary disease hip arthroplasty (THA) (CABG) Surgery (COPD) hospitalization and/or total knee arthroplasty (TKA) months prior to the secondary diagnosis of admissions for 2. Aged 65 or over; sepsis (not including of the index admission, patients age 65-94. date of admission; and severe sepsis) with a COPD with exacerbation; and enrolled in Part A 3. Discharged alive We deviated from that enrolled in Part A secondary diagnosis of during the index Enrolled in from a non-federal definition during during the index pneumonia (including admission; and, Medicare fee-for-service short-term acute care development and admission; aspiration pneumonia) (FFS) Part A and Part B 3. Aged 65 or over. hospital; and testing due to the coded as POA and no 2. Aged 65 or older for the 12 months prior Isolated CABG surgeries 4. Not transferred to limited dataset secondary diagnosis of 3. Having a qualifying to the date of index are defined as those another acute care available that included severe sepsis coded as admission, and enrolled elective primary CABG procedures facility. the EHR data POA; THA/TKA procedure; in Part A during the index performed without the The ACO version of elements needed to 2. Enrolled in Medicare admission, beneficiaries; following concomitant elective primary this measure has the calculate this THA/TKA procedures fee-for-service (FFS) 3. Aged 65 or over; valve or other major additional criterion measure. Note that are defined as those Part A and Part B for and cardiac, vascular, or that only the risk model already procedures without the 12 months prior to thoracic procedures: 4. hospitalizations for Not transferred includes age in years, the date of index any of the following: o Valve procedures; ACO-assigned from another acute care as a risk variable.) admission, and enrolled beneficiaries that • Femur, hip, or pelvic facility. o Atrial and/or ventricular An index admission is in Part A during the meet all of the other fractures coded in the ICD-9 and ICD-10 cohort septal defects; the hospitalization to index admission; principal or secondary criteria listed above codes are included in the o Congenital anomalies; which the mortality 3. Aged 65 or over; and are included. The discharge diagnosis attached Data Dictionary. o Other open cardiac outcome is attributed cohort definition is field of the index 4. Not transferred from procedures; and includes otherwise identical to admission another acute care admissions for o Heart transplants; facility that of the HWR • Partial hip patients: o Aorta or other nondescribed below. arthroplasty (PHA) ICD-9 and ICD-10 1. Not transferred cardiac arterial bypass procedures (with a The measure cohort codes are from another acute procedures; concurrent THA/TKA); aggregates the ICD-9 included in the care facility o Head, neck, intracranial partial knee attached Data principal diagnosis and Rationale: Admissions vascular procedures; or, Dictionary. all procedure codes of arthroplasty to an acute cate the index admission procedures are not o Other chest and hospital within one distinguished by ICD9 thoracic procedures into clinically coherent day of discharge from codes and are groups of conditions International another acute care currently captured by and procedures Classification of Diseases, hospital are (condition categories the THA/TKA measure 9th Revision, Clinical considered transfers. or procedure • Revision procedures Modification (ICD-9) **Transferred patients** categories) using the with a concurrent codes as well as are included in the AHRQ CCS. There are a THA/TKA International measure cohort, but it total of 285 mutually Resurfacing Classification of Disease, is the initial exclusive AHRQ procedures with a 10th Revision (ICD-10) hospitalization rather condition categories, concurrent THA/TKA codes used to define the than any "transfer-in" most of which are cohort are listed in the Mechanical hospitalization(s), that single, homogenous attached Data Dictionary. complication coded in is included as the diseases such as the principal discharge hospitalization to pneumonia or acute • Malignant neoplasm which the mortality myocardial infarction. of the pelvis, sacrum, outcome is attributed Some are aggregates coccyx, lower limbs, or (the index admission). of conditions, such as bone/bone marrow or 2. Aged between 50 "other bacterial a disseminated and 94 years infections." There are malignant neoplasm The hybrid measure is a total of 231 mutually coded in the principal exclusive procedure intended for the discharge diagnosis categories. Using the Medicare FFS field population but was AHRQ CCS procedure • Removal of and condition tested in a limited implanted categories, the dataset due to the devises/prostheses measure assigns each EHR data elements • Transfer status from index hospitalization included. The use of a another acute care to one of five mutually small dataset required facility for the exclusive specialty that we expand the THA/TKA cohorts: sample by including surgery/gynecology, Patients are eligible admissions from cardiorespiratory, patients ages 50 to 94 for inclusion in the years. Note that the cardiovascular, denominator if they neurology, and measure already had an elective medicine. The primary THA and/or a adjusts for age. rationale behind this TKA AND had 3. Not admitted for organization is that continuous primary psychiatric conditions typically enrollment in Part A diagnoses cared for by the same and Part B Medicare **Rationale: Patients** team of clinicians are fee-for-service (FFS) admitted for expected to 12 months prior to the psychiatric treatment experience similar date of index are typically cared for added (or reduced) admission. in separate psychiatric levels of readmission This measure can also facilities that are not risk. be used for an allcomparable to short-The measure first payer population aged term acute care assigns admissions 18 years and older. hospitals (see data We have explicitly with qualifying AHRQ dictionary, HWM Nonprocedure categories tested the measure in Acute Care Inclusion to the both patients aged tab). Surgery/Gynecology 18+ years and those 4. Not admitted for Cohort. This cohort aged 65+ years (see rehabilitation includes admissions Section 2b4.11 of the Rationale: These **Testing Attachment** likely cared for by admissions are not surgical or for details, 2b4.11). typically to a shortgynecological teams. International term acute care Classification of hospital and are not

NATIONAL QUALITY FORUM

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)	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	2558 Hospital 30-Day, All- Cause, Risk-Standardized Mortality Rate (RSMR) Following Coronary Artery Bypass Graft (CABG) Surgery
		arthroplasty (TKA)		(COPD) Hospitalization	
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	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.	elective primary total hip arthroplasty (THA) and/or total knee arthroplasty (TKA) 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: OSR90J9 Replacement of Right Hip Joint with Synthetic Substitute, Cemented, Open Approach OSR90JA Replacement of Right Hip Joint with Synthetic Substitute, Uncemented, Open Approach OSR90JZ Replacement of Right Hip Joint with Synthetic Substitute, Uncemented, Open Approach OSR90JZ Replacement of Right Hip Joint with Synthetic Substitute, Open Approach OSR90JP Replacement of Left Hip Joint with Synthetic Substitute, Cemented, Open Approach OSRB0JA Replacement of Left Hip Joint with Synthetic Substitute, Cemented, Open Approach	pneumonia	chronic obstructive	Artery Bypass Graft
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	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 nonsurgical 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).	Synthetic Substitute, Uncemented, Open Approach OSRBOJZReplacement of Left Hip Joint with Synthetic Substitute, Open Approach OSRCO7Z Replacement of Right Knee Joint with Autologous Tissue Substitute, Open Approach OSRCOJZReplacement of Right Knee Joint with Synthetic Substitute, Open Approach OSRCOKZ Replacement of Right Knee Joint with Nonautologous Tissue Substitute, Open Approach OSRDO7Z Replacement of Left Knee Joint with Autologous Tissue Substitute, Open Approach OSRDO7Z Replacement of Left Knee Joint with Autologous Tissue Substitute, Open Approach OSRDOJZ Replacement of Left Knee Joint with Synthetic Substitute, Open Approach OSRDOKZReplacement of Left Knee Joint with Nonautologous Tissue Substitute, Open Approach OSRTO7Z Replacement of Right Knee Joint, Femoral Surface with Autologous Tissue Substitute, Open Approach			
Metastatic Cancer Inclusion tab). 9. Not with a principal discharge diagnosis, or a secondary diagnosis		OSRTOJZ Replacement of Right Knee Joint, Femoral Surface with Synthetic Substitute, Open Approach			

NATIONAL QUALITY FORUM

134

3502 Hybrid Hospital-	1789 Hospital-Wide	1550 Hospital-level	0468 Hospital 30-day,	1893 Hospital 30-Day,	2558 Hospital 30-Day, All-
Wide (All-Condition, All-Procedure) Risk-	All-Cause Unplanned Readmission Measure	risk-standardized	all-cause, risk-	all-cause, risk-	Cause, Risk-Standardized
Standardized	(HWR)	complication rate (RSCR) following	standardized mortality rate (RSMR) following	standardized mortality rate (RSMR) following	Mortality Rate (RSMR) Following Coronary
Mortality Measure		elective primary total	pneumonia	chronic obstructive	Artery Bypass Graft
		hip arthroplasty (THA) and/or total knee	hospitalization	pulmonary disease (COPD) hospitalization	(CABG) Surgery
		arthroplasty (TKA)			
that is present on admission (POA) for a		OSRTOKZ Replacement of Right Knee Joint,			
condition which		Femoral Surface with			
hospitals have limited ability to influence		Nonautologous Tissue Substitute, Open			
survival		Approach			
Rationale: Hospitals		OSRU07Z Replacement			
have little ability to impact mortality for		of Left Knee Joint, Femoral Surface with			
some conditions. This		Autologous Tissue			
list of conditions (see data dictionary, HWM		Substitute, Open Approach			
ICD-10 Inclusion tab)		OSRUOJZ Replacement			
was determined through independent		of Left Knee Joint, Femoral Surface with			
review, by several		Synthetic Substitute,			
clinicians, of conditions associated		Open Approach			
with high mortality.		OSRUOKZ Replacement of Left Knee Joint,			
The decisions were also reviewed with our		Femoral Surface with			
Technical Expert Panel		Nonautologous Tissue Substitute, Open			
(TEP) and Technical		Approach			
Work Group. Admissions are not		OSRV07Z Replacement			
included in the cohort		of Right Knee Joint, Tibial Surface with			
if the patient had a principal diagnosis		Autologous Tissue			
code that is on this		Substitute, Open Approach			
list, or a secondary code with POA that is		OSRVOJZ Replacement			
on the list.		of Right Knee Joint, Tibial Surface with			
In addition, for patients with multiple		Synthetic Substitute,			
admissions, the		Open Approach			
measure selects only one admission, at		OSRVOKZ Replacement of Right Knee Joint,			
random, for inclusion.		Tibial Surface with			
There is no practical statistical modeling		Nonautologous Tissue Substitute, Open			
approach that can		Approach			
account or adjust for the complex		0SRW07Z Replacement of Left			
relationship between		Knee Joint, Tibial			
the number of		Surface with Autologous Tissue			
admissions and risk of mortality in the		Substitute, Open			
context of a hospital-		Approach			
wide mortality measure. Random		OSRWOJZ Replacement of Left Knee Joint,			
selection ensures that		Tibial Surface with			
providers are not penalized for a "last"		Synthetic Substitute, Open Approach			
admission during the		OSRWOKZ			
measurement period; selecting the last		Replacement of Left Knee Joint, Tibial			
admission would not		Surface with			
be as accurate a reflection of the risk of		Nonautologous Tissue Substitute, Open			
death as random		Approach			
selection, as the last admission is		An ICD-9 to ICD-10			
inherently associated		crosswalk is attached in field S.2b. (Data			
with a higher mortality risk. Random		Dictionary or Code			
selection is also used		Table). Elective primary			
in CMS's condition- specific mortality		THA/TKA procedures			
measures. Note that		are defined as those procedures without			
random selection reduces the number		any of the following:			
of admissions, but		1) Femur, hip, or			
does not exclude any patients from the		pelvic fractures coded in principal or			
measure.		secondary discharge			
The cohort is defined		diagnosis fields of the index admission			
using ICD-10 Clinical Modification codes		2) Partial hip			
identified in Medicare		arthroplasty (PHA)			
Part A Inpatient claims data. The measure		procedures with a concurrent THA/TKA			
aggregates the ICD-10		3) Revision procedures			
principal diagnosis and all procedure codes of		with a concurrent THA/TKA			
the index admission		· · · · , · · · ·			
IALITY FORLINA					

NATIONAL QUALITY FORUM

NQF REVIEW DRAFT—Comments due by August 26, 2019 by 6:00 PM ET.

Into attituding whereast processing and processing and processing conditions of processing condi	3502 Hybrid Hospital- Wide (All-Condition, All-Procedure) Risk- Standardized	1789 Hospital-Wide All-Cause Unplanned Readmission Measure (HWR)	1550 Hospital-level risk-standardized complication rate (RSCR) following	0468 Hospital 30-day, all-cause, risk- standardized mortality rate (RSMR) following	1893 Hospital 30-Day, all-cause, risk- standardized mortality rate (RSMR) following	2558 Hospital 30-Day, All- Cause, Risk-Standardized Mortality Rate (RSMR) Following Coronary
into clinically coherent groups of conditions and procedures with a concurrent TNA/TIA. It is concurrent to concurrent TNA/TIA. It is concurrent to	Mortality Measure		hip arthroplasty (THA) and/or total knee	•	pulmonary disease	Artery Bypass Graft (CABG) Surgery
	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 the defining surgical procedure then that procedure is the defining surgical procedure then that procedure is the defining surgical procedure, the first dated procedure performed during the index admission is the defining surgical procedure; 2) if a patient has more than one major surgical procedure the first dated procedure is the defining surgical procedure; 3) if there is more than one major surgical procedure the first dated procedure is the defining surgical procedure. The index admission is the defining surgical procedure the first dated procedure the first dated procedure the first dated procedure with the		elective primary total hip arthroplasty (THA) and/or total knee arthroplasty (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	pneumonia	chronic obstructive pulmonary disease	Artery Bypass Graft
is the defining surgical procedure. These divisions include admissions likely cared for by surgical teams.	divisions include admissions likely cared for by surgical					

NATIONAL QUALITY FORUM

136

	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
	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.	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.	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.	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	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	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.

Wide (/ All-Pro Standa	lybrid Hospital- All-Condition, cedure) Risk- rdized ity 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
				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.	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.	
Details Unknow (from cother claims Rations measured included patient admiss the dat where death of the dat but the dischared becaused likely eduta. 2. Discommedical Rations did not opport full cared the pate dischared as with for spire (CCS 22 face from 228), Ir Injury (Crushired internation 234), Outlier (CCS 234	ale: The re does not e stays for ts where the ion date is after te of death, or the date of occurs before te of discharge e patient was rged alive te these are errors in the harged against al advice (AMA) ale: Providers thave the unity to deliver e and prepare tient for	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.	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.	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 admissions. 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.	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.	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 admission for inclusion in the measure and exclude subsequent 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.

NATIONAL QUALITY FORUM

138

	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
	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 nonconvergence 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	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	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	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	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	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 logodds 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	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 logodds 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,

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

0468 Hospital 30-day, all-cause, riskstandardized mortality rate (RSMR) following pneumonia hospitalization

1893 Hospital 30-Day, all-cause, riskstandardized 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

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 hospitalspecific effect for each cohort is added to the

sum of the estimated

regression coefficients

multiplied by patient

characteristics. The

transformed via an

inverse logit function

and summed over all

patients attributed to

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

specific effect. The

transformed via an

results are

place of the hospital-

a hospital to get a

results are

represents the underlying risk of a readmission, after accounting for patient risk. The hospitalspecific effects are given a distribution to account for the clustering (nonindependence) 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.

arthroplasty (TKA) arising from a normal distribution. The hospital intercept represents the underlying risk of a complication at the hospital, after accounting for patient risk. The hospitalspecific intercepts are given a distribution to account for the clustering (nonindependence) 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

hospital intercept represents the underlying risk of a mortality at the hospital, after accounting for patient risk. The hospitalspecific intercepts are given a distribution to account for the clustering (nonindependence) 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-thanexpected mortality rates or better quality,

and a higher ratio

expected mortality

The "predicted"

numerator) is

factors and the

hospital-specific

mortality. The

indicates higher-than-

rates or worse quality.

number of deaths (the

calculated by using the

coefficients estimated

by regressing the risk

intercept on the risk of

specific effect is added

estimated regression

characteristics. The

coefficients multiplied

estimated hospital-

to the sum of the

by the patient

results are log

transformed and

summed over all

patients attributed to a

calculated by using

regressing the risk

the coefficients

factors and the

hospital-specific

admission with a

of having an

intercept on the risk

estimated by

mortality at the hospital, after accounting for patient risk. The hospitalspecific intercepts are given a distribution to account for the clustering (nonindependence) 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-thanexpected 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

after accounting for patient risk. The hospitalspecific effects are given a distribution to account for the clustering (nonindependence) of patients within the same hospital (Normand and Shahian, 2007). If there were no differences among hospitals, then risk, the hospital effects all hospitals.

after adjusting for patient should be identical across 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 higherthan-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 hospitalspecific effect. The results are log transformed and summed over all patients

in the hospital to get an

expected value. To assess

hospital performance for

For each specialty

readmissions (the

numerator) is

"predicted" number of

cohort, the

3502 Hybrid Hospital-1789 Hospital-Wide 1550 Hospital-level 0468 Hospital 30-day, 1893 Hospital 30-Day, 2558 Hospital 30-Day, All-Wide (All-Condition, All-Cause Unplanned risk-standardized all-cause, riskall-cause, risk-Cause, Risk-Standardized Readmission Measure All-Procedure) Riskcomplication rate standardized mortality standardized mortality Mortality Rate (RSMR) Standardized (HWR) rate (RSMR) following rate (RSMR) following (RSCR) following **Following Coronary** Mortality Measure elective primary total pneumonia chronic obstructive Artery Bypass Graft hospitalization (CABG) Surgery hip arthroplasty (THA) pulmonary disease (COPD) hospitalization and/or total knee arthroplasty (TKA) log transformed and calculated by using complication. The hospital to get a each reporting period, we inverse logit function and summed over all the coefficients estimated hospitalpredicted value. The summed over all patients re-estimate the model patients in the estimated by specific intercept is "expected" number of in the hospital to get an coefficients using the expected value. To assess hospital to get an regressing the risk added to the sum of deaths (the years of data in that factors (found in Table expected value. This the estimated denominator) is hospital performance for period. D.9) and the hospitalobtained in the same each reporting period, approach is analogous regression coefficients This calculation to a ratio of specific effect on the multiplied by the manner, but a common we re-estimate the transforms the ratio of "observed" to risk of readmission. patient characteristics. intercept using all model coefficients using predicted over expected "expected" used in The results are log The estimated hospitals in our sample the years of data in that into a rate that is other types of hospital-specific effect is added in place of the transformed and period. compared to the national statistical analyses. It hospital-specific for each cohort is summed over all This calculation observed mortality rate. conceptually allows a patients attributed to intercept. The results added to the sum of transforms the ratio of The hierarchical logistic are log transformed particular hospital's the estimated a hospital to get a predicted over expected regression models are regression coefficients performance, given its predicted value. The and summed over all into a rate that is described fully in the multiplied by patient "expected" number of patients in the hospital case mix and service compared to the national original methodology characteristics. The mix, to be compared admissions with a to get an expected report (Suter et al. 2012). observed readmission complication (the to an average results are log value. To assess rate. The hierarchical Reference: hospital's transformed and denominator) is hospital performance logistic regression 1. Normand S-LT, Shahian for each reporting performance with the summed over all obtained in the same models are described DM. 2007. Statistical and patients attributed to period, we re-estimate same case mix and manner, but a fully in the original Clinical Aspects of service mix. Thus, a a hospital to get a common intercept the model coefficients methodology report **Hospital Outcomes** predicted value. The using all hospitals in lower ratio indicates using the years of data (Krumholz et al., 2005). Profiling. Stat Sci 22(2): lower-than-expected "expected" number of our sample is added in in that period. References: 206-226. place of the hospitalmortality rates or readmissions (the This calculation 1. Normand S-LT, 2. Suter L, Wang C, Araas specific effect. The denominator) is better quality, while a transforms the ratio of Shahian DM. 2007. M, et al. Hospital-Level higher ratio indicates obtained in the same results are log predicted over Statistical and Clinical 30-day All-Cause higher-than-expected transformed and manner, but a expected into a rate Aspects of Hospital Mortality Following mortality rates or common effect using summed over all that is compared to the Outcomes Profiling. Stat Coronary worse quality. all hospitals in our patients in the national observed Sci 22(2): 206-226. Artery Bypass Graft hospital to get an sample is added in To assess hospital readmission rate. The 2. Krumholz H, Normand Surgery; Updated expected value. To place of the hospitalperformance for each hierarchical logistic S, Galusha D, et al. 2005. Measure Methodology specific effect. The assess hospital reporting period, the regression models are Risk-Adjustment Models Report. 2012 results are log performance for each measure re-estimates described fully in the for AMI and HF 30-Day transformed and reporting period, we the model coefficients original methodology Mortality Methodology. summed over all re-estimate the model report (Krumholz et al., using the data in that coefficients using the patients in the period. 2005). hospital to get an years of data in that The division-level References: expected value. To period. SMRs are then pooled 1. Normand S-LT, assess hospital for each hospital using This calculation Shahian DM. 2007. performance for each transforms the ratio of an inverse variance-Statistical and Clinical reporting period, we predicted over weighted geometric Aspects of Hospital re-estimate the model expected into a rate mean to create a Outcomes Profiling. coefficients using the that is compared to hospital-wide Stat Sci 22(2): 206-226. data in that period. the national observed composite SMR. (Note 2. Krumholz H, The specialty cohort complication rate. The that in the case of the Normand S, Galusha D, SRRs are then pooled hierarchical logistic hybrid measure, we et al. 2005. Riskregression models are for each hospital using are presenting data Adjustment Models for described fully in the a volume-weighted from 9 of the total 15 AMI and HF 30-Day divisions due to geometric mean to original methodology Mortality Methodology. create a hospital-wide report (Grosso et al., limitations in 2012). composite SRR. The availability of composite SRR is electronic health References: multiplied by the records data). The Grosso L, Curtis J, hospital-wide SMR is national observed Geary L, et al. readmission rate to then multiplied by the Hospital-level Riskproduce the RSRR. The national observed Standardized statistical modeling mortality rate to **Complication Rate** approach is described produce the RSMR. **Following Elective** fully in Appendix A **Primary Total Hip** and in the original Arthroplasty (THA) methodology report And/Or Total Knee (Horwitz et al., 2012). Arthroplasty (TKA) The ACR quality Measure measure was adapted Methodology Report. from the HWR quality 2012. measure. The unit of Normand S-LT, analysis was changed Shahian DM. 2007. from the hospital to Statistical and Clinical the ACO. This was Aspects of Hospital possible because both Outcomes Profiling. the HWR and ACR Stat Sci 22(2): 206measures assess 226. 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

NATIONAL QUALITY FORUM

141

	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
		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.qualityne t.org/dcs/BlobServer? blobkey=id&blobnoca che=true&blobwhere= 1228889825199&blob header=multipart%2F octet-stream&blobheaderna me1=Content-Disposition&blobhead ervalue1=attachment %3Bfilename%3DDryR un_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.				
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	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	5.1 Identified measures: 0534: Hospital specific riskadjusted 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 riskstandardized 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	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	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	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

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

1789 Hospital-Wide All-Cause Unplanned Readmission Measure (HWR) (RSCR) following

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

0468 Hospital 30-day, all-cause, riskstandardized mortality rate (RSMR) following pneumonia hospitalization

limited due to broader

patient exclusions. This

typically only include a

measure (for example,

patients who receive a

specific medication or

procedure). Lastly, this

measure and the NQF

Inpatient Pneumonia

Mortality (AHRQ)

than competing

they both assess

hospitals with a

pneumonia, the

assesses 30-day

diagnosis of

principal discharge

Measure #0231 are

measures. Although

mortality for patients

admitted to acute care

specified outcomes are

different. This measure

mortality while #0231

mortality. Assessment

of 30-day and inpatient

assesses inpatient

mortality outcomes

advantages and uses

which make them

complementary as

period provides a

hospital care and

period to examine

to avoid bias by

opposed to competing.

For example the 30-day

broader perspective on

utilizes standard time

hospital performance

differences in length of

stay among hospitals.

settings it may not be

However, in some

have distinct

complementary rather

undergo a specific

is because they

specific subset of

patients who are

eligible for that

1893 Hospital 30-Day, all-cause, riskstandardized 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

0505: Hospital 30-day readmission rate (RSRR) following acute myocardial infarction (AMI) hospitalization. 0506: Hospital 30day, all-cause, riskreadmission rate (RSRR) following

5a.1 Are specs completely harmonized? No 5a.2 If not completely harmonized, identify difference, rationale, impact: This measure

failure (HF)

hospitalization

all-cause risk-

standardized

standardized

pneumonia

hospitalization

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 riskstandardized 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

procedures that fall

conditions or

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, nonoutcome 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 hospital-level, riskstandardized payment measure. Our measure associated with a 30cohort was heavily day episode of care for vetted by clinical pneumonia cohort. experts, a technical Version 9.2 of the expert panel, and a pneumonia mortality measure cohort is, Additionally, the measure, with the however, not harmonized with the specified cohort, has pneumonia payment been publicly reported measure cohort. There since December 2014. is intention to Because this is an harmonize the outcome measure, pneumonia mortality and payment measure cohorts in the future. over alignment with We did not include in related non-outcome our list of related measures any nonoutcome (for example, are limited due to broader patient process) measures with the same target exclusions. This is population as our because they typically measure. Because this only include a specific subset of patients who is an outcome measure, are eligible for that clinical coherence of the cohort takes measure (for example, patients who receive a precedence over specific medication or alignment with related non-outcome undergo a specific measures. procedure). Furthermore, non-5b.1 If competing, why outcome measures are

superior or rationale for additive value: N/A

target population as our public comment period. clinical coherence of the cohort takes precedence measures. Furthermore, non-outcome measures

acute myocardial infarction (AMI) hospitalization for patients 18 and older 0468: Hospital 30-day, all-cause, riskstandardized 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, riskstandardized mortality rate (RSMR) following chronic obstructive pulmonary disease (COPD) hospitalization 2515: Hospital 30-day, all-cause, unplanned, riskstandardized 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

another

complementary

mortality measure,

3502 Hybrid Hospital-1789 Hospital-Wide 1550 Hospital-level 0468 Hospital 30-day, 1893 Hospital 30-Day, 2558 Hospital 30-Day, All-Wide (All-Condition, All-Cause Unplanned all-cause, risk-Cause, Risk-Standardized risk-standardized all-cause, riskstandardized mortality All-Procedure) Risk-Readmission Measure standardized mortality Mortality Rate (RSMR) complication rate Standardized (HWR) rate (RSMR) following rate (RSMR) following (RSCR) following **Following Coronary** Mortality Measure elective primary total pneumonia chronic obstructive Artery Bypass Graft hospitalization hip arthroplasty (THA) pulmonary disease (CABG) Surgery and/or total knee (COPD) hospitalization arthroplasty (TKA) which captures a under five specialties: feasible to capture are eligible for that different patient measure (for example, surgery/gynecology, post-discharge population and a general medicine, mortality making the patients who receive a cardiorespiratory, specific medication or different outcome inpatient measure cardiovascular, and compared with the more useable. We have undergo a specific neurology. This previously consulted procedure). **HWM** measure submitted with this measure is specified with AHRQ to examine 5b.1 If competing, why application. PSI-02 for evaluating hospital harmonization of superior or rationale for captures patients 18 or ACO performance. complementary additive value: The NQFyears of age or older, However, despite measures of mortality endorsed STS measure or obstetric patients, these differences in for patients with AMI that has the same target whereas the HWM cohort specifications, and stroke. We have population and similar measure captures both measures under found that the measure focus as the NQF guidance have patients between the measures are proposed CABG mortality ages of 65 and 94. PSIbeen harmonized to harmonized to the measure is the Risk-02 captures DRGs with the extent possible extent possible given adjusted operative through modifications less than 0.5% that small differences mortality for CABG (NQF mortality rate, such as exclusion of in cohort inclusion and #0119). The measure planned readmissions. whereas the HWM exclusion criteria are steward for the registrymeasure captures all We did not include in warranted on the basis based mortality measure patients within all our list of related of the use of different for CABG is STS. In CCSs, regardless of measures any nonoutcomes. However, developing the measure, mortality rate. HWM outcome (e.g., this current measure has been modified from we sought to harmonize captures mortality up process) measures to 30 days past with the same target with the STS measure to the last endorsed the greatest extent admission, where population as our version to include AHRQ PSI-02 only feasible given competing measure. Because this patients with a measure design objectives captures in-hospital is an outcome principal discharge mortality. IQI 90 (NQF measure, clinical and differences in the diagnosis of sepsis and #0530) is another coherence of the a secondary discharge data source. The potential complimentary sources of discrepancy are cohort takes diagnosis of pneumonia mortality measure, precedence over that is present on target patient population, which is a composite alignment with related admission. The cohort age, isolated CABG, measure of the non-outcome was also expanded to period of observation, include patients with a number of in-hospital measures. and included hospitals. deaths for a narrow Furthermore, nonprincipal discharge The STS measure also range of conditions outcome measures diagnosis of aspiration assesses both deaths (CHF, stroke, hip are limited due to pneumonia. Thus the occurring during CABG fracture, pneumonia, broader patient current measure cohort hospitalization (inacute myocardial exclusions. This is is no longer hospital death, even if infarction and GI harmonized with because they typically after 30 days) and deaths hemorrhage). The only include a specific measure #0231. occurring within 30 days **HWM** measure subset of patients who of procedure date. As 5b.1 If competing, are eligible for that presented in this indicated above, the why superior or measure (for example, application captures proposed measure uses a rationale for additive patients who receive a all deaths after 30 standard follow-up period value: N/A days of admission, for specific medication or of 30 days of procedure all conditions and undergo a specific date in order to measure procedures. procedure). each patient consistently. 5b.1 If competing, 5b.1 If competing, The proposed claimswhy superior or why superior or based measure has been rationale for additive tested and is appropriate rationale for value: There are no for use in all-payer data additive value: N/A competing NQFfor patients 18 years and endorsed measures. 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...

companisor	101 NQ1 3302, 17	09, 1550, 0400, 10	33, 2336, 0230, 0	7229, 2070, 0347	and 0550 contint	icu
Steward	3502 Hybrid Hospital-Wide (All-Condition, All-Procedure) Risk-Standardized Mortality Measure Centers for Medicare &	0230 Hospital 30-day, all-cause, risk-standardized mortality rate (RSMR) following acute myocardial infarction (AMI) hospitalization Centers for Medicare & Medicaid Services	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 Centers for Medicare &	O347 Death Rate in Low-Mortality Diagnosis Related Groups (PSI02) Agency for Healthcare	O530 Mortality for Selected Conditions Agency for Healthcare
Description The mestimal hospit day ris standal mortal (RSMF) death cause days a index date for who a the ag 94.	Medicaid Services (CMS) 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	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	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	Medicaid Services (CMS) 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	Research and Quality 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 immunocompromis ed state, and transfers to an	Research and Quality A composite measure of inhospital mortality indicators for selected conditions
	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	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 nonfederal hospitals or patients hospitalized in Veterans Health Administration (VA) facilities.	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-forservice (FFS) beneficiaries and hospitalized in nonfederal hospitals or patients hospitalized in Veterans Health Administration (VA) facilities.	as death from any cause within 30 days of the index admission date, including inhospital 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-forservice (FFS) administrative claims for the cohort derivation, outcome, and risk adjustment.	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.]	
	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					

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
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 Medicare FFS patients age 50-94 (see later discussion for justification) 3. External empiric validity testing a. Not possible for the hybrid measure within the hybrid testing to measure within the hybrid testing form. 4. Socioecon omic risk factor			claims-based risk adjustment for		
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					

	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
	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. Meaningf ul 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 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	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 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	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	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.	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/disch arge 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.	Electronic administrative data/claims

3502 Hybrid 0230 Hospital 30-day, 0229 Hospital 30-2876 Hospital 30-0347 Death Rate in 0530 Mortality for Hospital-Wide (Allall-cause, riskday, all-cause, riskday, all-cause, risk-Low-Mortality Selected Conditions Condition, Allstandardized standardized Diagnosis Related standardized Procedure) Riskmortality rate (RSMR) mortality rate mortality rate Groups (PSI02) Standardized following acute (RSMR) following (RSMR) following myocardial infarction acute ischemic heart failure (HF) Mortality Measure (AMI) hospitalization hospitalization stroke hospitalization with claims-based risk adjustment for stroke severity development, as contains Medicare database contains Users are expected 2. Medicare described in the beneficiary Medicare to provide POA Enrollment attached demographic, beneficiary data. Database (EDB): methodology benefit/coverage, demographic, This database Available at and vital status benefit/coverage, report). contains Medicare measure-specific and vital status information. This beneficiary The two data web page URL data source was used information. This sources listed demographic, identified in S.1 to obtain information data source was benefit/coverage, below were used Attachment on several used to obtain and vital status for testing the PSI_02_Death_Rate inclusion/exclusion information on information. This claims-based _in_Lowindicators such as several measure; the data source was Mortality_Diagnosis Medicare status on inclusion/exclusion hybrid testing form used to obtain _Related_Groups_admission as well as indicators such as information on includes some DRGs-_vital status. These Medicare status on several testing data from _Editable.xlsx data have previously admission as well as inclusion/exclusion the claims-based been shown to vital status. These measure (for indicators such as accurately reflect data have previously example, for the Medicare status on patient vital status been shown to social risk factor admission, as well (Fleming et al., 1992). accurately reflect as vital status. and external patient vital status 3. Veterans Health validation These data have (Fleming et al., analyses). Administration Data: previously been 1992). This data source shown to **HWM** claims-only contains claims data 3. Veterans Health accurately reflect datasets: Administration (VA) patient vital status for VA inpatient and Medicare Part A outpatient services Data: This data (Fleming et al., **Inpatient Claims** including: inpatient source contains 1992). Data hospital care, claims data for VA 3. For measure The index dataset outpatient hospital inpatient and development contains services, skilled outpatient services purposes only, we administrative including: inpatient nursing facility care, linked the data inpatient some home health hospital care, sources above with hospitalization outpatient hospital agency services, as data from the data for Medicare well as inpatient and services, skilled AHA/ASA GWTG-FFS beneficiaries, outpatient physician nursing facility care, Stroke Registry. aged 65-94 on claims for the 12 some home health The registry data admission. The months prior to and agency services, as were used to history dataset including each index well as inpatient obtain the National includes admission. Unlike and outpatient Institutes of Health administrative physician claims for Medicare FFS (NIH) Stroke Scale inpatient patients, VA patients the 12 months prior scores and clinical hospitalization are not required to to and including risk variables. data on each have been enrolled in each index When this measure patient for the 12 Part A and Part B admission. Unlike is implemented months prior to the Medicare for the 12 Medicare FFS **NIH Stroke Scale** index admission. months prior to the patients, VA scores will be This data was used date of admission. patients are not derived from ICDalong with the required to have 10 codes in All-payer data Medicare been enrolled in Medicare claims. sources: Enrollment Part A and Part B Reference: For our analyses to Database (EDB) for Medicare for the 12 examine use in all-Fleming C, Fisher testing the claimsmonths prior to the payer data, we used based measure. ES, Chang CH, date of admission. all-payer data from Bubolz TA, Malenka Medicare California in addition All-payer data DJ. Studying Enrollment to CMS data for sources: outcomes and Database (EDB) Medicare FFS 65+ For our analyses to hospital utilization This database patients in California examine use in allin the elderly: The contains Medicare hospitals. California is payer data, we used advantages of a beneficiary all-payer data from a diverse state, and, merged data base demographic, with more than 37 California in for Medicare and benefit/coverage, million residents, addition to CMS Veterans Affairs and vital status California represents data for Medicare hospitals. Medical information. This 12% of the US FFS 65+ patients in Care. 1992; 30(5): data source was population. We used California hospitals. 377-91. Data used to obtain the California Patient California is a sources for the allinformation on diverse state, and, Discharge Data, a payer update several large, linked with more than 37 No data collection inclusion/exclusion database of patient million residents, instrument indicators such as California hospital admissions. provided Medicare status on represents 12% of In 2006, there were Attachment admission as well the US population. approximately 3 NQF_2876_Claimsas vital status. It million adult We used the Only_Stroke_Morta was also used to discharges from California Patient lity_S2b_Mortality_ determine hospice more than 450 non-Discharge Data, a Data_Dictionary_v1 enrollment. Federal acute care large, linked No data collection hospitals. Records database of patient 635884757617681 instrument are linked by a hospital admissions. 755.xlsx provided unique patient In 2006, there were Attachment identification approximately 3 Del18b2HOP5HW number, allowing us million adult MHybridDataDictio to determine patient discharges from nary01072019.xlsx history from previous more than 450 nonhospitalizations and Federal acute care

	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
		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_Mor tality_Data_Dictionar y_Final-63697330064376210 6.xlsx	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_Dat_Dictionary_v3.0_Fishall. 19.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 Home or Custodial Care Services	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	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	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	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	Number of deaths (DISP=20) among cases meeting the inclusion and exclusion rules for the denominator.	Number of in- hospital deaths

	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
	30 days of the index admission date.	hospital with a principal diagnosis of AMI. Additional details are provided in S.5 Numerator Details.	and older discharged from the hospital with a principal diagnosis of HF. Additional details are provided in S.5 Numerator Details.	patients with a principal discharge diagnosis of acute ischemic stroke.		
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 Administratior's Death Master File (DMF) or the Centers for Disease Control and Prevention's National Death Index (NDI). Reference: 1. Simoes J, Grady J, Puroid J, Puroid J, Condition S, Death Master File (DMF) or the Centers for Disease Control and Prevention's National Death Index (NDI). Reference: 1. Simoes J, Grady J, Puroid J	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 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). Ref. File Control of Control Contr	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.quality indicators.ahrq.gov/ Modules/IQI_TechS pec.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
		et.org/dcs/ContentSe rver?c=Page&pagena me=QnetPublic/Page /QnetTier3&cid=1163 010421830. Accessed May 4, 2018.	Level 30-Day Risk-Standardized Mortality Measures. http://www.quality net.org/dcs/Content Server?c=Page&pag ename=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:h4 11			
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 nonfederal 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 nonfederal 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/com orbidities and codes with (major) complications/com orbidities 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	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 claimsonly measure so that both measures will capture admissions for patients age 65-94. We deviated from that definition	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	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 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:	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.quality indicators.ahrq.gov/

NATIONAL QUALITY FORUM

NQF REVIEW DRAFT—Comments due by August 26, 2019 by 6:00 PM ET.

F C S	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
	during development and testing due to the limited dataset available that included the EHR data elements meeded 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 included in the measure cohort, but it is the initial hospitalization rather than any "transferred patients are included in the measure cohort, but it is the initial hospitalization rather than any "transfer-in" hospitalization for which the mortality outcome is attributed (the index admission). 2. Aged between 50 and 94 years The hybrid measure 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 included as the hospitalization for a population but was the hospitalization for a population for the hospitaliz	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.	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.	1. Enrolled in Medicare fee-forservice (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 artery with cerebral infarction 433.31 Occlusion and stenosis of multiple and bilateral precerebral artery with cerebral infarction 433.81 Occlusion and stenosis of other specified precerebral artery with cerebral infarction 433.81 Occlusion and stenosis of other specified precerebral artery with cerebral infarction 433.91 Occlusion and stenosis of other specified precerebral artery with cerebral infarction 434.01 Cerebral artery with cerebral infarction 434.01 Cerebral artery with cerebral infarction 434.91 Cerebral artery occlusion, unspecified with cerebral infarction 434.91 Cerebral artery occlusion or stenosis of basilar arterion due to ensolism of uspecified occlusion or stenosis of basilar arteries IG3.22 Cerebral infarction due to embolism of unspecified carotid arteries IG3.139 Cerebral infarction due to embolism of unspecified carotid artery IG3.239 Cerebral infarction due to embolism of unspecified carotid artery IG3.239 Cerebral infarction due to embolism of unspecified carotid artery IG3.239 Cerebral infarction due to		Modules/IQI_TechS pec.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
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 hospice enrollment is indequate to differentiate this issue. However, for most patients and hospice enrollment is not likely the primary goal due to their condition 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 their index admission Rationale: Patients admitted primarily for cancer who are enrolled in hospice during their index admission are unlikely to have 30-day survival as a primary goal dat do the discussion are unlikely to have 30-day survival as a primary goal dat do the discussion are unlikely to have 30-day survival as a primary goal dat do the discussion are unlikely to have 30-day survival as a primary goal dat do their condition and not the quality of care enceived.			unspecified occlusion or stenosis of unspecified carotid arteries 163.019 Cerebral infarction due to thrombosis of unspecified vertebral artery 163.119 Cerebral infarction due to embolism of unspecified vertebral artery 163.219 Cerebral infarction due to unspecified occlusion or stenosis of unspecified occlusion or stenosis of unspecified vertebral arteries 163.59 Cerebral infarction due to unspecified occlusion or stenosis of other cerebral artery 163.20 Cerebral infarction due to unspecified occlusion or stenosis of unspecified cerebral artery 163.40 Cerebral infarction due to thrombosis of unspecified cerebral artery 163.50 Cerebral infarction due to embolism of unspecified cerebral artery 167.8 Other specified cerebral artery 167.8 Other specified cerebrovascular diseases 167.89 Other cerebral artery 167.8 Other specified cerebrovascular diseases 167.89 Other cerebral artery 163.50 Cerebral infarction due to unspecified cerebrovascular diseases 167.89 Other cerebral artery 167.8 Other specified cerebrovascular diseases 167.89 Other cerebral artery 163.50 Cerebral infarction due to unspecified cerebrovascular diseases 167.89 Other cerebral artery 163.50 Cerebral infarction due to unspecified 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
	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					
NATIONAL OL	for the complex JALITY FORUM					 154

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
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 stroke severity	
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,	
NATIONAL QUALITY FORUM	150

	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
	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 nonsurgical 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 234), 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	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).	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	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 immunocompromis ed state (Appendix I: IMMUNID) with any listed ICD-10-PCS procedure codes for immunocompromis ed state (Appendix I: IMMUNID) with any listed ICD-10-PCS procedure codes for immunocompromis ed state (Appendix I: IMMUNIP) transfer to an acute care facility (DISP=2) with missing discharge disposition (DISP=missing), gender	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 in that division within the measurement year.	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.	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.		(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 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 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	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, including the first day of the index admission. Enrollment to Medicare beneficiaries is determined using the Medicare Enrollment Database. Rationale: These patients are likely	1. Inconsisten t 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 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	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	Appendix G: Trauma Diagnosis Codes Appendix H: Cancer Diagnosis Codes Appendix I: Immunocompromis ed State Diagnosis and Procedure Codes (See attached Appendix G, Appendix I for detailed list of codes.)	See Inpatient Quality Indicators: Technical Specifications for additional details (available at http://www.qualityi ndicators.ahrq.gov/ Modules/IQI_TechS pec.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
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 nonconvergence 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 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 unique cut-off volume CCS codes (CCS<100 patients) into one groups would precide volume Cute codes in the unique cute for the individual ICD-10 codes in the unique cute for the individual ICD-10 codes in the unique cute for the individual ICD-10 codes in the unique cute for the individual ICD-10 codes in the unique cute for the individual ICD-10 codes in the unique cute f	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.	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 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 provading the index admission or in the 12 months prior to the index admission Patients with LVAD implantation or in the ransplantation during an index admission Patients with LVAD implantation or heart transplantation during an index admission or in the previous 12 months	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 admissions. 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
Risk	Statistical risk model	Statistical risk model	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. The July admissions are excluded to avoid assigning a single death to two admissions. 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 =	Rate/proportion better quality = lower	Rate/proportion better quality =	Rate/proportion better quality =	Rate/proportion better quality =	
Algorithm	Iower score The measure estimates hospital- level, risk-	score The measure estimates hospital- level 30-day all-cause	Iower score The measure estimates hospital- level 30-day all-	Iower score The measure estimates hospital- level, 30-day, all-	lower score Risk adjustment is not currently included in the ICD-	

0530 Mortality for 3502 Hybrid 0230 Hospital 30-day, 0229 Hospital 30-2876 Hospital 30-0347 Death Rate in Hospital-Wide (Allall-cause, riskday, all-cause, riskday, all-cause, risk-Low-Mortality **Selected Conditions** Condition, Allstandardized standardized standardized Diagnosis Related Procedure) Riskmortality rate (RSMR) mortality rate mortality rate Groups (PSI02) Standardized following acute (RSMR) following (RSMR) following myocardial infarction heart failure (HF) acute ischemic Mortality Measure (AMI) hospitalization hospitalization stroke hospitalization with claims-based risk adjustment for stroke severity standardized RSMRs following cause RSMRs cause RSMRs 10-CM/PCS v2018 mortality rates hospitalization for following following of the AHRQ QI hospitalization for hospitalization for (RSMRs) within 30 AMI using specifications, due hierarchical logistic stroke using days of hospital HF using hierarchical to the transition to admission using regression models. In logistic regression hierarchical logistic ICD-10-CM/PCS hierarchical brief, the approach models. In brief, the regression models. (October 1, 2015). logistical simultaneously approach In brief, the At least one full regression models models data at the simultaneously approach year of data coded simultaneously through a Bayesian patient and hospital models data at the in ICD-10-CM/PCS is Markov Chain levels to account for patient and hospital models data at the needed in order to Monte Carlo variance in patient levels to account for patient and develop robust risk (MCMC) outcomes within and variance in patient hospital levels to adjustment models. procedure. In brief, between hospitals outcomes within account for A full year of ICD-(Normand and we used and between variance in patient 10-CM/PCS coded hierarchical logistic Shahian, 2007). At hospitals (Normand outcomes within all-payer data will regression to the patient level, it and Shahian, 2007). and between not be available model the log-odds models the log-odds At the patient level, hospitals (Normand until mid-2019. of mortality for of mortality within 30 it models the logand Shahian, 2007). AHRQ will each of the 15 days of discharge odds of mortality At the patient level, announce an service-line using age, sex, within 30 days of it models the loganticipated date as divisions. Death selected clinical index admission odds of mortality soon as one is using age, sex, within 30 days of within 30 days was covariates, and a known. modeled as a hospital-specific selected clinical index admission function of patientintercept. At the covariates, and a using age, selected level demographic hospital level, it hospital-specific clinical covariates, and clinical models the hospitalintercept. At the and a hospitalcharacteristics and specific intercepts as hospital level, it specific intercept. models the hospitala random hospitalarising from a normal At the hospital level intercept. This distribution. The specific intercepts level, it models the model specification hospital intercept as arising from a hospital-specific accounts for normal distribution. represents the intercepts as The hospital within-hospital underlying risk of arising from a correlation of the mortality at the intercept represents normal observed hospital, after the underlying risk distribution. The outcomes and accounting for of a mortality at the hospital intercept patient risk. The models the hospital, after represents the assumption that hospital-specific accounting for underlying risk of a patient risk. The underlying intercepts are given a mortality at the differences in distribution to hospital-specific hospital, after quality among the account for the intercepts are given accounting for health care clustering (nona distribution to patient risk. The facilities being independence) of account for the hospital-specific patients within the evaluated lead to clustering (nonintercepts are systematic same hospital. If independence) of given a distribution differences in there were no patients within the to account for the outcomes. We differences among same hospital. If clustering (nonestimated a hospitals, then after there were no independence) of separate adjusting for patient differences among patients within the hierarchical logistic risk, the hospital hospitals, then after same hospital. If there were no regression model intercepts should be adjusting for patient for each serviceidentical across all risk, the hospital differences among hospitals. line division. In intercepts should be hospitals, then order to obtain the identical across all after adjusting for The RSMR is variance and hospitals. patient risk, the calculated as the hospital intercepts interval estimates, The RSMR is ratio of the number we fit the should be identical of "predicted" to the calculated as the hierarchical model across all hospitals. number of ratio of the number under the Bayesian "expected" deaths, of "predicted" to The RSMR is framework along calculated as the multiplied by the the number of with the Markov national unadjusted "expected" deaths ratio of the number Chain Monte Carlo mortality rate. For at a given hospital, of "predicted" to (MCMC) technique. each hospital, the multiplied by the the number of "expected" deaths Admissions are numerator of the national observed assigned to one of ratio ("predicted") is mortality rate. For at a given hospital, 15 mutually the number of deaths each hospital, the multiplied by the exclusive divisions within 30 days numerator of the national observed (groups of predicted on the ratio is the number mortality rate. For discharge condition basis of the hospital's of deaths within 30 each hospital, the categories and performance with its days predicted on numerator of the procedure observed case mix, the basis of the ratio is the number and the denominator categories). For hospital's of deaths within 30 each division and ("expected") is the performance with days predicted on each hospital with number of deaths its observed case the basis of the patients in that expected on the basis mix, and the hospital's performance with division, the of the nation's denominator is the its observed case standardized performance with number of deaths mortality ratio that hospital's case expected based on mix, and the (SMR) is calculated mix. This approach is the nation's denominator is the as the ratio of the analogous to a ratio performance with number of deaths expected based on number of of "observed" to that hospital's case "predicted" deaths "expected" used in mix. This approach the nation's is analogous to a to the number of other types of performance with

3502 Hybrid 0230 Hospital 30-day, 0229 Hospital 30-2876 Hospital 30-0347 Death Rate in 0530 Mortality for Hospital-Wide (Allday, all-cause, riskday, all-cause, riskall-cause, risk-Low-Mortality Selected Conditions Diagnosis Related Condition, Allstandardized standardized standardized Procedure) Riskmortality rate (RSMR) mortality rate mortality rate Groups (PSI02) Standardized following acute (RSMR) following (RSMR) following myocardial infarction acute ischemic Mortality Measure heart failure (HF) (AMI) hospitalization hospitalization stroke hospitalization with claims-based risk adjustment for stroke severity that hospital's case "expected" deaths statistical analyses. It ratio of "observed" at a given hospital. conceptually allows to "expected" used mix. This approach The predicted for a comparison of a in other types of is analogous to a number of deaths particular hospital's statistical analyses. ratio of "observed" is based on the performance given its It conceptually to "expected" used hospital's case mix to an allows for a in other types of performance with average hospital's comparison of a statistical analyses. its observed case performance with particular hospital's It conceptually performance given mix and service the same case mix. allows for a mix, and is Thus, a lower ratio its case mix to an comparison of a calculated by using indicates loweraverage hospital's particular hospital's the coefficients than-expected performance with performance given estimated by mortality or better the same case mix. its case mix to an regressing the risk quality and a higher Thus, a lower ratio average hospital's factors and the ratio indicates indicates lowerperformance with hospital-specific higher-than-expected than-expected the same case mix. effect on the risk of mortality or worse mortality rates or Thus, a lower ratio mortality. The quality. better quality, and a indicates lowerestimated hospitalhigher ratio than-expected The "predicted" specific effect for indicates highermortality rates or number of deaths each cohort is better quality, and than-expected (the numerator) is a higher ratio added to the sum mortality rates or calculated by using of the estimated worse quality. indicates higherthe coefficients regression than-expected The "predicted" estimated by coefficients mortality rates or regressing the risk number of deaths multiplied by worse quality. (the numerator) is factors and the patient hospital-specific calculated by using The "predicted" characteristics. The the coefficients intercept on the risk number of deaths results are estimated by of mortality. The (the numerator) is transformed via an estimated hospitalregressing the risk calculated by using inverse logit the coefficients specific effect is factors and the function and added to the sum of hospital-specific estimated by summed over all intercept on the risk the estimated regressing the risk patients attributed of mortality. The regression factors and the to a hospital to get coefficients estimated hospitalhospital-specific a predicted value. multiplied by the specific effect is intercept on the The expected added to the sum of risk of mortality. patient number of deaths characteristics. The the estimated The estimated is based on the results are log hospital-specific regression nation's transformed and coefficients intercept is added performance with summed over all multiplied by the to the sum of the that hospital's case patients attributed to patient estimated mix and service mix a hospital to get a characteristics. The regression and is obtained in predicted value. The results are log coefficients the same manner, "expected" number transformed and multiplied by the but a common of deaths (the summed over all patient effect using all denominator) is patients attributed characteristics. The hospitals in our obtained in the same to a hospital to get a results are sample is added in predicted value. The transformed and manner, but a place of the "expected" number summed over all common intercept hospital-specific of deaths (the patients attributed using all hospitals in effect. The results our sample is added denominator) is to a hospital to get are transformed in place of the obtained in the a predicted value. via an inverse logit hospital specific same manner, but a The "expected" function and intercept. The results common intercept number of deaths summed over all are log transformed using all hospitals in (the denominator) patients in the and summed over all our sample is added is obtained in the hospital to get an in place of the patients in the same manner, but expected value. hospital to get an hospital-specific a common This approach is intercept. The expected value. To intercept using all analogous to a assess hospital results are log hospitals in our ratio of "observed" performance for each transformed and sample is added in to "expected" used reporting period, we summed over all place of the in other types of re-estimate the patients in the hospital-specific statistical analyses. model coefficients hospital to get an intercept. The It conceptually using the years of expected value. To results are allows a particular data in that period. assess hospital transformed and hospital's performance for summed over all This calculation performance, given patients in the each reporting transforms the ratio its case mix and period, we rehospital to get an of predicted over service mix, to be estimate the model expected value. To expected into a rate compared to an coefficients using assess hospital that is compared to average hospital's the years of data in performance for the national performance with that period. each reporting observed the same case mix period, we re-This calculation readmission rate. The and service mix. estimate the model transforms the ratio hierarchical logistic Thus, a lower ratio coefficients using regression models of predicted over indicates lowerthe years of data in are described fully in expected into a rate than-expected that period. the original that is compared to mortality rates or methodology report This calculation the national better quality, (Krumholz et al., observed mortality transforms the while a higher ratio 2005). ratio of predicted rate. 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
	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.	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.	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.	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 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	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	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 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	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	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:

0530 Mortality for 3502 Hybrid 0230 Hospital 30-day, 0229 Hospital 30-2876 Hospital 30-0347 Death Rate in Hospital-Wide (Allall-cause, riskday, all-cause, riskday, all-cause, risk-Low-Mortality Selected Conditions Condition, Allstandardized standardized standardized Diagnosis Related Procedure) Riskmortality rate (RSMR) mortality rate mortality rate Groups (PSI02) Standardized following acute (RSMR) following (RSMR) following acute ischemic Mortality Measure myocardial infarction heart failure (HF) hospitalization (AMI) hospitalization stroke hospitalization with claims-based risk adjustment for stroke severity (RSRR) following for specific elective primary or undergo a heart failure (HF) conditions and total hip specific procedure). procedures. By hospitalization arthroplasty (THA) Additionally, this and/or total knee measuring 0505: Hospital 30measure and the mortality outcomes arthroplasty (TKA) NQF endorsed day all-cause riskacross almost all **Acute Stroke** standardized 0506: Hospital 30hospitalized Mortality Rate (IQI readmission rate day, all-cause, riskpatients, this 17) (AHRQ) (RSRR) following standardized Measure #0467 are measure will acute myocardial readmission rate provide an complementary infarction (AMI) (RSRR) following important and related rather hospitalization. pneumonia additional than competing hospitalization 1893: Hospital 30performance measures. 0330: Hospital 30-Day, all-cause, riskassessment that Although they both standardized day, all-cause, riskwill complement assess mortality for mortality rate (RSMR) standardized condition- and patients admitted following chronic readmission rate procedure-specific to acute care obstructive (RSRR) following or other more hospitals with a pulmonary disease heart failure (HF) narrowly defined principal discharge (COPD) hospitalization mortality measures diagnosis of acute hospitalization 0505: Hospital 30ischemic stroke. and allow a greater 0468: Hospital 30day all-cause risknumber of patients the specified day, all-cause, riskstandardized and hospitals to be outcomes are standardized readmission rate evaluated. This different. Our mortality rate (RSMR) (RSRR) following **HWM** measure measure assesses following pneumonia acute myocardial captures a similarly 30-day mortality, hospitalization infarction (AMI) broad cohort to while #0467 hospitalization. 0229: Hospital 30the CMS Hospitalassesses inpatient day, all-cause, risk-1789: Hospital-Wide All-Cause mortality. The 30standardized Wide All-Cause Risk-Standardized day mortality and mortality rate (RSMR) Unplanned Readmission inpatient mortality following heart Readmission Measure (NQF outcomes each failure (HF) Measure (HWR) #1789), and a have distinct hospitalization broader cohort 5a.1 Are specs advantages and than those of other 5a.1 Are specs completely uses, which make CMS conditioncompletely harmonized? Yes them specific measures. harmonized? Yes complementary 5a.2 If not Because the (and related) as 5a.2 If not completely mortality measure opposed to harmonized, completely is focused on a competing. For harmonized, identify identify difference, different outcome, example the 30-day difference, rationale, rationale, impact: it differs from the period provides a impact: We did not We did not include existing CMS broader include in our list of in our list of related Hospital-Wide Allperspective on related measures any measures any non-Cause Risk hospital care and non-outcome (e.g., outcome (e.g., Standardized utilizes a standard process) measures process) measures Readmission time period to with the same target with the same Measure (NQF examine hospital population as our target population as #1789) in a couple performance to measure. Our our measure. Our of ways. First, this avoid bias by measure cohort was measure cohort was **HWM** measure differences in heavily vetted by heavily vetted by includes patients length of stay clinical experts, a clinical experts. with a principal among hospitals. Additionally, the technical expert discharge diagnosis However, in some measure, with the panel, and a public of cancer, whereas settings it may not specified cohort, has comment period. those patients are be feasible to been publicly Additionally, the not included in the capture postreported since 2008. measure, with the readmission discharge specified cohort, has Because this is an mortality, making measure. Cancer outcome measure, been publicly patients are the inpatient reported since 2008. clinical coherence of appropriate to measure more the cohort takes Because this is an include as many useable. We have precedence over outcome measure, have survival as previously alignment with clinical coherence of consulted with their primary goal, related non-outcome the cohort takes AHRQ to examine however due to measures. precedence over cancer treatment harmonization of alignment with Furthermore, nonplans, readmissions the measures' related nonoutcome measures are frequently part cohort. As a result are limited due to outcome measures. of the plan and of that broader patient Furthermore, nonexpected and collaboration, we exclusions. This is outcome measures therefore are not a have found that are limited due to because they reasonable signal the measures' typically only include broader patient of quality. Another cohorts are a specific subset of exclusions. This is difference between harmonized to the patients who are because they the two measures extent possible and eligible for that typically only is the number of that the small include a specific measure (for differences in divisions or example, patients subset of patients cohort inclusion specialty cohorts who are eligible for who receive a the patients are and exclusion specific medication that measure (for divided into in criteria are or undergo a specific example, patients order to more appropriate procedure). who receive a accurately risk because the specific medication

NATIONAL QUALITY FORUM

NOT DESCRIPTION DRAFT. Common and the August 25, 2010 by 6,00 PM FT.

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
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 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 inhospital mortality. IQI 90 (NQF #0530) is another complimentary mortality measure, which is a composite measure of the number of inhospital deaths for a narrow range of conditions (CHF, stroke, hip fracture, pneumonia, acute myocardial infarction and Gl 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 rationale for	5b.1 If competing, why superior or rationale for additive value: N/A	or undergo a specific procedure). 5b.1 If competing, why superior or rationale for additive value: N/A	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 inhospital) 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) in any given program.		

	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	
	additive value: There are no competing NQF- endorsed measures.						

Lomparisc	on of NQF 3504	4, 1789, 1550, 0	468, 1893, 2558,	0230, 0229, 28	67, 0347 and 05	530	
Steward Description	3504 Claims- Only Hospital- Wide (All- Condition, All- Procedure) Risk- Standardized Mortality Measure Centers for Medicare & Medicaid Services (CMS) The measure estimates a hospital-level 30-day hospital-wide risk- standardized mortality rate	1789 Hospital-Wide All-Cause Unplanned Readmission Measure (HWR) Centers for Medicare & Medicaid Services (CMS) For the hospital-wide readmission (HWR) measure that was previously endorsed and is used in the Hospital Inpatient	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 The measure estimates a hospital-level risk-standardized complication rate (RSCR) associated with elective primary THA and	0468 Hospital 30-day, all- cause, risk- standardized mortality rate (RSMR) following pneumonia hospitalization Centers for Medicare & Medicaid Services (CMS) This measure estimates a hospital-level, 30-day risk- standardized mortality rate (RSMR) for patients	1893 Hospital 30-Day, all-cause, risk-standardized mortality rate (RSMR) following chronic obstructive pulmonary disease (COPD) hospitalization Centers for Medicare & Medicaid Services This measure estimates a hospital-level, 30-day risk-standardized mortality rate (RSMR) for patients	2558 Hospital 30-Day, All- Cause, Risk- Standardized Mortality Rate (RSMR) Following Coronary Artery Bypass Graft (CABG) Surgery Centers for Medicare & Medicaid Services The measure estimates a hospital-level, risk- standardized mortality rate (RSMR) for patients	0230 Hospital 30-day, all- cause, risk- standardized mortality rate (RSMR) following acute myocardial infarction (AMI) hospitalization Centers for Medicare & Medicaid Services (CMS) This measure estimates a hospital-level, 30-day risk- standardized mortality rate (RSMR) for patients
	(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 implementatio n, the two measures will be exactly the same, with the exception of the additional risk adjustment added by the CCDE in the hybrid	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/gynecolo gy; general medicine; cardiorespiratory; cardiovascular; and neurology, each of which will be described in greater detail below. The measure also indicates the hospital-level	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.	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 feefor-service (FFS) beneficiaries and hospitalized in non-federal acute care	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	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 Feefor-Service (FFS) patients 65 years and older and was tested in all-payer patients 18 years and older.	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 feefor-service (FFS) beneficiaries hospitalized in non-federal hospitals or patients hospitalized in Veterans Health Administration (VA) facilities.
	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	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		hospitals.			

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
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. Datase t 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 nation-wide Medicare FFS claims and the enrollment database. b. The hybrid measure uses nation-wide Medicare FFS claims and the enrollment database. b. The hybrid measure uses nation-wide Medicare FFS claims and the enrollment database. b. The hybrid measure uses nation-wide Medicare FFS claims and the enrollment database. b. The hybrid measure includes in patients in cohort: a. The claims-only measure includes Alge of patients age 50-94 (see later	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 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	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	0468 Hospital 30-day, all- cause, risk- standardized mortality rate (RSMR) following pneumonia	1893 Hospital 30- Day, all-cause, risk-standardized mortality rate (RSMR) following chronic obstructive pulmonary	2558 Hospital 30-Day, All- Cause, Risk- Standardized Mortality Rate (RSMR) Following Coronary Artery	0230 Hospital 30-day, all- cause, risk- standardized mortality rate (RSMR) following acute myocardial
	Measure		arthroplasty (TKA)	hospitalization	disease (COPD) hospitalization	Bypass Graft (CABG) Surgery	infarction (AMI) hospitalization
	discussion for					1 (1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1	
	justification) 3.						
	Extern al 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.						
	Socioe conomic 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. Exclusi						
	on 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.						
	Meani ngful						
	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 implementatio						
	n:						
	1. Risk adjustment:						
	a. The						
	claims-only measure uses						
NATIONAL Q	UALITY FORUM						169

	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
Туре	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.	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/coverag e, and vital status information. This data source was used to obtain information on several inclusion/exclus ion indicators such das Medicare status on admission as	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	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	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/exclusi on indicators such as Medicare status on admission as well as vital status. These data have previously been shown to accurately reflect patient vital status	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/exclusio n 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	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/exclusi on indicators such as Medicare status on admission as well as vital status. These data have previously been shown to accurately reflect patient vital status (Flemical Figure 1992).	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/coverag e, and vital status information. This data source was used to obtain information on several inclusion/exclusi on indicators such as Medicare status on admission as well as vital status. These data have
	well as vital status. It was also used to determine hospice enrollment.	data source was used to obtain information on several inclusion/exclusion indicators such as Medicare	definition of THA/TKA complication (original model specification) against a medical record data.	(Fleming et al., 1992). 3. The American Community Survey (2008- 2012): The American	American Community Survey data is collected annually and an aggregated 5- years data was	The American Community Survey (2008- 2012): The American Community Survey data is	previously been shown to accurately reflect patient vital status (Fleming et al., 1992).

	3504 Claims- Only Hospital- Wide (All- Condition, All-	1789 Hospital- Wide All-Cause Unplanned Readmission	1550 Hospital-level risk-standardized complication rate (RSCR) following	0468 Hospital 30-day, all- cause, risk- standardized	1893 Hospital 30- Day, all-cause, risk-standardized mortality rate	2558 Hospital 30-Day, All- Cause, Risk- Standardized	0230 Hospital 30-day, all- cause, risk- standardized
	Procedure) Risk- Standardized	Measure (HWR)	elective primary total hip arthroplasty (THA)	mortality rate (RSMR) following	(RSMR) following chronic obstructive	Mortality Rate (RSMR) Following	mortality rate (RSMR) following acute
	Mortality Measure		and/or total knee arthroplasty (TKA)	pneumonia hospitalization	pulmonary disease (COPD) hospitalization	Coronary Artery Bypass Graft (CABG) Surgery	myocardial infarction (AMI) hospitalization
	No data	status on	3. Data abstracted	Community	used to calculate	collected	3. Veterans
	collection	admission and following	from medical	Survey data is collected	the AHRQ SES composite index	annually and an aggregated 5-	Health
	instrument provided	discharge from	records from eight participating	annually and an	score.	years data was	Administration Data: This data
	Attachment	index admission	hospitals	aggregated 5-	4. Data sources	used to calculate	source contains
	Del18b1HOP5H WMClaimsData	ACR 1. Medicare Part	(approximately 96 records per	years data was used to calculate	for the all-payer testing: For our	the AHRQ socioeconomic	claims data for VA inpatient and
	Dictionary0107	A claims data for	hospital; 644 total	the AHRQ SES	analyses to	status (SES)	outpatient
	2019.xlsx	calendar years	records) for Medicare	composite index score.	examine use in all-payer data, we	composite index score.	services including:
		2013, 2014, and 2015.	beneficiaries over	4. Data sources	used all-payer	Data sources for	inpatient
		2. Medicare	the age of 65 years who had a	for the all-payer update:	data from California.	the all-payer testing: For our	hospital care, outpatient
		Enrollment Database (EDB).	qualifying THA/TKA	For our analyses	California is a	analyses to	hospital services,
		Reference:	procedure between January 1 2007 and	to examine use	diverse state, and, with more	examine use in all-payer data,	skilled nursing facility care,
		Fleming C., Fisher	December 31, 2008.	in all-payer data, we used all-	than 37 million	we used all-	some home
		ES, Chang CH, Bubolz D,	The measure was also specified and	payer data from	residents, California	payer data from California.	health agency services, as well
		Malenda J.	testing using an all-	California in addition to CMS	represents 12% of	California is a	as inpatient and
		Studying outcomes and	payer claims dataset although it	data for Medicare FFS	the US population. We	diverse state, and, with more	outpatient physician claims
		hospital utilization in the	is only publically	patients aged 65	used the	than 37 million	for the 12
		elderly: The	reported using the data sources listed	years or over	California Patient Discharge Data, a	residents, California	months prior to and including
		advantages of a	above	(65+) in California	large, linked	represents 12%	each index
		merged data base for Medicare and	4. California Patient	hospitals. California is a	database of patient hospital	of the US population. We	admission. Unlike Medicare
		Veterans Affairs Hospitals.	Discharge Data is a large, linked	diverse state,	admissions. In	used the	FFS patients, VA
		Medical Care.	database of patient	and, with more than 37 million	2006, there were approximately 3	California Patient	patients are not required to have
		1992; 30(5): 377- 91.	hospital admissions in the state of	residents,	million adult	Discharge Data,	been enrolled in
		Available in	California. Using all- payer data from	California represents 12%	discharges from more than 450	a large linked database of	Part A and Part B Medicare for the
		attached	California, we	of the US	non-Federal	patient hospital	12 months prior
		appendix at A.1 Attachment	performed analyses to determine	population. We used the	acute care hospitals. Records	admissions. In 2006, there	to the date of admission.
		NQF_1789_NQF_	whether the	California	are linked by a	were	All-payer data
		Data_Dictionary_ 05-26-	THA/TKA complication	Patient Discharge Data,	unique patient identification	approximately 3 million adult	sources: For our analyses
		17_v1.0.xlsx	measure can be	a large, linked	number, allowing	discharges from	to examine use
			applied to all adult patients, including	database of patient hospital	us to determine patient history	more than 450 non-Federal	in all-payer data, we used all-
			not only FFS	admissions. In	from previous	acute care	payer data from
			Medicare patients aged 65 years or	2009, there were 3,193,904	hospitalizations and to evaluate	hospitals. Records are	California in addition to CMS
			over, but also non-	adult discharges	rates of both readmission and	linked by a	data for
			FFS Medicare patients aged 18-64	from 446 non- Federal acute	mortality (via	unique patient identification	Medicare FFS 65+ patients in
			years at the time of	care hospitals.	linking with California vital	number, allowing us to	California
			admission. Additional Data	Records are linked by a	statistics records).	determine	hospitals. California is a
			source used for	unique patient	Using all-payer	patient history from previous	diverse state,
			analysis of the impact of SES	identification number,	data from California, we	hospitalizations	and, with more than 37 million
			variables on the	allowing us to determine	performed analyses to	and to evaluate rates of both	residents,
			measure's risk model. Note, the	patient history	determine	readmission and	California represents 12%
			variables derived	from previous hospitalizations	whether the COPD mortality	mortality (via linking with	of the US population. We
			from these data are not included in the	and to evaluate	measure can be	California vital	used the
			measure as	rates of both readmission and	applied to all adult patients,	statistics records).	California Patient
			specified 5. The American	mortality (via	including not only	Using all-payer	Discharge Data,
			Community Survey	linking with California vital	FFS Medicare patients aged 65	data from California, we	a large, linked database of
			(2009-2013): The American	statistics	or over, but also	performed	patient hospital
			Community Survey	records). Using all-payer	non-FFS Medicare patients aged 18-	analyses to determine	admissions. In 2006, there
			data is collected annually and an	data from	64 years at the	whether the HF	were
			aggregated 5-years	California as well as CMS	time of admission.	readmission measure can be	approximately 3 million adult
			data was used to calculate the AHRQ	Medicare FFS	Reference:	applied to all	discharges from
			socioeconomic	data for California	Fleming C., Fisher ES, Chang CH,	adult patients, including not	more than 450 non-Federal
			status (SES) composite index	hospitals, we	Bubolz D,	only FFS	acute care
			score.	performed analyses to	Malenda J. Studying	Medicare patients aged 65	hospitals. Records are
			Reference: Fleming C., Fisher	determine	outcomes and	years or older,	linked by a
			ES, Chang CH,	whether the pneumonia	hospital utilization in the	but also non-FFS Medicare	unique patient identification
			Bubolz D, Malenda J. Studying	mortality	elderly: The	patients aged	number,
NATIONAL O	UALITY FORUM			measure can be	advantages of a	18-64 years at	allowing us to

	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 merged data base	2558 Hospital 30-Day, All- Cause, Risk- Standardized Mortality Rate (RSMR) Following Coronary Artery Bypass Graft (CABG) Surgery the time of	0230 Hospital 30-day, all- cause, risk- standardized mortality rate (RSMR) following acute myocardial infarction (AMI) hospitalization determine
			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.xls x	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_Pneu monia_Mortality _Data_Dictionar y_09-26-17_v1.0.xls	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.xl sx	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_CAB G_Mortality_Dat a_Dictionary_12 -30-16_v1.0.xlsx	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 65+ and younger 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. Medicare and Veterans Affairs hospitals utilization in the elderly: The advantages of a merged data base for Medicare and Veterans Affairs hospitals utilization in the elderly: The advantages of a merged data base for Medicare and Veterans Affairs hospital utilization in the elderly: The advantages of a merged data base for Medicare and Veterans Affairs hospital utilization in the elderly: The advantages of a merged data base for Medicare and Veterans Affairs hospitals utilization in the elderly: The advantages of a merged data base for Medicare and Veterans Affairs hospital utilization in the elderly: The advantages of a merged data base for Medicare and Veterans Affairs hospital utilization in the elderly: The advantages of a merged data base for Medicare and Veterans Affairs hospital utilization in the elderly: The advantages of a merged data base for Medicare and Veterans Affairs hospital utilization in the elderly: The advantages of a merged data
Level	Facility	Facility, Integrated Delivery System	Facility	Facility	Facility	Facility	Facility
Setting	Inpatient/Hospi tal	Inpatient/Hospita I, Outpatient Services	Inpatient/Hospital	Inpatient/Hospit al	Inpatient/Hospita I	Inpatient/Hospit al	Inpatient/Hospit al
Numerator Statement	The outcome for this measure is 30-day, all-cause mortality.	The outcome for the HWR measure is 30-day readmission. We define	The outcome for this measure is any complication occurring during the	The outcome for this measure is 30-day, all-cause mortality. We define mortality	The outcome for this measure is 30-day, all-cause mortality. We define mortality	The outcome for this measure is 30-day all-cause mortality.	The outcome for this measure is 30-day all-cause mortality. We define mortality

	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 is defined as death from any cause, either during or after admission, within 30 days of the index admission date.	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 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. The outcome for that index admission. The outcome for the ACR measure is also 30-day readmission. The outcome for the ACR measure is also 30-day readmission. The outcome for the ACR measure is also 30-day readmission. The outcome for the ACR measure is also 30-day readmission. The outcome for the ACR measure is also 30-day readmission. The outcome for the ACR measure is also 30-day readmission. The outcome for the ACR measure is also 30-day readmission. The outcome for the ACR measure is also 30-day readmission. The outcome for the ACR measure is also 30-day readmission. The outcome for the ACR measure is also 30-day readmission. The outcome for the ACR measure is also 30-day readmission.	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".	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.	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.	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.	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	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	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 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	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	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	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	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

3504 Claims-1789 Hospital-1550 Hospital-level 0468 Hospital 1893 Hospital 30-2558 Hospital 0230 Hospital Only Hospital-Wide All-Cause risk-standardized 30-day, all-30-Day, All-30-day, all-Day, all-cause, Wide (Allcause, riskrisk-standardized Cause, Risk-Unplanned complication rate cause, risk-Standardized Condition, All-Readmission (RSCR) following standardized mortality rate standardized Procedure) Measure (HWR) elective primary mortality rate (RSMR) following **Mortality Rate** mortality rate Risktotal hip (RSMR) chronic (RSMR) (RSMR) Following Standardized obstructive following acute arthroplasty (THA) following Mortality and/or total knee **Coronary Artery** pneumonia pulmonary myocardial Measure hospitalization disease (COPD) **Bypass Graft** infarction (AMI) arthroplasty (TKA) (CABG) Surgery hospitalization hospitalization whether the admission (and are 30 days of influenced by contiguous 30 days of The Planned patient died admission can hospital care and admissions, at admission can Readmission not present on within 30 days admission) or be influenced by appropriate least one of be influenced by Algorithm is a set of the index transition to the during a hospital care which involves a hospital care of criteria for admission date. readmission. and early and early non-acute care qualifying classifying transition to the setting. The 30isolated CABG transition to the readmissions as The complications non-acute care day time frame is procedure is as non-acute care planned among captured in the setting. The 30a clinically follows: setting. The 30the general numerator are day time frame meaningful day time frame Medicare 1) If a patient identified during is a clinically period for is a clinically undergoes a population using the index admission meaningful hospitals to meaningful Medicare OR associated with CABG procedure period for collaborate with period for administrative a readmission up to in the first hospitals to their hospitals to claims data. The 90 days post-date of hospital and is collaborate with communities to collaborate with algorithm index admission, then transferred reduce mortality their their identifies depending on the to a second communities to (Simoes et al., communities to admissions that complication. The hospital where reduce mortality 2018; reduce are typically follow-up period for there is no CABG (Simoes et al., Dharmarajan et mortality. planned and may complications from procedure, the 2017; al., 2015). (Simoes et al., occur within 30 date of index mortality Dharmarajan et 2018; days of discharge admission is as Identifying deaths outcome is al., 2015). Dharmarajan et from the hospital. follows: in the Medicare attributed to the al., 2015). The Planned Identifying FFS population first hospital The follow-up deaths in the performing the Identifying Readmission As currently period for AMI, Medicare FFS index CABG deaths in the Algorithm has pneumonia, and reported, we procedure and Medicare FFS population three sepsis/septicemia/s identify deaths the 30-day population fundamental hock is seven days As currently for FFS Medicare window starts principles: As currently reported, we patients 65 years from the date of with the date of identify deaths and older in the index admission reported, we 1. A few specific, index CABG for FFS Medicare identify deaths limited types of because these Medicare procedure. conditions are more Enrollment for FFS Medicare care are always patients 65 Database (EDB). Rationale: A patients 65 considered likely to be years and older years and older planned attributable to the in the Medicare transfer Reference: in the Medicare procedure if they following CABG (obstetric Enrollment 1. Simoes J, Grady delivery, occur within the Database (EDB). is most likely Enrollment J, Purvis D, et al. first week after the transplant due to a Database (EDB). Identifying 2018 Conditionprocedure. complication of surgery, deaths in the all-Identifying Specific Measures Additionally, payer the index maintenance deaths in the all-Updates and analyses indicated a procedure and chemotherapy/im population payer Specifications munotherapy, sharp decrease in that care population For the purposes Report Hospitalthe rate of these provided by the rehabilitation); of development Level 30-Day Risk-For the purposes complications after hospital 2. Otherwise, a of an all-payer Standardized of development seven days. performing the planned measure, deaths Mortality of an all-payer CABG procedure Death, surgical site readmission is were identified Measures. measure, deaths likely dominates bleeding, and defined as a nonusing the http://www.quali were identified pulmonary mortality risk acute California vital tynet.org/dcs/Co using the even among embolism are readmission for a statistics data ntentServer?c=Pa California vital transferred followed for 30 days scheduled file. Nationally, ge&pagename=Q statistics data following admission patients. procedure; and post-discharge netPublic/Page/Q file. Nationally, because clinical 2) If a patient is 3. Admissions for deaths can be netTier3&cid=116 post-discharge experts agree these admitted to a identified using 3010421830. deaths can be acute illness or complications are first hospital but for complications an external Accessed June 6, identified using still likely does not receive source of vital 2018. an external of care are never attributable to the a CABG status, such as source of vital planned. 2. Dharmarajan K, hospital performing procedure there the Social status, such as Hsieh AF, Kulkarni The algorithm the procedure and is then Security the Social VT, et al. 2015 was developed in transferred to a during this period Administration's Security 2011 as part of Trajectories of and rates for these second hospital Death Master Administration's the Hospital-Wide risk after complications where a CABG is Death Master File (DMF) or the hospitalization for Readmission performed, the remained elevated Centers for File (DMF) or the measure. In 2013, heart failure, mortality until roughly 30 Disease Control Centers for CMS applied the acute myocardial outcome is days post and Prevention's **Disease Control** algorithm to its infarction, or attributed to the admission. and Prevention's National Death other pneumonia: second hospital The measure Index (NDI). **National Death** readmission retrospective performing the Index (NDI). follow-up period is References: measures. cohort study. BMJ index CABG 90 days after Reference: 1. Simoes J, (Clinical The Planned procedure and admission for Grady J, DeBuhr researched);350: 1. Simoes J, Readmission the 30-day mechanical J, et al. 2017 Grady J, Purvis h411 Algorithm and window starts complications and Condition-D, et al. 2018 associated code with the date of periprosthetic joint Specific Conditiontables are index CABG infection/wound Measures Specific attached in data procedure. infection. Experts Updates and Measures field S.2b (Data agree that Rationale: Care **Specifications** Updates and Dictionary or provided by the mechanical Report Hospital-Specifications Code Table). complications and hospital Level 30-Day Report Hospitalperiprosthetic joint performing the Risk-Level 30-Day infection/wound CABG procedure Standardized Riskinfections due to likely dominates Mortality Standardized the index THA/TKA mortality risk. Measures. Mortality occur up to 90 days 3) If a patient http://www.qual Measures. following THA/TKA. undergoes a itynet.org/dcs/C http://www.qual The measure counts CABG procedure ontentServer?c= itynet.org/dcs/C all complications in the first Page&pagename ontentServer?c= occurring during the hospital and is

	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
			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 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".	eQnetPublic/Pag e/QnetTier3&cid =116301042183 0. 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		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.	Page&pagename =QnetPublic/Pag e/QnetTier3&cid =116301042183 0. Accessed May 4, 2018.
Denominat or 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.	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.	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	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.	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	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

	3504 Claims- Only Hospital- Wide (All- Condition, All- Procedure) Risk- Standardized Mortality Measure	1789 Hospital- Wide All-Cause Unplanned Readmission Measure (HWR)	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
		Additional details are provided in S.9 Denominator Details.		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.	The measure is currently publicly reported by CMS for those patients 65 years and older who are Medicare FFS beneficiaries admitted to nonfederal hospitals Additional details are provided in S.7 Denominator Details.	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.	Medicare FFS beneficiaries admitted to non- federal hospitals or patients admitted to VA hospitals. Additional details are provided in S.7 Denominator Details.
Denominat or 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	To be included in the hospital level measure, cohort patients must be: 1. Enrolled in Medicare fee-forservice (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 nonfederal shortterm 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	To be included in the measure cohort used in public reporting, patients must meet the following additional inclusion criteria: 1. Enrolled in Medicare fee-forservice (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	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 feefor-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	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 feefor-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 feefor-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;	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.

	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
	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 (such that the hybrid measure (such that the claims-only measure) differs from the claims-only measure) differs from the claims-only measure in terms of the age range of included admissions; the hybrid measure interms of the age range of included admissions for patients and inpatient admissions for patients aged 50-94 years old. The fully harmonize the cohort definitions for the two	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/gynecolo gy, 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/Gyn-Tolo gynecological teams. The measure then sorts admissions into one of the sort admissions into one of the four remaining specialty cohorts based on the AHRQ diagnosis category of the principal discharge diagnosis: The Cardiorespiratory	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). 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: STROJO Replacement of Right Hip Joint with Synthetic Substitute, Cemented, Open Approach	ICD-9 and ICD-10 cohort codes are included in the attached Data Dictionary.		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.	
NATIONAL C	QUALITY FORUM						17

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
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 at the time of, or 12 months prior to, their index admission Rationale: Patients enrolled in hospice at the time of, or 12 months prior to, their index admission Rationale: Patients enrolled in hospice at the time of, or 12 months prior to, their index admission Rationale: Patients enrolled in hospice at the time of, or 12 months prior to, their index admission Rationale: Patients enrolled in hospice at the time of, or 12 months prior to, their index admission Rationale: Patients enrolled in hospice at the time of, or 12 months prior to, their index admission Rationale: Patients enrolled in hospice at the time of, or 12 months prior to, their index admission Rationale: Patients enrolled in hospice at the time of, or 12 months prior to their index admission Rationale: Patients enrolled in hospice at the time of, or 12 months prior to their index admission Rationale: Patients enrolled in hospice at the time of, or 12 months prior to their index admission Rationale: Patients enrolled in hospice at the time of, or 12 months prior to the prior the prior the prior th	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 cardiac or cardiovascular 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).	Replacement of Right Hip Joint with Synthetic Substitute, Uncemented, Open Approach OSR90JZ Replacement of Right Hip Joint with Synthetic Substitute, Open Approach OSRBOJ9 Replacement of Left Hip Joint with Synthetic Substitute, Open Approach OSRBOJ9 Replacement of Left Hip Joint with Synthetic Substitute, Cemented, Open Approach OSRBOJA Replacement of Left Hip Joint with Synthetic Substitute, Uncemented, Open Approach OSRBOJZReplaceme nt of Left Hip Joint with Synthetic Substitute, Open Approach OSRCO7Z Replacement of Right Knee Joint with Autologous Tissue Substitute, Open Approach OSRCOJZReplaceme nt of Right Knee Joint with Synthetic Substitute, Open Approach OSRCOJZReplaceme nt of Right Knee Joint with Synthetic Substitute, Open Approach OSRCOKZ Replacement of Right Knee Joint with Nonautologous Tissue Substitute, Open Approach OSROO7Z Replacement of Left Knee Joint with Autologous Tissue Substitute, Open Approach OSROO7Z Replacement of Left Knee Joint with Synthetic Substitute, Open Approach OSRDOJZ Replacement of Left Knee Joint with Synthetic Substitute, Open Approach OSROOZ Replacement of Left Knee Joint with Synthetic Substitute, Open Approach OSROOZ Replacement of Left Knee Joint Synthetic Substitute, Open Approach OSROOZ Replacement of Right Knee Joint, Femoral Surface with Autologous Tissue Substitute, Open Approach OSRTOJZ Replacement of Right Knee Joint, Femoral Surface with Synthetic Substitute, Open Approach OSROJZ Replacement of Right Knee Joint, Femoral Surface with Synthetic Substitute, Open Approach OSROJZ Replacement of Right Knee Joint, Femoral Surface with Synthetic Substitute, Open Approach OSROJZ Replacement of Right Knee Joint, Femoral Surface with Synthetic Substitute, Open Approach OSROJZ Replacement of Right Knee Joint, Femoral Surface with Synthetic Substitute, Open Approach				

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
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 their index admission Rationale: Patients admitted primarily for cancer who are enrolled in hospice during their index admission and agreed to enrolled in hospice during their index admission and not the quality of care received. 8. Not with a principal diagnosis of cancer and enrolled in hospice during their index admission and not the quality of care received. 8. Not with a principal diagnosis of cancer and enrolled in hospice during their index admission and not the quality of care received. 9. Wothout any diagnosis of care. (see data dictionary, HVMM cancer Inclusion to the patients of material stationale: Although some patients		OSRTOKZ Replacement of Right Knee Joint, Femoral Surface with Nonautologous Tissue Substitute, Open Approach OSRUO7Z Replacement of Left Knee Joint, Femoral Surface with Autologous Tissue Substitute, Open Approach OSRUOJZ Replacement of Left Knee Joint, Femoral Surface with Synthetic Substitute, Open Approach OSRUOKZ Replacement of Left Knee Joint, Femoral Surface with Nonautologous Tissue Substitute, Open Approach OSRVO7Z Replacement of Right Knee Joint, Tibial Surface with Autologous Tissue Substitute, Open Approach OSRVOJZ Replacement of Right Knee Joint, Tibial Surface with Synthetic Substitute, Open Approach OSRVOJZ Replacement of Right Knee Joint, Tibial Surface with Synthetic Substitute, Open Approach OSRVOKZ Replacement of Right Knee Joint, Tibial Surface with Nonautologous Tissue Substitute, Open Approach OSRVOJZ Replacement of Left Knee Joint, Tibial Surface with Nonautologous Tissue Substitute, Open Approach OSRWOJZ Replacement of Left Knee Joint, Tibial Surface with Autologous Tissue Substitute, Open Approach OSRWOJZ Replacement of Left Knee Joint, Tibial Surface with Nonautologous Tissue Substitute, Open Approach OSRWOJZ Replacement of Left Knee Joint, Tibial Surface with Autologous Tissue Substitute, Open Approach OSRWOJZ Replacement of Left Knee Joint, Tibial Surface with Nonautologous Tissue Substitute, Open Approach OSRWOJZ Replacement of Left Knee Joint, Tibial Surface with Autologous Tissue Substitute, Open Approach OSRWOJZ Replacement of Left Knee Joint, Tibial Surface with Nonautologous Tissue Substitute, Open Approach OSRWOJZ Replacement of Left Knee Joint, Tibial Surface with Nonautologous Tissue Substitute, Open Approach OSRWOJZ Replacement of Left Knee Joint, Tibial Surface with Nonautologous Tissue Substitute, Open Approach OSRWOJZ Replacement of Left Knee Joint, Tibial Surface with				
admitted with a diagnosis of metastatic cancer will have 30-day		Elective primary THA/TKA procedures are defined as those procedures without				

	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
	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 Groups. 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 admission, at random, for inclusion. There is no practical statistical statistical		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."				
NATIONAL C	UALITY FORUM						180

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
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 the number of admissions, but does not exclude any patients from the measure. The cohort is defined using ICD-10 Clinical Modification codes the number of admissions, but does not exclude any patients from the measure. The cohort is defined using ICD-10 Clinical Modification codes of the index adata. The measure aggregates the ICD-10 principal diagnosis and all procedure codes of the index admission into clinically coherent groups of condition				disease (COPD)	Bypass Graft	infarction (AMI)
categories or procedure categories) using the Agency for Healthcare						

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
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, patient, and patient are givers on usability. The measure first assigns 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		arthroplasty (TKA)	nospitalization			
has one major surgical procedure then						

	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		and/or total knee	pneumonia	pulmonary disease (COPD)	Coronary Artery Bypass Graft	myocardial infarction (AMI)
	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						
NATIONAL C	diagnosis. The non-surgical						183

	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
Exclusions	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. 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/trun k (CCS 235), and burns (CCS 240); and 4. With a principal discharges diagnosis within a CCS with fewer than 100 admissions within the measurement year.	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.	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.	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, including the first day of the index admission for a given condition in a given year, only one index admission for a given condition in the cohort. Similarly, for the three-year combined and year of the three-year combined data, when index admissions occur during the transition between measure reporting periods (June and July of each year) and bothy are randomly	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. Discharg ed 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 within that year are excluded. Similarly, for the three-year combined data, when index admissions within that year are excluded. Similarly, for the three-year combined data, when index admissions within that year are excluded. Similarly, for the three-year combined data, when index and issions within that year are excluded. Similarly, for the three-year combined data, when index are reporting periods (June and July of each year) and both are randomly selected for inclusion in the measure, the measure, the measure includes only is a displayed and both are randomly selected for inclusion. The July admissions	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.	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, including the first day of the index admission, or 4. Discharged against medical advice (AIMA). For patients with more than one admission for a given condition in a given year, only one index admission for that condition in randomly selected for inclusion in the cohort. Similarly, for the three-year combined data, when index admissions occur during the transition betweaure reporting

	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 are excluded to	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 periods (June
				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.	avoid assigning a single death to two admissions.		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 the Medicare Enrollment Database, or where 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	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.	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.	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 with each episode of care is mutually independent with the same probability of the outcome. Additional admissions with each episode of care is mutually independent with the same probability of the outcome. Additional admission and therefore the episodes of care are not mutually	Inconsist ent 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 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. Discharg es against medical advice (AMA) are identified using the discharge disposition indicator. Rationale: Providers did not have the	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	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, including the first day of the index admission. Enrollment to Medicare before the date of death in the 12 months prior to the index admission, including the first day of the index admission. Enrollment to Medicare Enrollment to Medicare Enrollment Database.

	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
	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 ris			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.	opportunity to deliver full care and prepare the patient for discharge. Individual codes with descriptors can be found in the attached Data Dictionary.	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.	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 the outcome. Additional admissions within that year are excluded. For each patient, the probability of death increases with each subsequent admission and therefore the episode of care are not mutually independent. For the three-year combined data, when index admission so cranding 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.
NATIONAL C	convergence of UALITY FORUM		<u> </u>				

	3504 Claims- Only Hospital- Wide (All- Condition, All- Procedure) Risk- Standardized Mortality Measure	1789 Hospital- Wide All-Cause Unplanned Readmission Measure (HWR)	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 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 Adjustmen t	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 logodds of readmission	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
	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 cohorts eparately, and the coefficients associated with each variable may vary across specialty cohorts. Candidate and Final Risk-adjustment Variables: Candidate variables were patient-level risk-adjustment Variables: Candidate on empirical analysis, prior literature, and clinical judgment, including age and 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.	artificipliasty (TKA)	TIOSPITATIZATION			
	For the measure currently implemented by CMS, these riskadjusters are					

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
	identified using inpatient Medicare FFS claims data. The model adjusts for casemix 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 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 (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 year for leach year for meach year for ye					

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
	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 25-26) Pancreatic disease (CC 32) Dialysis status (CC 130) Renal failure (CC 131) Transplants (CC 128, 174) Severe infectious diseases and pneumonias (CC 6, 111-113) Septicemia/shock (CC 2) Congestive heart failure (CC 80) Coronary atherosclerosis or angina, cerebrovascular disease (CC 981-84, 98-99, 103-106) Specified arrhythmias and other heart rhythm disorders (CC 91-91-91-91-91-91-91-91-91-91-91-91-91-9		1 .	disease (COPD)	Bypass Graft	infarction (AMI)
	109) Protein-calorie malnutrition (CC 21) Disorders of fluid/electrolyte/					

	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	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, par	and/or total knee	pneumonia	pulmonary disease (COPD)	Coronary Artery Bypass Graft	myocardial infarction (AMI)
		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					
NATIONAL (QUALITY FORUM			•			191

	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
		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					
Stratificati on	N/A	N/A	N/A	N/A	N/A	N/A	N/A
Type Score	Rate/proportio n 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 logodds 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	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 logodds 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	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 logodds 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	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	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	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	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

3504 Claims-1789 Hospital-1550 Hospital-level 0468 Hospital 1893 Hospital 30-2558 Hospital 0230 Hospital Only Hospital-Wide All-Cause risk-standardized 30-day, all-Day, all-cause, 30-Day, All-30-day, all-Wide (Allcause, riskrisk-standardized Cause, Risk-Unplanned complication rate cause, risk-Condition, All-Standardized Readmission (RSCR) following standardized mortality rate standardized Procedure) Measure (HWR) elective primary mortality rate (RSMR) following **Mortality Rate** mortality rate Risk-(RSMR) chronic (RSMR) (RSMR) total hip Standardized Following obstructive following acute arthroplasty (THA) following Mortality **Coronary Artery** myocardial and/or total knee pneumonia pulmonary Measure hospitalization disease (COPD) **Bypass Graft** infarction (AMI) arthroplasty (TKA) hospitalization (CABG) Surgery hospitalization patient risk. The underlying risk of hospital intercept hospital effect distribution. The accounts for normal within-hospital a readmission, distribution. The represents the represents the hospital hospital-specific after accounting underlying risk correlation of intercepts are given hospital underlying risk of intercept the observed for patient risk. a distribution to intercept a mortality at the of mortality at represents the the hospital. outcomes and The hospitalaccount for the represents the hospital, after underlying risk after accounting models the specific effects clustering (nonunderlying risk accounting for of mortality at of a mortality at patient risk. The the hospital. assumption are given a independence) of for patient risk. patients within the that underlying hospital-specific after accounting distribution to the hospital, The hospitaldifferences in after accounting for patient risk. account for the same hospital. If intercepts are specific effects clustering (nonfor patient risk. quality among there were no given a are given a The hospitalthe health care independence) of differences among The hospitaldistribution to distribution to specific patients within facilities being hospitals, then after specific account for the account for the intercepts are evaluated lead the same hospital adjusting for patient intercepts are clustering (nonclustering (nongiven a given a independence) to systematic (Normand et al., risk, the hospital independence) of distribution to differences in 2007). If there intercepts should distribution to patients within of patients account for the outcomes. We were no be identical across account for the the same within the same clustering (nonestimated a differences all hospitals. clustering (nonhospital. If there hospital independence) separate among hospitals, independence) were no (Normand and of patients The RSCR is hierarchical then after of patients differences Shahian, 2007). within the same calculated as the within the same logistic adjusting for among hospitals, If there were no hospital. If there ratio of the number regression patient risk, the hospital. If there then after differences were no of "predicted" to hospital effects model for each were no adjusting for among hospitals, differences the number of differences service-line should be patient risk, the then after among hospitals, "expected" identical across division. In among hospitals, hospital adjusting for then after admissions with a order to obtain all hospitals. then after intercepts should patient risk, the adjusting for complication at a the variance adjusting for be identical hospital effects patient risk, the Admissions are given hospital, across all and interval patient risk, the should be hospital assigned to one multiplied by the estimates, we intercepts hospital hospitals. identical across of five mutually national observed fit the intercepts all hospitals. should be exclusive complication rate. The RSMR is identical across hierarchical should be For each hospital, specialty cohort calculated as the The RSMR is model under identical across all hospitals. groups consisting the numerator of ratio of the calculated as the the Bayesian all hospitals. number of of related the ratio is the ratio of the The RSMR is framework conditions or number of The RSMR is "predicted" to number of calculated as the along with the ratio of the procedures. For complications calculated as the the number of "predicted" Markov Chain deaths to the each specialty within 90 days ratio of the "expected" number of Monte Carlo cohort group, the predicted on the number of deaths at a given number of "predicted" to (MCMC) standardized basis of the "predicted" to hospital, "expected" the number of technique. readmission ratio hospital's the number of multiplied by the deaths at a given "expected" Admissions are (SRR) is calculated performance with "expected" national observed hospital, deaths, assigned to one as the ratio of the its observed case deaths at a given mortality rate. multiplied by the multiplied by the of 15 mutually number of mix, and the hospital, For each hospital, national national exclusive "predicted" denominator is the multiplied by the the numerator of observed unadjusted divisions readmissions to number of national the ratio is the mortality rate. mortality rate. (groups of the number of complications observed number of deaths For each For each discharge "expected" expected based on mortality rate. within 30 days hospital, the hospital, the condition readmissions at a the nation's For each predicted on the numerator of numerator of categories and given hospital. performance with hospital, the basis of the the ratio is the the ratio procedure For each hospital, that hospital's case numerator of hospital's number of ("predicted") is categories). For the numerator of mix. This approach the ratio is the performance with deaths within 30 the number of each division the ratio is the is analogous to a number of its observed case days predicted deaths within 30 and each number of ratio of "observed" deaths within 30 mix, and the based on the days predicted denominator is hospital with readmissions to "expected" used days predicted hospital's on the basis of patients in that within 30 days in other types of on the basis of the number of performance the hospital's division, the predicted based statistical analyses. the hospital's deaths expected with its performance standardized on the hospital's It conceptually performance based on the observed case with its mix, and the mortality ratio performance with allows for a with its nation's observed case denominator is mix, and the (SMR) is its observed case comparison of a observed case performance with calculated as mix and service particular hospital's mix, and the that hospital's the number of denominator the ratio of the denominator is deaths expected ("expected") is mix, and the performance given case mix. This denominator is approach is number of its case mix to an the number of based on the the number of the number of nation's "predicted" average hospital's deaths expected analogous to a deaths expected deaths to the readmissions performance with based on the ratio of performance on the basis of number of expected based the same case mix. "observed" to with that the nation's nation's "expected" "expected" used on the nation's Thus, a lower ratio performance hospital's case performance performance with with that deaths at a indicates lowerin other types of mix. This with that given hospital. that hospital's than-expected hospital's case statistical approach is hospital's case The predicted analyses. It case mix and complication rates mix. This analogous to a mix. This number of service mix. This or better quality, approach is conceptually ratio of approach is deaths is based analogous to a approach is and a higher ratio allows for a "observed" to analogous to a comparison of a on the analogous to a indicates higherratio of "expected" used ratio of in other types of hospital's ratio of than-expected "observed" to particular "observed" to performance "observed" to complication rates "expected" used hospital's statistical "expected" used with its "expected" used or worse quality. in other types of performance analyses. It in other types of in other types of statistical given its case mix observed case conceptually statistical The "predicted" mix and service analyses. It statistical to an average allows a analyses. It number of analyses. It mix, and is conceptually hospital's particular conceptually admissions with a hospital's allows for a calculated by conceptually allows for a performance with complication (the using the allows a comparison of a the same case performance, comparison of a numerator) is coefficients particular particular mix. Thus, a lower given its case particular calculated by using estimated by hospital's hospital's ratio indicates mix, to be hospital's the coefficients compared to an regressing the performance, performance lower-thanperformance estimated by given its case risk factors and given its case mix expected average given its case regressing the risk the hospitaland service mix, mix to an mortality rates or hospital's mix to an factors and the

3504 Claims-1789 Hospital-1550 Hospital-level 0468 Hospital 1893 Hospital 30-2558 Hospital 0230 Hospital Only Hospital-Wide All-Cause risk-standardized 30-day, all-Day, all-cause, 30-Day, All-30-day, all-Wide (Allcause, riskrisk-standardized Cause, Risk-Unplanned complication rate cause, risk-Condition, All-Readmission (RSCR) following standardized mortality rate Standardized standardized Procedure) Measure (HWR) elective primary mortality rate (RSMR) following **Mortality Rate** mortality rate Risk-(RSMR) chronic (RSMR) (RSMR) total hip Standardized arthroplasty (THA) obstructive following acute following **Following** Mortality myocardial and/or total knee pneumonia pulmonary **Coronary Artery** Measure hospitalization disease (COPD) **Bypass Graft** infarction (AMI) arthroplasty (TKA) hospitalization (CABG) Surgery hospitalization specific effect to be compared hospital-specific better quality, performance average average on the risk of to an average intercept on the risk hospital's and a higher ratio with the same hospital's performance mortality. The hospital's of having an indicates highercase mix. Thus, a performance admission with a estimated performance with with the same than-expected lower ratio with the same hospitalthe same case complication. The case mix. Thus, a mortality rates or indicates lowercase mix. Thus, a specific effect mix and service estimated hospitallower ratio worse quality. than-expected lower ratio indicates lowerindicates lowerfor each cohort mix. Thus, a lower specific intercept is mortality rates The "predicted" is added to the or better quality, ratio indicates added to the sum of than-expected than-expected number of deaths lower-thansum of the the estimated mortality rates while a higher mortality or (the numerator) or better quality, expected estimated regression ratio indicates better quality is calculated by regression readmission rates coefficients and a higher higher-thanand a higher using the or better quality, coefficients multiplied by the ratio indicates expected ratio indicates coefficients patient multiplied by while a higher higher-thanmortality rates higher-thanestimated by or worse quality. patient ratio indicates characteristics. The expected expected regressing the results are log characteristics. higher-thanmortality rates mortality or The "predicted" risk factors and The results are expected transformed and or worse quality. worse quality. the hospitalnumber of transformed via readmission rates summed over all The "predicted" The "predicted" specific intercept deaths (the or worse quality. patients attributed an inverse logit number of on the risk of numerator) is number of function and to a hospital to get For each specialty deaths (the mortality. The calculated by deaths (the summed over a predicted value. cohort, the numerator) is estimated using the numerator) is all patients The "expected" "predicted" calculated by hospital-specific coefficients calculated by attributed to a number of using the estimated by number of effect is added to using the hospital to get admissions with a readmissions (the coefficients the sum of the regressing the coefficients complication (the a predicted risk factors and numerator) is estimated by estimated estimated by value. The denominator) is calculated by regressing the regression the hospitalregressing the expected obtained in the using the coefficients risk factors and risk factors and specific effect on number of same manner, but a the hospitalcoefficients multiplied by the the risk of the hospitaldeaths is based common intercept estimated by specific patient mortality. The specific on the nation's using all hospitals in characteristics. estimated intercept on the regressing the intercept on the performance our sample is added hospital-specific risk factors (found risk of mortality. The results are risk of mortality. with that in place of the in Table D.9) and The estimated log transformed effect is added The estimated hospital's case hospital-specific and summed over the hospitalhospital-specific to the sum of hospital-specific mix and service effect. The results specific effect on effect is added all patients the estimated effect is added mix and is are log transformed to the sum of the risk of attributed to a regression to the sum of obtained in the and summed over hospital to get a readmission. The the estimated coefficients the estimated same manner, all patients in the estimated regression predicted value. multiplied by the regression but a common hospital to get an hospital-specific coefficients The "expected" patient coefficients effect using all expected value. To effect for each multiplied by the number of deaths characteristics. multiplied by the hospitals in our assess hospital cohort is added patient (the The results are patient performance for sample is to the sum of the characteristics. denominator) is log transformed characteristics. added in place each reporting estimated The results are obtained in the and summed The results are period, we reof the hospitalregression log transformed same manner, over all patients log transformed specific effect. estimate the model coefficients and summed but a common attributed to a and summed The results are coefficients using multiplied by over all patients intercept using all hospital to get a over all patients transformed via the years of data in patient attributed to a hospitals in our predicted value. attributed to a an inverse logit that period. characteristics. hospital to get a sample is added The "expected" hospital to get a function and The results are This calculation predicted value. in place of the number of predicted value. summed over log transformed transforms the ratio The "expected" hospital-specific deaths (the The "expected" all patients in and summed over of predicted over number of intercept. The denominator) is number of the hospital to all patients expected into a rate deaths (the results are log obtained in the deaths (the get an expected attributed to a that is compared to denominator) is transformed and same manner, denominator) is value. This hospital to get a the national obtained in the summed over all but a common obtained in the approach is predicted value. observed same manner, patients in the effect using all same manner, analogous to a but a common hospital to get an The "expected" complication rate. hospitals in our but a common ratio of expected value. number of The hierarchical intercept using sample is added intercept using "observed" to all hospitals in in place of the readmissions (the logistic regression To assess hospital all hospitals in "expected" denominator) is models are our sample is performance for hospital-specific our sample is used in other obtained in the described fully in added in place each reporting effect. The added in place types of same manner, the original of the hospitalperiod, we reresults are log of the hospital statistical specific specific but a common methodology report estimate the transformed and analyses. It effect using all (Grosso et al., intercept. The model summed over all intercept. The conceptually hospitals in our 2012). results are log coefficients using patients in the results are log allows a sample is added transformed and the years of data hospital to get transformed and References: particular in place of the summed over all summed over all in that period. an expected Grosso L, Curtis J, hospital's patients in the value. To assess hospital-specific patients in the This calculation Geary L, et al. performance, hospital to get effect. The results hospital to get hospital transforms the Hospital-level Riskgiven its case are log an expected performance for an expected ratio of predicted Standardized mix and service transformed and value. To assess each reporting value. To assess over expected **Complication Rate** mix, to be summed over all hospital period, we rehospital into a rate that is **Following Elective** compared to an patients in the performance for estimate the performance for compared to the Primary Total Hip average hospital to get an each reporting model each reporting national observed Arthroplasty (THA) hospital's period, we reexpected value. coefficients period, we rereadmission rate. And/Or Total Knee performance To assess hospital estimate the using the years estimate the The hierarchical Arthroplasty (TKA) with the same performance for model of data in that model logistic regression Measure case mix and coefficients each reporting period. coefficients models are Methodology service mix. period, we reusing the years using the years described fully in This calculation Report. 2012. Thus, a lower estimate the of data in that of data in that the original transforms the Normand S-LT, ratio indicates model period. period. methodology ratio of Shahian DM. 2007. lower-thancoefficients using This calculation report (Krumholz This calculation predicted over Statistical and expected the data in that transforms the et al., 2005). expected into a transforms the Clinical Aspects of mortality rates period. ratio of ratio of rate that is References: **Hospital Outcomes** or better The specialty predicted over compared to the predicted over 1. Normand S-LT, Profiling. Stat Sci quality, while a cohort SRRs are expected into a national expected into a Shahian DM. 22(2): 206-226.

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
higher ratio indicates higher-than-expected mortality rates or worse quality. To assess hospital performance for each reporting period, the measure reestimates 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.	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 HWR measure in the same way that they are excluded for the ACR quality measure in the same way that they are excluded for the HWR measure in the SCR quality 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 HWR measure in the SCR quality measure in		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.	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.	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	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.

	3504 Claims- Only Hospital- Wide (All- Condition, All- Procedure) Risk- Standardized Mortality Measure	1789 Hospital- Wide All-Cause Unplanned Readmission Measure (HWR)	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
		id&blobnocache= true&blobwhere= 1228889825199& blobheader=multi part%2Foctet- stream&blobhead ername1=Conten t- Disposition&blob headervalue1=att achment%3Bfilen ame%3DDryRun_ HWR_TechReport _081012.pdf&blo bcol=urldata&blo btable=MungoBlo bs. 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			- No spitalization	(GRBG) Surgerly	Trospitalization
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 outcomes, similar to other complementary pairs of readmission and mortality outcomes sof specific conditions and procedures. By measuring mortality outcomes across almost all hospitalized patients, this measure will	appendix at A.1 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 heart failure (HF) hospitalization 0505: Hospital 30-day all-cause risk-standardized readmission rate (RSRR) following heart failure (HF) hospitalization	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 nonoutcome measures (for example, process measures) with the same target population as	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: Hospitallevel, risk-standardized payment associated with a 30-day episode of care for pneumonia (PN) 5a.1 Are specs completely harmonized, identify difference, rationale, impact: The pneumonia mortality measure cohort,	5.1 Identified measures: 0701: Functional Capacity in COPD patients before and after Pulmonary Rehabilitation 0700: Healthrelated Quality of Life in COPD patients before and after Pulmonary Rehabilitation 0275: Chronic Obstructive 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	5.1 Identified measures: 0114: Risk-Adjusted Postoperative Renal Failure 0115: Risk-Adjusted Surgical Reexploration 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 Operative Prolonged Intubation (Ventilation) 0130: Risk-Adjusted Postoperative Prolonged Intubation (Ventilation) 0130: Risk-Adjusted Deep Sternal Wound Infection 0131: Risk-Adjusted Stroke/Cerebrov ascular Accident 0229: Hospital 30-day, all-cause, risk-standardized mortality rate (RSMR) following heart	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 resk-standardized resk-standardized resk-standardized resk-standardized resk-standardized

3504 Claims-1789 Hospital-1550 Hospital-level 0468 Hospital 1893 Hospital 30-2558 Hospital 0230 Hospital Only Hospital-Wide All-Cause risk-standardized 30-day, all-30-Day, All-Day, all-cause, 30-day, all-Wide (Allcause, riskrisk-standardized Cause, Risk-Unplanned complication rate cause, risk-Condition, All-Standardized Readmission (RSCR) following standardized mortality rate standardized Procedure) Measure (HWR) elective primary mortality rate (RSMR) following **Mortality Rate** mortality rate Risk-(RSMR) chronic (RSMR) (RSMR) total hip Standardized arthroplasty (THA) obstructive following acute following **Following** Mortality myocardial and/or total knee pneumonia pulmonary **Coronary Artery** Measure hospitalization disease (COPD) **Bypass Graft** infarction (AMI) arthroplasty (TKA) (CABG) Surgery hospitalization hospitalization infarction (AMI) Because this is an version 9.0, is was heavily failure (HF) readmission rate provide an important hospitalization. harmonized with vetted by clinical hospitalization (RSRR) following outcome measure. additional clinical coherence the hospitalexperts, a heart failure (HF) 0506: Hospital 0230: Hospital performance of the cohort takes level, risktechnical expert hospitalization 30-day, all-30-day, all-cause, precedence over assessment standardized panel, and a 0505: Hospital risk-standardized cause, riskthat will alignment with payment public comment readmission rate standardized 30-day all-cause complement related nonassociated with period. (RSRR) following mortality rate riska 30-day episode condition- and outcome measures. Additionally, the pneumonia (RSMR) standardized of care for procedure-Furthermore, nonmeasure, with hospitalization following acute readmission rate specific or pneumonia outcome measures the specified myocardial (RSRR) following 5a.1 Are specs other more are limited due to cohort. Version cohort, has been infarction (AMI) acute completely narrowly broader patient 9.2 of the publicly reported hospitalization myocardial harmonized? No defined exclusions. This is pneumonia since December for patients 18 infarction (AMI) 5a.2 If not mortality mortality because they 2014. Because and older hospitalization. completely measures and typically only measure cohort this is an 0468: Hospital 1893: Hospital harmonized, allow a greater include a specific is, however, not outcome 30-day, all-30-Day, allidentify number of subset of patients harmonized with measure, clinical cause, riskcause, riskdifference, patients and who are eligible for the pneumonia coherence of the standardized standardized rationale, impact: hospitals to be that measure (for payment cohort takes mortality rate mortality rate This measure and evaluated. This example, patients measure cohort. precedence over (RSMR) (RSMR) **HWM** measure the National who receive a There is alignment with following following Committee for specific medication captures a intention to related nonpneumonia chronic similarly broad Quality Assurance or undergo a harmonize the outcome hospitalization obstructive pneumonia (NCQA) Plan Allcohort to the specific procedure). measures. 0535: 30-day pulmonary Cause CMS Hospitalmortality and Furthermore, 5b.1 If competing, disease (COPD) all-cause risk-Readmissions Wide All-Cause payment non-outcome hospitalization why superior or standardized (PCR) Measure Riskmeasure cohorts measures are mortality rate 0468: Hospital rationale for #1768 are related Standardized in the future. limited due to following 30-day, alladditive value: measures, but are Readmission We did not broader patient percutaneous cause, risknot competing N/A include in our exclusions. This is Measure (NQF standardized coronary #1789), and a because they list of related because they intervention mortality rate don't have the broader cohort measures any typically only (PCI) for patients (RSMR) same measure than those of non-outcome include a specific without ST following focus and same subset of patients other CMS (for example, segment pneumonia target population. conditionwho are eligible process) elevation hospitalization specific In addition, both measures with for that measure myocardial 0229: Hospital have been measures. the same target (for example, infarction 30-day, allpreviously population as Because the patients who (STEMI) and cause, riskharmonized to mortality our measure. receive a specific without standardized the extent measure is Because this is medication or cardiogenic mortality rate focused on a possible under an outcome undergo a specific shock (RSMR) the guidance of different measure, clinical procedure). 0536: 30-day following heart the National outcome, it coherence of the 5b.1 If all-cause riskfailure (HF) Quality Forum differs from the cohort takes competing, why standardized hospitalization Steering existing CMS precedence over superior or mortality rate Hospital-Wide Committee in alignment with 5a.1 Are specs following rationale for 2011. Each of All-Cause Risk related noncompletely Percutaneous additive value: these measures Standardized outcome harmonized? Yes Coronary has different N/A Readmission measures. 5a.2 If not Intervention specifications. Measure (NQF Furthermore, completely (PCI) for patients #1789) in a NCQA's Measure non-outcome harmonized, with ST segment couple of ways. #1768 counts the measures are identify elevation number of First, this HWM limited due to difference, myocardial inpatient stays for measure broader patient rationale, infarction patients aged 18 includes exclusions. This impact: We did (STEMI) or patients with a and older during is because they not include in cardiogenic a measurement principal typically only our list of shock year that were discharge include a specific related 1502 : Riskfollowed by an diagnosis of subset of measures any Adjusted cancer (with patients who are non-outcome some readmission for eligible for that Operative (e.g., process) any diagnosis Mortality for exceptions), measure (for measures with Mitral Valve any hospital whereas those example, the same target (MV) Repair + within 30 days. It patients are not patients who population as contrasts this **CABG Surgery** included in the receive a specific our measure. count with a readmission medication or 1893: Hospital Our measure calculation of the 30-Day, allmeasure. undergo a cohort was predicted Cancer patients cause, riskspecific heavily vetted by probability of an procedure). are appropriate standardized clinical experts. acute mortality rate to include in Lastly, this Additionally, the readmission. the HWM measure and the (RSMR) measure, with NCQA's measure measure as **NQF** Inpatient following the specified is intended for many have Pneumonia chronic cohort, has been quality survival as their Mortality obstructive publicly monitoring and (AHRQ) Measure pulmonary primary goal; reported since accountability at #0231 are disease (COPD) however due to 2008. Because the health plan cancer complementary hospitalization this is an level. This treatment rather than 2515: Hospital outcome measure plans, competing 30-day, allmeasure, clinical estimates the readmissions measures. cause, coherence of the risk-standardized are frequently Although they unplanned, riskcohort takes rate of part of the plan both assess standardized precedence over unplanned, alland expected mortality for readmission rate alignment with cause NATIONAL QUALITY FORUM 197

3504 Claims- Only Hospital-	1789 Hospital- Wide All-Cause	1550 Hospital-level risk-standardized	0468 Hospital 30-day, all-	1893 Hospital 30- Day, all-cause,	2558 Hospital 30-Day, All-	0230 Hospital 30-day, all-
Wide (All-	Unplanned	complication rate	cause, risk-	risk-standardized	Cause, Risk-	cause, risk-
Condition, All- Procedure)	Readmission Measure (HWR)	(RSCR) following elective primary	standardized mortality rate	mortality rate (RSMR) following	Standardized Mortality Rate	standardized mortality rate
Risk-	ivicasare (rivvit)	total hip	(RSMR)	chronic	(RSMR)	(RSMR)
Standardized Mortality		arthroplasty (THA)	following	obstructive	Following	following acute
Measure		and/or total knee arthroplasty (TKA)	pneumonia hospitalization	pulmonary disease (COPD)	Coronary Artery Bypass Graft	myocardial infarction (AMI)
				hospitalization	(CABG) Surgery	hospitalization
and therefore, are not a	readmissions to a hospital or ACO		patients admitted to		(RSRR) following coronary artery	related non- outcome
reasonable	for any eligible		acute care		bypass graft	measures.
signal of	condition within		hospitals with a		(CABG) surgery	Furthermore,
quality. Another	30 days of hospital discharge		principal discharge		5a.1 Are specs	non-outcome measures are
difference	for patients aged		diagnosis of		completely harmonized? Yes	limited due to
between the	18 and older. The measure will		pneumonia, the		5a.2 If not	broader patient exclusions. This
two measures is the number	result in a single		specified outcomes are		completely	is because they
of divisions or	summary risk-		different. This		harmonized, identify	typically only
specialty cohorts the	adjusted readmission rate		measure assesses 30-day		difference,	include a specific subset of
patients are	for conditions or		mortality while		rationale,	patients who are
divided into, to	procedures that		#0231 assesses		impact: We did not include in	eligible for that
more accurately risk	fall under five specialties:		inpatient mortality.		our list of	measure (for example,
adjust for case-	surgery/gynecolo		Assessment of		related	patients who
mix and service-mix.	gy, general medicine,		30-day and inpatient		measures any non-outcome	receive a specific medication or
The	cardiorespiratory,		mortality		(e.g., process)	undergo a
readmission	cardiovascular,		outcomes have		measures with the same target	specific
measure divides patients	and neurology. This measure is		distinct advantages and		population as	procedure).
into five	specified for		uses which make		our measure.	5b.1 If
categories, or	evaluating		them		Our measure cohort was	competing, why superior
"specialty cohorts", while	hospital or ACO performance.		complementary as opposed to		heavily vetted by	or rationale for
the mortality	However, despite		competing. For		clinical experts,	additive value:
measure uses 15. This is	these differences in cohort		example the 30- day period		expert panel,	N/A
because the	specifications,		provides a		and a public	
risk of mortality	both measures		broader		comment period. In	
is much more closely related	under NQF guidance have		perspective on hospital care		addition, the	
to patient	been harmonized		and utilizes		related claims- based CABG	
factors than readmission is	to the extent possible through		standard time period to		readmission	
related to	modifications		examine hospital		measure, which	
patient factors.	such as exclusion		performance to		utilizes the same definition of	
PSI-02 (NQF #0357) is	of planned readmissions. We		avoid bias by differences in		isolated CABG as	
another	did not include in		length of stay		the mortality	
complementary	our list of related		among hospitals.		measure, was validated using	
mortality measure, which	measures any non-outcome		However, in some settings it		STS clinical	
captures a	(e.g., process)		may not be		registry data. Because this is	
different	measures with		feasible to		an outcome	
patient population and	the same target population as our		capture post- discharge		measure, clinical	
a different	measure. Because		mortality making		coherence of the cohort takes	
outcome compared with	this is an outcome		the inpatient measure more		precedence over	
the HWM	measure, clinical		useable. We		alignment with	
measure	coherence of the		have previously		related non- outcome	
submitted with this application.	cohort takes precedence over		consulted with AHRQ to		measures.	
PSI-02 captures	alignment with		examine		Furthermore, non-outcome	
patients 18 years of age or	related non- outcome		harmonization of		measures are	
older, or	measures.		complementary		limited due to	
obstetric	Furthermore,		measures of		broader patient exclusions. This	
patients, whereas the	non-outcome measures are		mortality for patients with		is because they	
HWM measure	limited due to		AMI and stroke.		typically only include a specific	
captures patients	broader patient exclusions. This is		We have found that the		subset of	
between the	because they		measures are		patients who are	
ages of 65 and	typically only		harmonized to		eligible for that measure (for	
94. PSI-02 captures DRGs	include a specific subset of patients		the extent possible given		example,	
with less than	who are eligible		that small		patients who	
0.5% mortality	for that measure		differences in		receive a specific medication or	
rate, whereas the HWM	(for example, patients who		cohort inclusion and exclusion		undergo a	
measure	receive a specific		criteria are		specific	
captures all	medication or		warranted on		procedure).	
patients within all CCSs,	undergo a specific procedure).		the basis of the use of different		5b.1 If competing,	
regardless of	5b.1 If		outcomes.		why superior	
mortality rate.	competing, why		However, this		or rationale for	
Hospital-wide	competing, with		Clirrant mascura	I .	I .	
Hospital-wide mortality	superior or rationale for		current measure has been		additive value: The NQF-	

captures of the controlled from the last of the last o	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
NATIONAL QUALITY FORUM	mortality up to 30 days past admission, where AHRQ PSI-02 only captures inhospital mortality. IQI 90 (NQF #0530) is another complimentary mortality measure, which is a composite measure of the number of inhospital 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 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:		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 during CABG hospitalization (in-hospital death, even if after 30 days) and deaths occurring during CABG hospitalization (in-hospital death, even if after 30 days) and deaths occurring during CABG hospitalization (in-hospital death, even if after 30 days) and deaths occurring during CABG hospitalization (in-bospital death, even if after 30 days) and deaths occurring during CABG hospitalization (in-bospital death, even if after 30 days) and deaths occurring during CABG hospitalization (in-bospital death, even if after 30 days) and deaths occurring during CABG hospitalization (in-bospital death, even if after 30 days) and deaths occurring during CABG hospitalization (in-hospital death, even if after 30 days) and deaths occurring during CABG hospitalization (in-hospital death, even if after 30 days) and deaths occurring during CABG hospitalization (in-hospital death, even if after 30 days) and deaths occurring during CABG hospitalization (in-hospital death, even if after 30 days) and deaths occurring during CABG hospitalization (in-hospital death, even if after 30 days) and deaths occurring during CABG hospitalization (in-hospital death, even if after 30 days) and deaths occurring during CABG hospitalization (in-hospital death, even if after 30 days occurring during CABG hospitalization (in-hospital death,	

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
					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 Description	Centers for Medicare & Medicaid Services (CMS) 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 claimsonly 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 of data availability, as well as actual intended differences in the measure, data, and testing that reflect limitations of data availability. 1. Dataset used for development, some testing that reflect limitations of data availability. 2. Dataset used for development, some testing that reflect limitations of data availability. 3. The claims-only measure would differences in the measure, data, and testing that reflect limitations of data availability. 3. The claims-only measure results: 3. The claims-only measure and the end of the end	Centers for Medicare & Medicaid Services 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.	adjustment for stroke	Agency for Healthcare Research and Quality 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.]	Agency for Healthcare Research and Quality A composite measure of in-hospital mortality indicators for selected conditions.
	b. The hybrid measure uses an electronic health record (EHR) database from 21 hospitals in the Kaiser				

	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
	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 claimsonly 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 claimsonly 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.				
Туре	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 beneficiaries, aged 65-94 on admission,	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	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	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	Electronic administrative data/claims
	hospitalized from July 1, 2016-June 30, 2017. The	hospital care, outpatient hospital services, skilled	inpatient hospital care, outpatient hospital	dataset with Present on Admission (POA)	

3504 Claims-Only 0229 Hospital 30-day, all-2876 Hospital 30-day, all-0347 Death Rate in Low-0530 Mortality for Hospital-Wide (All-Mortality Diagnosis cause, risk-standardized cause, risk-standardized **Selected Conditions** mortality rate (RSMR) mortality rate (RSMR) Condition, All-Procedure) Related Groups (PSI02) Risk-Standardized following heart failure (HF) following acute ischemic Mortality Measure hospitalization stroke hospitalization with claims-based risk adjustment for stroke severity history dataset includes nursing facility care, some services, skilled nursing information. Note that in administrative inpatient home health agency facility care, some home Version 5.0 (April 2015), hospitalization data on services, as well as health agency services, as the AHRQ QI software will each patient for the 12 inpatient and outpatient well as inpatient and no longer support outpatient physician claims prediction of POA status months prior to the index physician claims for the 12 for the 12 months prior to admission. months prior to an index using an embedded prediction module. Users admission. an index admission. 2. Medicare Enrollment are expected to provide 2. Medicare Enrollment 2. Medicare Enrollment Database (EDB): This POA data. Database (EDB): This Database (EDB): This database contains Available at measure-Medicare beneficiary database contains database contains demographic, Medicare beneficiary Medicare beneficiary specific web page URL identified in S.1 benefit/coverage, and demographic, demographic, benefit/coverage, and vital benefit/coverage, and vital vital status information. Attachment This data source was used status information. This status information. This PSI_02_Death_Rate_in_Lo to obtain information on data source was used to data source was used to several obtain information on obtain information on Mortality_Diagnosis_Relat inclusion/exclusion several inclusion/exclusion several inclusion/exclusion ed_Groups_-DRGs-_indicators such as indicators such as indicators such as Editable.xlsx Medicare status on Medicare status on Medicare status on admission as well as vital admission as well as vital admission, as well as vital status. It was also used to status. These data have status. These data have determine hospice previously been shown to previously been shown to enrollment. accurately reflect patient accurately reflect patient No data collection vital status (Fleming et al., vital status (Fleming et al., instrument provided 1992). 1992). 3. Veterans Health Attachment 3. For measure Administration (VA) Data: Del18b1HOP5HWMClaim development purposes This data source contains only, we linked the data sDataDictionary01072019 claims data for VA .xlsx sources above with data inpatient and outpatient from the AHA/ASA GWTGservices including: Stroke Registry. The inpatient hospital care, registry data were used to outpatient hospital obtain the National services, skilled nursing Institutes of Health (NIH) facility care, some home Stroke Scale scores and health agency services, as clinical risk variables. well as inpatient and When this measure is outpatient physician claims implemented NIH Stroke for the 12 months prior to Scale scores will be derived and including each index from ICD-10 codes in admission. Unlike Medicare claims. Medicare FFS patients, VA Reference: patients are not required Fleming C, Fisher ES, Chang to have been enrolled in CH, Bubolz TA, Malenka DJ. Part A and Part B Medicare Studying outcomes and for the 12 months prior to hospital utilization in the the date of admission. elderly: The advantages of All-payer data sources: a merged data base for For our analyses to Medicare and Veterans examine use in all-payer Affairs hospitals. Medical data, we used all-payer Care. 1992; 30(5): 377-91. data from California in Data sources for the alladdition to CMS data for payer update Medicare FFS 65+ patients No data collection in California hospitals. instrument provided California is a diverse state, Attachment and, with more than 37 NQF_2876_Claimsmillion residents, California Only_Stroke_Mortality_S2 represents 12% of the US b_Mortality_Data_Dictiona population. We used the ry v1.0-California Patient 635884757617681755.xlsx 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

	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
		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_Morta lity_Data_Dictionary_v1.0_Final-636973301131111819.xlsx			
Setting 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.	Inpatient/Hospital, Other Hospital & Despital & Despita	Facility Hospital 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.	Inpatient/Hospital Number of deaths (DISP=20) among cases meeting the inclusion and exclusion rules for the denominator.	Hospital 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 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-	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.qualityindicat ors.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
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.	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=Pag e&pagename=QnetPublic/Page/QnetTier3&cid=1163 010421830. 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 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 discharge diagnosis of HF and with a principal discharge diagnosis of HF and 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 as admitted to NA hospitals. Additional des. 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 lowmortality (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 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.	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);	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	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).

3504 Claims-Only	0229 Hospital 30-day, all-	2876 Hospital 30-day, all-	0347 Death Rate in Low-	0530 Mortality for
Hospital-Wide (All-	cause, risk-standardized	cause, risk-standardized	Mortality Diagnosis	Selected Conditions
Condition, All-Procedure) Risk-Standardized	mortality rate (RSMR) following heart failure (HF)	mortality rate (RSMR) following acute ischemic	Related Groups (PSI02)	
Mortality Measure	hospitalization	stroke hospitalization with		
		claims-based risk adjustment for stroke		
		severity		
2. Not transferred from another acute care facility	3. Aged 65 or over; and, 4. Not transferred from	3. Enrolled in Part A and Part B Medicare for the 12		
Rationale: Admissions to	another acute care facility.	months prior to the date of		
an acute cate hospital within one day of	VA beneficiaries are eligible for inclusion in the	index admission. ICD-9-CM codes that		
discharge from another	AMI, HF, and pneumonia	define the patient cohort:		
acute care hospital are considered transfers.	measure cohorts regardless of Medicare FFS	433.01 Occlusion and stenosis of basilar artery		
Transferred patients are included in the measure	enrollment or whether	with cerebral infarction		
cohort, but it is the initial	they were hospitalized in a VA or non-VA short-term	433.11 Occlusion and stenosis of carotid artery		
hospitalization rather than any "transfer-in"	acute care hospital.	with cerebral infarction		
hospitalization(s), that is	This measure can also be used for an all-payer	433.21 Occlusion and stenosis of vertebral artery		
included as the hospitalization to which	population aged 18 years and older. We have	with cerebral infarction		
the mortality outcome is	explicitly tested the	433.31 Occlusion and stenosis of multiple and		
attributed (the index admission).	measure in both patients aged 18+ years and those	bilateral precerebral		
3. Aged between 65 and	aged 65+ years.	arteries with cerebral infarction		
94 years Rationale: Medicare	ICD-9 and ICD-10 cohort codes are included in the	433.81 Occlusion and		
patients younger than 65	attached Data Dictionary.	stenosis of other specified precerebral artery with		
are not included in the measure because they		cerebral infarction		
usually qualify for the		433.91 Occlusion and stenosis of unspecified		
program due to severe disability and are		precerebral artery with		
considered to be clinically distinct from Medicare		cerebral infarction 434.01 Cerebral		
patients 65 and over.		thrombosis with cerebral		
Patients over age 94 are not included to avoid		infarction 434.11 Cerebral		
holding hospitals		embolism with cerebral		
responsible for the survival of the very		infarction 434.91 Cerebral artery		
elderly patients, who may be less likely to have		occlusion, unspecified with		
survival as a primary goal.		cerebral infarction 436 Acute, but ill-		
Note that the hybrid measure (submitted for		defined, cerebrovascular disease		
NQF endorsement in		ICD-10 codes that define		
parallel with the claims- only measure) differs		the patient cohort:		
from the claims-only		I63.22 Cerebral infarction due to		
measure in terms of the age range of included		unspecified occlusion or stenosis of basilar arteries		
admissions; the hybrid measure includes all		I63.139 Cerebral		
inpatient admissions for		infarction due to embolism of unspecified carotid		
patients aged 50-94 years old. The intention is to		artery		
fully harmonize the		163.239 Cerebral infarction due to		
cohort definitions for the two measures, so that		unspecified occlusion or		
both measures will capture admissions for		stenosis of unspecified carotid arteries		
patients age 65-94. We		I63.019 Cerebral		
deviated from that definition during		infarction due to thrombosis of unspecified		
development and testing		vertebral artery		
for the hybrid measure due to the limited dataset		I63.119 Cerebral infarction due to embolism		
available that included the EHR data elements		of unspecified vertebral		
needed to calculate the		artery I63.219 Cerebral		
hybrid measure. Note that the risk model		infarction due to		
already includes age in		unspecified occlusion or stenosis of unspecified		
years, as a risk variable.) 4. Not admitted for		vertebral arteries 163.59 Cerebral		
primary psychiatric		infarction due to		
diagnoses Rationale: Patients		unspecified occlusion or stenosis of other cerebral		
admitted for psychiatric		artery		
treatment are typically cared for in separate		163.20 Cerebral infarction due to		
psychiatric facilities that are not comparable to		unspecified occlusion or		
short-term acute care		stenosis of unspecified precerebral arteries		
hospitals (see data dictionary, HWM Non-		l63.30 Cerebral		
Acute Care Inclusion tab).		infarction due to thrombosis of unspecified		
		cerebral artery		

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
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 Rationale: Although some patients admitted with a diagnosis of metastatic cancer Rationale: Although some patients admitted with a diagnosis of metastatic cancer Rationale: Although some patients admitted with a diagnosis of metastatic cancer Rationale: Although some patients admitted with a diagnosis of metastatic cancer Rationale: Although some patients admitted with a diagnosis of metastatic cancer Inclusion tab). 9. Without any diagnosis of metastatic cancer Rationale: Although some patients admitted with a diagnosis of metastatic cancer Inclusion tab). 10. Not with a principal		claims-based risk adjustment for stroke		
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				

	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
	mortality for some conditions. This list of		- Sevency		
	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				
L NATIONAL OU	myocardial infarction.				

He Co Ri	504 Claims-Only lospital-Wide (All- ondition, All-Procedure) isk-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
Scot control of the property o	ome are aggregates of onditions, such as "other acterial infections". here is a total of 231 nutually exclusive rocedure categories. Ising the AHRQ CCS rocedure and condition ategories, the measure ssigns each index ospitalization to one of 5 mutually exclusive ivisions. The divisions were created based upon linical coherence, onsistency of mortality sk, adequate patient and ospital case volume for table results reporting, and input from clinicians, atients, and patient aregivers on usability. He measure first assigns dmissions with ualifying AHRQ rocedure categories to ne of six surgery ivisions by identifying a efining surgical rocedure. The defining urgical procedure is dentified using the following algorithm: 1) if patient only has one najor surgical procedure, the rest dated procedure is the efining surgical rocedure; 2) if a patient as more than one major urgical procedure, the rocedure; 3) if there is note than one major urgical procedure the procedure is the efining surgical rocedure; 3) if there is note than one major urgical procedure the procedure is the efining surgical rocedure; 3) if there is note than one major urgical procedure on that procedure is the efining surgical rocedure; 3) if there is note than one major urgical procedure is the efining surgical rocedure; 3) if there is note than one major urgical procedure on that procedure is the efining surgical rocedure; 3) if there is note than one major urgical procedure. These ivisions include dmissions likely cared or by surgical teams. The surgical Cancer (see note elow), Cardiothoracic urgery, General Surgery,	nospitalization	claims-based risk adjustment for stroke		
Te Th th in su or Co di no Ca Ga	o feedback from our echnical Expert Panel. he measure then assigns ne remaining admissions nto one of the nine nonurgical divisions based in the AHRQ diagnostic CS of the principal ischarge diagnosis. The on-surgical divisions are: ancer, Cardiac, fastrointestinal, infectious Disease,				

	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
	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 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	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	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	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.qualityindicat ors.ahrq.gov/Modules/IQI_ TechSpec.aspx).

3504 Claims-Only 0229 Hospital 30-day, all-2876 Hospital 30-day, all-0347 Death Rate in Low-0530 Mortality for cause, risk-standardized Hospital-Wide (Allcause, risk-standardized Mortality Diagnosis **Selected Conditions** Condition, All-Procedure) mortality rate (RSMR) mortality rate (RSMR) Related Groups (PSI02) Risk-Standardized following heart failure (HF) following acute ischemic Mortality Measure hospitalization stroke hospitalization with claims-based risk adjustment for stroke severity indicator. After all head/neck/trunk (CCS admission, including the 235), and burns (CCS 240) first day of the index exclusions are applied, the admission measure randomly selects Rationale: Even though a one index admission per Rationale: Hospice hospital likely can patient per year for influence the outcome of enrollment in the 12 inclusion in the cohort so months prior to or on the some of these conditions, that each episode of care is index admission is in many cases death mutually independent with events are not a signal of identified using hospice the same probability of the poor quality of care when data and the Inpatient standard analytic file (SAF). patients present with outcome. For each patient, This exclusion applies these conditions. These the probability of death conditions are also when the measure is used increases with each infrequent events that in Medicare FFS patients subsequent admission, and are unlikely to be only. therefore, the episodes of uniformly distributed care are not mutually Rationale: These patients across hospitals. are likely continuing to independent. Similarly, for 4. With a principal seek comfort measures the three year combined discharge diagnosis within only; thus, mortality is not data, when index a CCS with fewer than 100 necessarily an adverse admissions occur during admissions in that outcome or signal of poor the transition between division within the quality care. measure reporting periods measurement year. (June and July of each Discharged year) and both are Rationale: To calculate a against medical advice randomly selected for stable and precise risk Discharges against medical model, there are a inclusion in the measure, advice are identified using the measure includes only minimum number of the discharge disposition the June admission. The admissions that are indicator. July admissions are needed. In addition, a Rationale: Providers did excluded to avoid assigning minimum number of not have the opportunity admissions and/or a single death to two to deliver full care and outcome events are admissions. prepare the patient for required to inform discharge. grouping admissions into Discharged alive larger categories. These on the day of admission or admissions present the following day who challenges to both were not transferred to accurate risk prediction another acute care facility. and coherent risk The discharge disposition grouping and are indicator is used to identify therefore excluded. patients alive at discharge. Note: During measure Transfers are identified in development we analyzed the claims when a patient different volume cut-offs with a qualifying admission (25, 50 and 100). Using is discharged from an cut-off values below 100 acute care hospital and resulted in too many CCS admitted to another acute codes in some of the care hospital on the same divisions (the CCS day or next day. category codes are used Rationale: It is unlikely that in risk adjustment) which these patients had resulted in nonclinically significant HF. convergence of those 5. With a procedure division-level risk models. code for LVAD The total number of implantation or heart patients excluded is very transplantation either small (13,597 or 0.21% of during the index admission admissions for a cut off of or in the 12 months prior 100). During measure to the index admission development we also Patients with LVAD explored the option of implantation or heart pooling low-volume CCS transplantation during an codes (CCS<100 patients) index admission or in the into one group, however, the heterogeneity in previous 12 months are identified by the mortality rates for the corresponding codes for individual ICD-10 codes in these procedures included those groups would in claims data. preclude adequate risk adjustment. The TEP Rationale: These patients supported excluding represent a clinically distinct group (ICD-10-PCS these admissions. 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

	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
Risk	Statistical risk model	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.	Statistical risk model	No risk adjustment or risk	No risk adjustment or risk
Adjustment				stratification	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 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.	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 "predicted" to the number of "predicted" to the number of "expected" deaths at a given hospital, multiplied	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 "predicted" to the number of "predicted" to the number of "expected" deaths at a given hospital, multiplied	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 0229 Hospital 30-day, all-2876 Hospital 30-day, all-0347 Death Rate in Low-0530 Mortality for cause, risk-standardized Hospital-Wide (Allcause, risk-standardized Mortality Diagnosis **Selected Conditions** Condition, All-Procedure) mortality rate (RSMR) mortality rate (RSMR) Related Groups (PSI02) Risk-Standardized following heart failure (HF) following acute ischemic Mortality Measure hospitalization stroke hospitalization with claims-based risk adjustment for stroke severity by the national observed Admissions are assigned by the national observed to one of 15 mutually mortality rate. For each mortality rate. For each hospital, the numerator of hospital, the numerator of exclusive divisions (groups of discharge the ratio is the number of the ratio is the number of deaths within 30 days deaths within 30 days condition categories and procedure categories). predicted on the basis of predicted on the basis of the hospital's performance For each division and the hospital's performance with its observed case mix, with its observed case mix, each hospital with and the denominator is the and the denominator is the patients in that division, number of deaths number of deaths the standardized expected based on the expected based on the mortality ratio (SMR) is calculated as the ratio of nation's performance with nation's performance with that hospital's case mix. that hospital's case mix. the number of "predicted" deaths to the This approach is analogous This approach is analogous to a ratio of "observed" to number of "expected" to a ratio of "observed" to "expected" used in other "expected" used in other deaths at a given hospital. The predicted number of types of statistical types of statistical analyses. It conceptually analyses. It conceptually deaths is based on the allows for a comparison of allows for a comparison of hospital's performance a particular hospital's a particular hospital's with its observed case mix performance given its case performance given its case and service mix, and is mix to an average calculated by using the mix to an average hospital's performance hospital's performance coefficients estimated by with the same case mix. with the same case mix. regressing the risk factors Thus, a lower ratio and the hospital-specific Thus, a lower ratio indicates lower-thaneffect on the risk of indicates lower-thanexpected mortality rates or mortality. The estimated expected mortality rates or hospital-specific effect for better quality, and a higher better quality, and a higher ratio indicates higher-thaneach cohort is added to ratio indicates higher-thanexpected mortality rates or the sum of the estimated expected mortality rates or worse quality. worse quality. regression coefficients multiplied by patient The "predicted" number of The "predicted" number of characteristics. The deaths (the numerator) is deaths (the numerator) is results are transformed calculated by using the calculated by using the via an inverse logit coefficients estimated by coefficients estimated by function and summed regressing the risk factors regressing the risk factors over all patients and the hospital-specific and the hospital-specific attributed to a hospital to intercept on the risk of intercept on the risk of get a predicted value. The mortality. The estimated mortality. The estimated expected number of hospital-specific effect is hospital-specific intercept deaths is based on the added to the sum of the is added to the sum of the nation's performance estimated regression estimated regression with that hospital's case coefficients multiplied by coefficients multiplied by mix and service mix and is the patient characteristics. the patient characteristics. obtained in the same The results are log The results are manner, but a common transformed and summed transformed and summed effect using all hospitals over all patients attributed over all patients attributed in our sample is added in to a hospital to get a to a hospital to get a place of the hospitalpredicted value. The predicted value. The specific effect. The results "expected" number of "expected" number of are transformed via an deaths (the denominator) deaths (the denominator) inverse logit function and is obtained in the same is obtained in the same summed over all patients manner, but a common manner, but a common in the hospital to get an intercept using all hospitals intercept using all hospitals expected value. This in our sample is added in in our sample is added in approach is analogous to place of the hospitalplace of the hospitala ratio of "observed" to specific intercept. The specific intercept. The "expected" used in other results are log transformed results are transformed types of statistical and summed over all and summed over all analyses. It conceptually patients in the hospital to patients in the hospital to allows a particular get an expected value. To get an expected value. To hospital's performance, assess hospital assess hospital given its case mix and performance for each performance for each service mix, to be reporting period, we rereporting period, we recompared to an average estimate the model estimate the model hospital's performance coefficients using the years coefficients using the years with the same case mix of data in that period. of data in that period. and service mix. Thus, a This calculation transforms This calculation transforms lower ratio indicates the ratio of predicted over the ratio of predicted over lower-than-expected expected into a rate that is expected into a rate that is mortality rates or better compared to the national compared to the national quality, while a higher observed mortality rate. observed mortality rate. ratio indicates higher-The hierarchical logistic The hierarchical logistic than-expected mortality regression models are regression models are rates or worse quality. described fully in the described fully in the To assess hospital original methodology original methodology report (Krumholz et al., performance for each report (Grosso et al., reporting period, the 2005). 2011). measure re-estimates the References: References: model coefficients using 1. Normand S-LT, Shahian Normand S-LT, Shahian the data in that period. DM. 2007. Statistical and DM. 2007. Statistical and The division-level SMRs Clinical Aspects of Hospital Clinical Aspects of Hospital are then pooled for each Outcomes Profiling. Stat Outcomes Profiling. Stat hospital using an inverse Sci 22(2): 206-226. Sci 22(2): 206-226. variance-weighted

	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
	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.	2. Krumholz H, Normand S, Galusha D, et al. 2005. Risk-Adjustment Models for AMI and HF 30-Day Mortality Methodology.			
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 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 suryival as their primary goal; hovever due to cancer treadmission are fequently expected and treasonable signal of cancer (with some exceptions), whereas those patients are not included in the readmission part of the primary goal; hovever due to cancer treadmission are not included in the readmission are fequently expected and treasonable signal of quality. Another	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 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 pneumonia hospitalization 0330: Hospital 30-day all- cause, risk-standardized readmission rate (RSRR) following acute myocardial infarction (AMI) hospitalization 0330: Hospital 30-day all- cause, risk-standardized readmission rate (RSRR) following heart fallure (HF) hospitalization 0505: Hospital-Wide All- Cause Unplanned Readmission Measure (HWR) 5a.1 Are specs 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 propulation as our measure was heavily eated by clinical expert, pane, and a public compent period. Additionally, the measure, with the specified cohort, has been publicly reported since 2008. Because this is	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 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 wortality, making the inpatient wortality outcomes each have distinct advantages and uses, which make them complementary (and related) as opposed to	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:

NATIONAL QUALITY FORUM
214

3504 Claims-Only 0229 Hospital 30-day, all-2876 Hospital 30-day, all-0347 Death Rate in Low-0530 Mortality for cause, risk-standardized Mortality Diagnosis **Selected Conditions** Hospital-Wide (Allcause, risk-standardized Condition, All-Procedure) mortality rate (RSMR) mortality rate (RSMR) Related Groups (PSI02) Risk-Standardized following heart failure (HF) following acute ischemic Mortality Measure hospitalization stroke hospitalization with claims-based risk adjustment for stroke severity clinical coherence of the difference between the result of that two measures is the cohort takes precedence collaboration, we have number of divisions or over alignment with found that the measures' specialty cohorts the related non-outcome cohorts are harmonized to patients are divided into, the extent possible and measures. Furthermore, that the small differences to more accurately risk non-outcome measures are limited due to broader in cohort inclusion and adjust for case-mix and exclusion criteria are service-mix. The patient exclusions. This is readmission measure because they typically only appropriate because the include a specific subset of measures assess different divides patients into five categories, or "specialty patients who are eligible outcomes. cohorts", while the for that measure (for 5b.1 If competing, why mortality measure uses example, patients who superior or rationale for 15. This is because the receive a specific additive value: This medication or undergo a risk of mortality is much measure looks at a longer more closely related to specific procedure). outcome time frame (30patient factors than 5b.1 If competing, why days versus in-hospital) readmission is related to and incorporates stroke superior or rationale for patient factors. PSI-02 severity into the riskadditive value: N/A (NQF #0357) is another model. complementary mortality The current publicly measure, which captures reported measure, a different patient Hospital 30-Day Mortality population and a different Following Acute Ischemic outcome compared with Stroke Hospitalization the HWM measure Measure, is a potentially submitted with this competing measure. It is application. PSI-02 CMS intent to replace the captures patients 18 current measure in any years of age or older, or given program with this obstetric patients, newly developed measure, whereas the HWM which includes stroke measure captures severity in the risk model. patients between the The Hybrid Hospital 30ages of 65 and 94. PSI-02 Day, All-Cause, Riskcaptures DRGs with less Standardized Mortality than 0.5% mortality rate, Rate (RSMR) Following whereas the HWM Acute Ischemic Stroke with measure captures all Risk Adjustment for Stroke patients within all CCSs, Severity measure is also regardless of mortality being submitted to NQF rate. Hospital-wide for endorsement. This mortality captures measure uses a mortality up to 30 days combination of claims and past admission, where electronic health records AHRQ PSI-02 only (EHR) data for risk captures in-hospital mortality. IQI 90 (NQF adjustment but is #0530) is another otherwise harmonized complimentary mortality with the new claims-only measure. It is CMS intent measure, which is a to implement only one of composite measure of the number of in-hospital the new stroke mortality deaths for a narrow range measures (this claims-only of conditions (CHF, measure or the hybrid stroke, hip fracture, measure) in any given pneumonia, acute program. 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 NQFendorsed measures.

NATIONAL QUALITY FORUM
215

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:

OSR90J9 Replacement of Right Hip Joint with Synthetic Substitute, Cemented, Open Approach

OSR90JA Replacement of Right Hip Joint with Synthetic Substitute, Uncemented, Open Approach

OSR90JZ Replacement of Right Hip Joint with Synthetic Substitute, Open Approach

OSRBOJ9 Replacement of Left Hip Joint with Synthetic Substitute, Cemented, Open Approach

OSRBOJA Replacement of Left Hip Joint with Synthetic Substitute, Uncemented, Open Approach

OSRBOJZReplacement of Left Hip Joint with Synthetic Substitute, Open Approach

OSRC07Z Replacement of Right Knee Joint with Autologous Tissue Substitute, Open Approach

OSRCOJZReplacement of Right Knee Joint with Synthetic Substitute, Open Approach

OSRCOKZ Replacement of Right Knee Joint with Nonautologous Tissue Substitute, Open Approach

OSRD07Z Replacement of Left Knee Joint with Autologous Tissue Substitute, Open Approach

OSRDOJZ Replacement of Left Knee Joint with Synthetic Substitute, Open Approach

OSRDOKZReplacement of Left Knee Joint with Nonautologous Tissue Substitute, Open Approach

OSRT07Z Replacement of Right Knee Joint, Femoral Surface with Autologous Tissue Substitute, Open Approach

OSRTOJZ Replacement of Right Knee Joint, Femoral Surface with Synthetic Substitute, Open Approach

OSRTOKZ Replacement of Right Knee Joint, Femoral Surface with Nonautologous Tissue Substitute, Open Approach

OSRU07Z Replacement of Left Knee Joint, Femoral Surface with Autologous Tissue Substitute, Open Approach

OSRUOJZ Replacement of Left Knee Joint, Femoral Surface with Synthetic Substitute, Open Approach

OSRUOKZ Replacement of Left Knee Joint, Femoral Surface with Nonautologous Tissue Substitute, Open Approach

OSRVO7Z Replacement of Right Knee Joint, Tibial Surface with Autologous Tissue Substitute, Open Approach

OSRVOJZ Replacement of Right Knee Joint, Tibial Surface with Synthetic Substitute, Open Approach

OSRVOKZ Replacement of Right Knee Joint, Tibial Surface with Nonautologous Tissue Substitute, Open Approach

OSRW07Z Replacement of Left Knee Joint, Tibial Surface with Autologous Tissue Substitute, Open Approach

OSRWOJZ Replacement of Left Knee Joint, Tibial Surface with Synthetic Substitute, Open Approach

OSRWOKZ 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=122 8889825199&blobheader=multipart%2Foctet-stream&blobheadername1=Content-Disposition&blobheadervalue1=attachment%3Bfilename%3DDryRun_HWR_TechReport_081 012.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 conditionand 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 inhospital 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 postdischarge 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 & Despital: 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/Qnet Tier3&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/Qnet Tier3&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
- 163.139 Cerebral infarction due to embolism of unspecified carotid artery
- 163.239 Cerebral infarction due to unspecified occlusion or stenosis of unspecified carotid arteries
- I63.019 Cerebral infarction due to thrombosis of unspecified vertebral artery
- 163.119 Cerebral infarction due to embolism of unspecified vertebral artery
- I63.219 Cerebral infarction due to unspecified occlusion or stenosis of unspecified vertebral arteries
- 163.59 Cerebral infarction due to unspecified occlusion or stenosis of other cerebral artery
- 163.20 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
- 163.50 Cerebral infarction due to unspecified occlusion or stenosis of unspecified cerebral artery
- 167.8 Other specified cerebrovascular diseases
- 167.89 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

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 acutecare 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-forservice (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/Qnet Tier3&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/Qnet Tier3&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/Qnet Tier3&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:

OSR90J9 Replacement of Right Hip Joint with Synthetic Substitute, Cemented, Open Approach

OSR90JA Replacement of Right Hip Joint with Synthetic Substitute, Uncemented, Open Approach

OSR90JZ Replacement of Right Hip Joint with Synthetic Substitute, Open Approach

OSRBOJ9 Replacement of Left Hip Joint with Synthetic Substitute, Cemented, Open Approach

OSRBOJA Replacement of Left Hip Joint with Synthetic Substitute, Uncemented, Open Approach

OSRBOJZReplacement of Left Hip Joint with Synthetic Substitute, Open Approach

OSRC07Z Replacement of Right Knee Joint with Autologous Tissue Substitute, Open Approach

OSRCOJZReplacement of Right Knee Joint with Synthetic Substitute, Open Approach

OSRCOKZ Replacement of Right Knee Joint with Nonautologous Tissue Substitute, Open Approach

OSRD07Z Replacement of Left Knee Joint with Autologous Tissue Substitute, Open Approach

OSRDOJZ Replacement of Left Knee Joint with Synthetic Substitute, Open Approach

OSRDOKZReplacement of Left Knee Joint with Nonautologous Tissue Substitute, Open Approach

OSRTO7Z Replacement of Right Knee Joint, Femoral Surface with Autologous Tissue Substitute, Open Approach

OSRTOJZ Replacement of Right Knee Joint, Femoral Surface with Synthetic Substitute, Open Approach

OSRTOKZ Replacement of Right Knee Joint, Femoral Surface with Nonautologous Tissue Substitute, Open Approach

OSRU07Z Replacement of Left Knee Joint, Femoral Surface with Autologous Tissue Substitute, Open Approach

OSRUOJZ Replacement of Left Knee Joint, Femoral Surface with Synthetic Substitute, Open Approach

OSRUOKZ Replacement of Left Knee Joint, Femoral Surface with Nonautologous Tissue Substitute, Open Approach

OSRV07Z Replacement of Right Knee Joint, Tibial Surface with Autologous Tissue Substitute, Open Approach

OSRVOJZ Replacement of Right Knee Joint, Tibial Surface with Synthetic Substitute, Open Approach

OSRVOKZ Replacement of Right Knee Joint, Tibial Surface with Nonautologous Tissue Substitute, Open Approach

OSRW07Z Replacement of Left Knee Joint, Tibial Surface with Autologous Tissue Substitute, Open Approach

OSRWOJZ Replacement of Left Knee Joint, Tibial Surface with Synthetic Substitute, Open Approach

OSRWOKZ 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.

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=12 28889825199&blobheader=multipart%2Foctet-stream&blobheadername1=Content-Disposition&blobheadervalue1=attachment%3Bfilename%3DDryRun_HWR_TechReport_0 81012.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 logodds 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

References:

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 logodds 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 (nonindependence) 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 inhospital 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, nonoutcome 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, riskstandardized 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 30day 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

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 & Despital: 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/Qnet Tier3&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
- 163.139 Cerebral infarction due to embolism of unspecified carotid artery
- 163.239 Cerebral infarction due to unspecified occlusion or stenosis of unspecified carotid arteries
- 163.019 Cerebral infarction due to thrombosis of unspecified vertebral artery
- I63.119 Cerebral infarction due to embolism of unspecified vertebral artery
- 163.219 Cerebral infarction due to unspecified occlusion or stenosis of unspecified vertebral arteries
- 163.59 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
- 163.40 Cerebral infarction due to embolism of unspecified cerebral artery

- 163.50 Cerebral infarction due to unspecified occlusion or stenosis of unspecified cerebral artery
- 167.8 Other specified cerebrovascular diseases
- 167.89 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 inhospital 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.
- oThe 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.
- oAt 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 1030 15th St NW, Suite 800 Washington, DC 20005 http://www.qualityforum.org

ISBN ©2019 National Quality Forum