



Measure Information

This document contains the information submitted by measure developers/stewards, but is organized according to NQF's measure evaluation criteria and process. The item numbers refer to those in the submission form but may be in a slightly different order here. In general, the item numbers also reference the related criteria (e.g., item 1b.1 relates to sub criterion 1b).

Brief Measure Information

NQF #: 2473

Corresponding Measures:

De.2. Measure Title: Hybrid hospital 30-day, all-cause, risk-standardized mortality rate (RSMR) following acute myocardial infarction (AMI)

Co.1.1. Measure Steward: Centers for Medicare & Medicaid Services

De.3. Brief Description of Measure: This measure estimates a hospital-level 30-day, all-cause, risk-standardized mortality rate (RSMR) for patients discharged from the hospital with a principal discharge diagnosis of acute myocardial infarction (AMI). 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 AMI patients. This measure is harmonized with the Centers for Medicare and Medicaid Services' (CMS's) current publicly reported claims-based AMI mortality measure. The measure is referred to as a hybrid because it is CMS's intention to calculate the measure using two data sources: Medicare fee-for-service (FFS) administrative claims and clinical electronic health record (EHR) data.

1b.1. Developer Rationale: The goal of this measure is to improve patient outcomes by providing patients, physicians, and hospitals with information about hospital-level RSMRs following admission for AMI. Measurement of patient outcomes allows for a broad view of quality of care that encompasses more than what can be captured by individual process-of-care measures. Complex and critical aspects of care — such as communication among providers, prevention of and response to complications, patient safety, and coordinated transitions to the outpatient environment — all contribute to patient outcomes but are difficult to measure by individual process measures. As patient outcomes are not only influenced by care within the hospitalization but by patient status on presentation, outcomes measures ideally are risk-adjusted for patients' conditions at the time of hospitalization. This mortality measure was developed to identify hospitals whose performance is better or worse than would be expected based on their patient case mix, and to therefore promote hospital quality improvement and better inform consumers about care quality.

Because it is developed for use in EHRs, this measure can utilize detailed clinical data without requiring the investment of resources currently needed to collect registry or medical record-abstracted data. This EHR-based measure of AMI mortality responds to stakeholders' interest in using clinical data from medical records for risk adjustment in outcome measures. This measure will provide critical insight into AMI outcomes across hospitals, using clinical data for risk adjustment without undue burden on hospitals.

S.4. Numerator Statement: 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 patients with a principal discharge diagnosis of AMI.

S.6. Denominator Statement: The cohort includes inpatient admissions for Medicare FFS patients 65 years and older who were discharged from non-federal, short-term, acute care hospitals with a principal discharge diagnosis of AMI.

Additional details are provided in S.9 Denominator Details.

S.8. Denominator Exclusions: The 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 sex) 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 (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.

For Medicare FFS patients, the measure additionally excludes admissions for patients without at least 30 days of post-discharge enrollment in FFS Medicare (because the 30-day mortality outcome cannot be assessed in this group).

De.1. Measure Type: Outcome

S.17. Data Source: Claims (Only), Electronic Health Record (Only), Laboratory, Other

S.20. Level of Analysis: Facility

IF Endorsement Maintenance – Original Endorsement Date: Sep 08, 2014 **Most Recent Endorsement Date:** Sep 08, 2014

IF this measure is included in a composite, NQF Composite#/title:

IF this measure is paired/grouped, NQF#/title:

De.4. IF PAIRED/GROUPED, what is the reason this measure must be reported with other measures to appropriately interpret results? This measure is not included in a composite or paired with another measure.

1. Evidence, Performance Gap, Priority – Importance to Measure and Report

Extent to which the specific measure focus is evidence-based, important to making significant gains in healthcare quality, and improving health outcomes for a specific high-priority (high-impact) aspect of healthcare where there is variation in or overall less-than-optimal performance. ***Measures must be judged to meet all sub criteria to pass this criterion and be evaluated against the remaining criteria.***

1a. Evidence to Support the Measure Focus – See attached Evidence Submission Form

[AMI_Mortality_eMeasure_Evidence_Submission_Form.pdf](#)

1a.1 For Maintenance of Endorsement: Is there new evidence about the measure since the last update/submission?

Please update any changes in the evidence attachment in red. Do not remove any existing information. If there have been any changes to evidence, the Committee will consider the new evidence. If there is no new evidence, no updating of the evidence information is needed.

1b. Performance Gap

Demonstration of quality problems and opportunity for improvement, i.e., data demonstrating:

- considerable variation, or overall less-than-optimal performance, in the quality of care across providers; and/or
- Disparities in care across population groups.

1b.1. Briefly explain the rationale for this measure (e.g., how the measure will improve the quality of care, the benefits or improvements in quality envisioned by use of this measure)

IF a PRO-PM (e.g. HRQoL/functional status, symptom/burden, experience with care, health-related behaviors), provide evidence that the target population values the measured PRO and finds it meaningful. (Describe how and from whom their input was obtained.)

IF a COMPOSITE (e.g., combination of component measure scores, all-or-none, any-or-none), SKIP this question and provide rationale for composite in question 1c.3 on the composite tab.

The goal of this measure is to improve patient outcomes by providing patients, physicians, and hospitals with information about hospital-level RSMRs following admission for AMI. Measurement of patient outcomes allows for a broad view of quality of care that encompasses more than what can be captured by individual process-of-care measures. Complex and critical aspects of care — such as communication among providers, prevention of and response to complications, patient safety, and coordinated transitions to the outpatient environment — all contribute to patient outcomes but are difficult to measure by individual process measures. As patient outcomes are not only influenced by care within the hospitalization but by patient status on presentation, outcomes measures ideally are risk-adjusted for patients' conditions at the time of hospitalization. This mortality measure was developed to identify hospitals whose performance is better or worse than would be expected based on their patient case mix, and to therefore promote hospital quality improvement and better inform consumers about care quality.

Because it is developed for use in EHRs, this measure can utilize detailed clinical data without requiring the investment of resources currently needed to collect registry or medical record-abstracted data. This EHR-based measure of AMI mortality responds to stakeholders' interest in using clinical data from medical records for risk adjustment in outcome measures. This measure will provide critical insight into AMI outcomes across hospitals, using clinical data for risk adjustment without undue burden on hospitals.

1b.2. Provide performance scores on the measure as specified (current and over time) at the specified level of analysis. *(This is required for maintenance of endorsement. Include mean, std dev, min, max, interquartile range, scores by decile. Describe the data source including number of measured entities; number of patients; dates of data; if a sample, characteristics of the entities include.) This information also will be used to address the sub-criterion on improvement (4b) under Usability and Use.*

We analyzed variation in RSMRs among the hospitals in the development dataset – i.e., hospitals participating in the ACTION Registry(R)–GWTG(TM) (AR-G), for clinical data, merged with CMS Medicare claims and enrollment data – for the 30-day mortality outcome.

The development cohort includes AMI discharges for patients aged 65 and older from January 1 - December 31, 2009 who were discharged from hospitals participating in the AR-G and who were enrolled in Medicare. It includes 20,540 admissions from 280 hospitals. AMI RSMRs vary among hospitals, with a mean of 10.8%, a standard deviation of 0.006, and a range of 9.6% to 13.1%. The interquartile range is 10.3% to 11.1%. The set of hospitals included is likely to have a narrow range of performance due to their participation in the AR-G registry. The mean score by decile is as follows:

Decile of RSMR	Mean RSMR
1	0.100
2	0.103
3	0.105
4	0.107
5	0.107
6	0.108
7	0.109
8	0.110
9	0.112
10	0.118

1b.3. If no or limited performance data on the measure as specified is reported in 1b2, then provide a summary of data from the literature that indicates opportunity for improvement or overall less than optimal performance on the specific focus of measurement.

CMS currently publicly reports a claims-based measure of AMI mortality. The results for this measure, as reported in the 2010 update to the Hospital Compare website, are based on RSMRs calculated for AMI admissions among Medicare fee-for-service patients aged 65 and older from July 1, 2006 - June 30, 2009. It includes 558,665 admissions from 4,569 hospitals. For the most recently reported three years of data (July 2009 - June 2012), the mean hospital RSMR was 14.8%, with a range of 9.4% to 21.0%. The interquartile range was 13.8% to 15.9%.

Furthermore, recent work has identified specific strategies utilized by hospitals that achieve low AMI mortality rates (Bradley et al., 2012; Curry et al., 2011). This work demonstrates the relationship between hospital organizational factors and performance on the AMI mortality measures and supports the ability of hospitals to impact these rates.

References:

Bradley EH, Curry LA, Spatz ES, Herrin J, Cherlin EJ, Curtis JP, Thompson JW, Ting HH, Wang Y, Krumholz HM. Hospital strategies for reducing risk-standardized mortality rates in acute myocardial infarction. *Ann Intern Med.* 2012 May 1;156(9):618-26.

Curry LA, Spatz E, Cherlin E, Thompson JW, Berg D, Ting HH, Decker C, Krumholz HM, Bradley EH. What distinguishes top-performing hospitals in acute myocardial infarction mortality rates? A qualitative study. *Ann Intern Med.* 2011 Mar 15;154(6):384-90.

1b.4. Provide disparities data from the measure as specified (current and over time) by population group, e.g., by race/ethnicity,

gender, age, insurance status, socioeconomic status, and/or disability. (*This is required for maintenance of endorsement. Describe the data source including number of measured entities; number of patients; dates of data; if a sample, characteristics of the entities included.*) For measures that show high levels of performance, i.e., “topped out”, disparities data may demonstrate an opportunity for improvement/gap in care for certain sub-populations. This information also will be used to address the sub-criterion on improvement (4b) under Usability and Use.

We analyzed whether disparities in performance on this measure exist at the hospital level.

To identify potential disparities related to race, we examined the relationship between RSMR and hospital proportion of African-American patients among all hospitals included in the merged AR-G-CMS dataset used for measure development. We used the 2009 Medicare Provider Analysis and Review (MEDPAR) file to calculate the percentage of African-American patients treated at each hospital, using all patients admitted to each hospital. We classified hospitals into quintiles based on their proportion of African-American patients, with the lowest and highest quintile consisting of hospitals with lowest and highest proportions of African-American patients, respectively.

Analyses demonstrated that median RSMRs and the distributions of RSMRs were consistent across quintiles. Specifically, the median RSMR for hospitals in the lowest quintile was 10.8%, and the median RSMR for hospitals in the highest quintile was 10.8%. This analysis suggests that many hospitals with a high proportion of African-American patients can and do perform well on the measure.

To identify potential disparities related to socioeconomic status (SES), we examined the relationship between RSMR and hospital proportion of dual eligible patients. We used the 2009 MEDPAR file to calculate the percentage of dual eligible patients treated at each hospital. We used Medicaid eligibility status identified in the Medicare Enrollment Database as a proxy for SES. This approach is consistent with prior research as well as National Quality Forum (NQF) recommendations (http://www.qualityforum.org/Publications/2011/07/National_Voluntary_Consensus_Standards_for_Patient_Outcomes_2009.aspx). Hospitals were categorized into quintiles based on their proportion of dual eligible patients, with the lowest and highest quintile consisting of hospitals with lowest and highest proportions of dual eligible patients, respectively. Analyses showed that median RSMRs were consistent across quintiles of hospitals based on the hospital proportion of dual eligible patients. Specifically, the median RSMR for hospitals in the lowest quintile was 10.8%, and the median RSMR for hospitals in the highest quintile was 10.9%. The distributions were also consistent across quintiles. These results indicate that hospitals with high proportions of dual eligible patients can and do perform as well on the measure as hospitals with lower proportions of dual eligible patients.

The above analyses were performed using a linked AR-G-CMS dataset of AMI discharges for patients aged 65 and older from January 1 - December 31, 2009. It includes 20,540 admissions from 280 hospitals.

Consistent with NQF guidelines, this measure does not risk adjust for race or SES.

1b.5. If no or limited data on disparities from the measure as specified is reported in 1b.4, then provide a summary of data from the literature that addresses disparities in care on the specific focus of measurement. Include citations. Not necessary if performance data provided in 1b.4

In addition to the above, a recently published study demonstrated that patient SES accounted for a very small portion of variation in hospital performance on the claims-based AMI mortality measure (Bradley et al., 2010).

References:

Bradley EH, Herrin J, Curry L, Cherlin EJ, Wang Y, Webster TR, Drye EE, Normand SL, Krumholz HM. Variation in hospital mortality rates for patients with acute myocardial infarction. *Am J Cardiol.* 2010 Oct 15;106(8):1108-12.

2. Reliability and Validity—Scientific Acceptability of Measure Properties

Extent to which the measure, as specified, produces consistent (reliable) and credible (valid) results about the quality of care when implemented. **Measures must be judged to meet the sub criteria for both reliability and validity to pass this criterion and be evaluated against the remaining criteria.**

2a.1. Specifications The measure is well defined and precisely specified so it can be implemented consistently within and across organizations and allows for comparability. eMeasures should be specified in the Health Quality Measures Format (HQMF) and the

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Quality Data Model (QDM).
<p>De.5. Subject/Topic Area (check all the areas that apply): Cardiovascular : Coronary Artery Disease (AMI)</p> <p>De.6. Non-Condition Specific(check all the areas that apply): Care Coordination, Safety, Safety : Complications</p> <p>De.7. Target Population Category (Check all the populations for which the measure is specified and tested if any): Elderly, Populations at Risk</p>
<p>S.1. Measure-specific Web Page (Provide a URL link to a web page specific for this measure that contains current detailed specifications including code lists, risk model details, and supplemental materials. Do not enter a URL linking to a home page or to general information.) https://www.cms.gov/Medicare/Quality-Initiatives-Patient-Assessment-Instruments/HospitalQualityInits/Downloads/Core-Clinical-Data-Elements-and-Hybrid-Measures.zip</p> <p>S.2a. If this is an eMeasure, HQMF specifications must be attached. Attach the zipped output from the eMeasure authoring tool (MAT) - if the MAT was not used, contact staff. (Use the specification fields in this online form for the plain-language description of the specifications) This is an eMeasure Attachment: CCDE_AMI_Mortality_2016_Final_Specifications.zip</p> <p>S.2b. Data Dictionary, Code Table, or Value Sets (and risk model codes and coefficients when applicable) must be attached. (Excel or csv file in the suggested format preferred - if not, contact staff) Attachment Attachment: NQF_2473_Hybrid_AMI_Mortality_Data_Dictionary_v1.0.xls</p> <p>S.3.1. For maintenance of endorsement: Are there changes to the specifications since the last updates/submission. If yes, update the specifications for S1-2 and S4-22 and explain reasons for the changes in S3.2. No</p> <p>S.3.2. For maintenance of endorsement, please briefly describe any important changes to the measure specifications since last measure update and explain the reasons. N/A</p>
<p>S.4. Numerator Statement (Brief, narrative description of the measure focus or what is being measured about the target population, i.e., cases from the target population with the target process, condition, event, or outcome) DO NOT include the rationale for the measure. IF an OUTCOME MEASURE, state the outcome being measured. Calculation of the risk-adjusted outcome should be described in the calculation algorithm (S.14). 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 patients with a principal discharge diagnosis of AMI.</p> <p>S.5. Numerator Details (All information required to identify and calculate the cases from the target population with the target process, condition, event, or outcome such as definitions, time period for data collection, specific data collection items/responses, code/value sets – Note: lists of individual codes with descriptors that exceed 1 page should be provided in an Excel or csv file in required format at S.2b) IF an OUTCOME MEASURE, describe how the observed outcome is identified/counted. Calculation of the risk-adjusted outcome should be described in the calculation algorithm (S.14). The measure outcome is death from any cause within 30 days of the admission date of the index admission. As currently specified, we identify deaths for Medicare FFS patients 65 years and older in the Medicare Enrollment Database (EDB).</p>
<p>S.6. Denominator Statement (Brief, narrative description of the target population being measured) The cohort includes inpatient admissions for Medicare FFS patients 65 years and older who were discharged from non-federal, short-term, acute care hospitals with a principal discharge diagnosis of AMI.</p>

Additional details are provided in [S.9 Denominator Details](#).

S.7. Denominator Details *(All information required to identify and calculate the target population/denominator such as definitions, time period for data collection, specific data collection items/responses, code/value sets – Note: lists of individual codes with descriptors that exceed 1 page should be provided in an Excel or csv file in required format at S.2b.)*

IF an OUTCOME MEASURE, describe how the target population is identified. Calculation of the risk-adjusted outcome should be described in the calculation algorithm (S.14).

This outcome measure does not have a traditional numerator and denominator like a core process measure (for example, the percentage of adult patients with diabetes aged 18-75 years receiving one or more hemoglobin A1c tests per year); thus, we use this field to define the measure cohort.

To be included in the measure cohort, patients must meet the following inclusion criteria:

1. Had a principal discharge diagnosis of AMI
2. Enrolled in Medicare fee-for-service (FFS)
3. Aged 65 or over
4. Not transferred from another acute care facility; and
5. Enrolled in Part A and Part B Medicare for the 12 months prior to the date of index admission, and enrolled in Part A during the index admission.

International Classification of Diseases, 9th Revision, Clinical Modification (ICD-10-CM) codes used to define the cohort for each measure are:

- I2109 ST elevation (STEMI) myocardial infarction involving other coronary artery of anterior wall
- I2119 STEMI involving other coronary artery of inferior wall
- I2111 STEMI involving right coronary artery
- I2119 STEMI involving other coronary artery of inferior wall
- I2129 STEMI involving other sites
- I214 Non-ST elevation (NSTEMI) myocardial infarction
- I213 STEMI of unspecified site

An ICD-9 to ICD-10 crosswalk is attached in field S.2b. (Data Dictionary or Code Table).

S.8. Denominator Exclusions *(Brief narrative description of exclusions from the target population)*

The 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 sex) 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 (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.

For Medicare FFS patients, the measure additionally excludes admissions for patients without at least 30 days of post-discharge enrollment in FFS Medicare (because the 30-day mortality outcome cannot be assessed in this group).

S.9. Denominator Exclusion Details *(All information required to identify and calculate exclusions from the denominator such as definitions, time period for data collection, specific data collection items/responses, code/value sets – Note: lists of individual codes with descriptors that exceed 1 page should be provided in an Excel or csv file in required format at S.2b.)*

1. 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 is admitted to another acute care hospital on the same or next calendar day and the patient's length of stay and condition is identified from the admission claim.

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2. 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) the discharge date for a hospitalization is before the admission date; or 3) if the patient has a sex other than "male" or "female".
3. Hospice enrollment in the 12 months prior to or on the calendar day of 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.
4. Discharges AMA are identified using the discharge disposition indicator.
 - AMI admissions within 30 days of discharge from a qualifying index admission, which are identified by comparing the discharge date from the index admission with the readmission date.
 - Admissions without at least 30 days of post-discharge enrollment in FFS Medicare, which is determined by examining the Medicare Enrollment Database (EDB)

S.10. Stratification Information *(Provide all information required to stratify the measure results, if necessary, including the stratification variables, definitions, specific data collection items/responses, code/value sets, and the risk-model covariates and coefficients for the clinically-adjusted version of the measure when appropriate – Note: lists of individual codes with descriptors that exceed 1 page should be provided in an Excel or csv file in required format with at S.2b.)*

N/A

S.11. Risk Adjustment Type (Select type. Provide specifications for risk stratification in measure testing attachment)

Statistical risk model

If other:

S.12. Type of score:

Rate/proportion

If other:

S.13. Interpretation of Score *(Classifies interpretation of score according to whether better quality is associated with a higher score, a lower score, a score falling within a defined interval, or a passing score)*

Better quality = Lower score

S.14. Calculation Algorithm/Measure Logic *(Diagram or describe the calculation of the measure score as an ordered sequence of steps including identifying the target population; exclusions; cases meeting the target process, condition, event, or outcome; time period for data, aggregating data; risk adjustment; etc.)*

The measure estimates hospital-level 30-day all-cause RSMRs following 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 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 the 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 readmission rate. The hierarchical logistic regression models are described fully in the original methodology report for the claims-only AMI mortality measure (Krumholz et al., 2005).

Reference:

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.

S.15. Sampling (If measure is based on a sample, provide instructions for obtaining the sample and guidance on minimum sample size.)

IF a PRO-PM, identify whether (and how) proxy responses are allowed.

N/A. This measure is not based on a sample or survey.

S.16. Survey/Patient-reported data (If measure is based on a survey or instrument, provide instructions for data collection and guidance on minimum response rate.)

IF a PRO-PM, specify calculation of response rates to be reported with performance measure results.

N/A. This measure is not based on a sample or survey.

S.17. Data Source (Check ONLY the sources for which the measure is SPECIFIED AND TESTED).

If other, please describe in S.18.

Claims (Only), Electronic Health Record (Only), Laboratory, Other

S.18. Data Source or Collection Instrument (Identify the specific data source/data collection instrument (e.g. name of database, clinical registry, collection instrument, etc., and describe how data is collected.)

IF a PRO-PM, identify the specific PROM(s); and standard methods, modes, and languages of administration.

The data source for the measure will be the hospital EHR for clinical data, merged with CMS Medicare claims and enrollment data (or another external source of death data) for the 30-day mortality outcome.

The data source for measure development was the ACTION Registry(R)–GWTG(TM) (an initiative of the American College of Cardiology Foundation and the American Heart Association, with partnering support from Society of Chest Pain Centers, The American College of Emergency Physicians, and The Society of Hospital Medicine), maintained by the National Cardiovascular Data Registry (NCDR(R)), for clinical data, merged with CMS Medicare claims and enrollment data for the 30-day mortality outcome.

S.19. Data Source or Collection Instrument (available at measure-specific Web page URL identified in S.1 OR in attached appendix at A.1)

No data collection instrument provided

S.20. Level of Analysis (Check ONLY the levels of analysis for which the measure is SPECIFIED AND TESTED)

Facility

S.21. Care Setting (Check ONLY the settings for which the measure is SPECIFIED AND TESTED)

Hospital

If other:

S.22. COMPOSITE Performance Measure - Additional Specifications (Use this section as needed for aggregation and weighting rules, or calculation of individual performance measures if not individually endorsed.)

N/A

2. Validity – See attached Measure Testing Submission Form

[AMI_Mortality_eMeasure_Measure_Testing_Form.pdf](#)

2.1 For maintenance of endorsement

Reliability testing: If testing of reliability of the measure score was not presented in prior submission(s), has reliability testing of the measure score been conducted? If yes, please provide results in the Testing attachment. (Do not remove prior testing information – include date of new information in red.)

2.2 For maintenance of endorsement

Has additional empirical validity testing of the measure score been conducted? If yes, please provide results in the Testing attachment. (Do not remove prior testing information – include date of new information in red.)

2.3 For maintenance of endorsement

Risk adjustment: For outcome, resource use, cost, and some process measures, risk-adjustment that includes SDS factors is no longer prohibited during the SDS Trial Period (2015-2016). Please update sections 1.8, 2a2, 2b2, 2b4, and 2b6 in the Testing attachment and S.14 and S.15 in the online submission form in accordance with the requirements for the SDS Trial Period. NOTE: These sections must be updated even if SDS factors are not included in the risk-adjustment strategy. If yes, and your testing attachment does not have the additional questions for the SDS Trial please add these questions to your testing attachment:

What were the patient-level sociodemographic (SDS) variables that were available and analyzed in the data or sample used? For example, patient-reported data (e.g., income, education, language), proxy variables when SDS data are not collected from each patient (e.g. census tract), or patient community characteristics (e.g. percent vacant housing, crime rate).

Describe the conceptual/clinical and statistical methods and criteria used to select patient factors (clinical factors or sociodemographic factors) used in the statistical risk model or for stratification by risk (e.g., potential factors identified in the literature and/or expert panel; regression analysis; statistical significance of $p < 0.10$; correlation of x or higher; patient factors should be present at the start of care)

What were the statistical results of the analyses used to select risk factors?

Describe the analyses and interpretation resulting in the decision to select SDS factors (e.g. prevalence of the factor across measured entities, empirical association with the outcome, contribution of unique variation in the outcome, assessment of between-unit effects and within-unit effects)

3. Feasibility

Extent to which the specifications including measure logic, require data that are readily available or could be captured without undue burden and can be implemented for performance measurement.

3a. Byproduct of Care Processes

For clinical measures, the required data elements are routinely generated and used during care delivery (e.g., blood pressure, lab test, diagnosis, medication order).

3a.1. Data Elements Generated as Byproduct of Care Processes.

Generated or collected by and used by healthcare personnel during the provision of care (e.g., blood pressure, lab value, diagnosis, depression score), Coded by someone other than person obtaining original information (e.g., DRG, ICD-9 codes on claims)

If other:

3b. Electronic Sources

The required data elements are available in electronic health records or other electronic sources. If the required data are not in electronic health records or existing electronic sources, a credible, near-term path to electronic collection is specified.

3b.1. To what extent are the specified data elements available electronically in defined fields (i.e., data elements that are needed to compute the performance measure score are in defined, computer-readable fields) Update this field for maintenance of endorsement.

ALL data elements are in defined fields in a combination of electronic sources

3b.2. If ALL the data elements needed to compute the performance measure score are not from electronic sources, specify a

credible, near-term path to electronic capture, OR provide a rationale for using other than electronic sources. For **maintenance of endorsement**, if this measure is not an eMeasure (eCQM), please describe any efforts to develop an eMeasure (eCQM).

3b.3. If this is an eMeasure, provide a summary of the feasibility assessment in an attached file or make available at a measure-specific URL. Please also complete and attach the NQF Feasibility Score Card.

Attachment: [AMI_Mortality_eMeasure_Feasibility_Assessment.pdf](#)

3c. Data Collection Strategy

Demonstration that the data collection strategy (e.g., source, timing, frequency, sampling, patient confidentiality, costs associated with fees/licensing of proprietary measures) can be implemented (e.g., already in operational use, or testing demonstrates that it is ready to put into operational use). For eMeasures, a feasibility assessment addresses the data elements and measure logic and demonstrates the eMeasure can be implemented or feasibility concerns can be adequately addressed.

3c.1. Required for maintenance of endorsement. Describe difficulties (as a result of testing and/or operational use of the measure) regarding data collection, availability of data, missing data, timing and frequency of data collection, sampling, patient confidentiality, time and cost of data collection, other feasibility/implementation issues.

IF a PRO-PM, consider implications for both individuals providing PRO data (patients, service recipients, respondents) and those whose performance is being measured.

Testing of the fully eSpecified eMeasure resulted in some minor changes to the eSpecifications to increase eMeasure usability and alignment of the specifications with current recommendations. For example, we changed the way we identify transfers in response to difficulties hospitals encountered in identifying these patients during testing. We changed the logic to reflect inclusion of transfers from emergency departments and non-acute settings, and exclusion of transfers from inpatient admissions at other acute care hospitals.

3c.2. Describe any fees, licensing, or other requirements to use any aspect of the measure as specified (e.g., value/code set, risk model, programming code, algorithm).

There are no fees associated with the use of this measure.

4. Usability and Use

Extent to which potential audiences (e.g., consumers, purchasers, providers, policy makers) are using or could use performance results for both accountability and performance improvement to achieve the goal of high-quality, efficient healthcare for individuals or populations.

4a. Accountability and Transparency

Performance results are used in at least one accountability application within three years after initial endorsement and are publicly reported within six years after initial endorsement (or the data on performance results are available). If not in use at the time of initial endorsement, then a credible plan for implementation within the specified timeframes is provided.

4.1. Current and Planned Use

NQF-endorsed measures are expected to be used in at least one accountability application within 3 years and publicly reported within 6 years of initial endorsement in addition to performance improvement.

Specific Plan for Use	Current Use (for current use provide URL)
Public Reporting	
Not in use	

4a.1. For each CURRENT use, checked above (update for maintenance of endorsement), provide:

- Name of program and sponsor
- Purpose
- Geographic area and number and percentage of accountable entities and patients included

- Level of measurement and setting

N/A

4a.2. If not currently publicly reported OR used in at least one other accountability application (e.g., payment program, certification, licensing) what are the reasons? (e.g., Do policies or actions of the developer/steward or accountable entities restrict access to performance results or impede implementation?)

This measure is not currently publicly reported or used in an accountability application because it has only recently completed development and is being submitted to NQF for initial endorsement.

4a.3. If not currently publicly reported OR used in at least one other accountability application, provide a credible plan for implementation within the expected timeframes -- any accountability application within 3 years and publicly reported within 6 years of initial endorsement. (Credible plan includes the specific program, purpose, intended audience, and timeline for implementing the measure within the specified timeframes. A plan for accountability applications addresses mechanisms for data aggregation and reporting.)

CMS plans to use the measure for hospital inpatient quality public reporting.

Improvement

Progress toward achieving the goal of high-quality, efficient healthcare for individuals or populations is demonstrated. If not in use for performance improvement at the time of initial endorsement, then a credible rationale describes how the performance results could be used to further the goal of high-quality, efficient healthcare for individuals or populations.

4b. Refer to data provided in 1b but do not repeat here. Discuss any progress on improvement (trends in performance results, number and percentage of people receiving high-quality healthcare; Geographic area and number and percentage of accountable entities and patients included.)

If no improvement was demonstrated, what are the reasons? If not in use for performance improvement at the time of initial endorsement, provide a credible rationale that describes how the performance results could be used to further the goal of high-quality, efficient healthcare for individuals or populations.

N/A

4c. Unintended Consequences

The benefits of the performance measure in facilitating progress toward achieving high-quality, efficient healthcare for individuals or populations outweigh evidence of unintended negative consequences to individuals or populations (if such evidence exists).

4c.1. Please explain any unexpected findings (positive or negative) during implementation of this measure including unintended impacts on patients.

We did not identify any unintended consequences during measure development, model testing, or eMeasure testing. However, we are committed to monitoring this measure's use and assessing potential unintended consequences over time, such as the inappropriate shifting of care, increased patient morbidity and mortality, and other negative unintended consequences for patients.

4c.2. Please explain any unexpected benefits from implementation of this measure.

4d1.1. Describe how performance results, data, and assistance with interpretation have been provided to those being measured or other users during development or implementation.

How many and which types of measured entities and/or others were included? If only a sample of measured entities were included, describe the full population and how the sample was selected.

N/A

4d1.2. Describe the process(es) involved, including when/how often results were provided, what data were provided, what educational/explanatory efforts were made, etc.

N/A

4d2.1. Summarize the feedback on measure performance and implementation from the measured entities and others described in 4d.1.

Describe how feedback was obtained.

N/A

4d2.2. Summarize the feedback obtained from those being measured.

N/A

4d2.3. Summarize the feedback obtained from other users

N/A

4d.3. Describe how the feedback described in 4d.2 has been considered when developing or revising the measure specifications or implementation, including whether the measure was modified and why or why not.

N/A

5. Comparison to Related or Competing Measures

If a measure meets the above criteria and there are endorsed or new related measures (either the same measure focus or the same target population) or competing measures (both the same measure focus and the same target population), the measures are compared to address harmonization and/or selection of the best measure.

5. Relation to Other NQF-endorsed Measures

Are there related measures (conceptually, either same measure focus or target population) or competing measures (conceptually both the same measure focus and same target population)? If yes, list the NQF # and title of all related and/or competing measures.

Yes

5.1a. List of related or competing measures (selected from NQF-endorsed measures)

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

0730 : Acute Myocardial Infarction (AMI) Mortality Rate

5.1b. If related or competing measures are not NQF endorsed please indicate measure title and steward.

N/A

5a. Harmonization of Related Measures

The measure specifications are harmonized with related measures;

OR

The differences in specifications are justified

5a.1. If this measure conceptually addresses EITHER the same measure focus OR the same target population as NQF-endorsed measure(s):

Are the measure specifications harmonized to the extent possible?

No

5a.2. If the measure specifications are not completely harmonized, identify the differences, rationale, and impact on interpretability and data collection burden.

The measure specifications are, by design, not completely harmonized in that the current measure uses clinical data elements collected from EHR for risk adjustment, and the measures listed above use claims data for risk adjustment. Additionally, the outcome in measure #0730 is inpatient mortality rather than 30-day mortality. Inpatient mortality rates can be influenced by hospital length of stay, so 30-day measures that establish a standard follow-up period are more appropriate for profiling a diverse group of hospitals (Drye et al., 2012). The measures listed above have target populations aged 18+, whereas the current measure's target population is age 65+. The exclusion criteria of the current measure are largely similar to those of measure #0230. We recommend the endorsement of an additional AMI mortality measure. The current measure represents an opportunity to move toward the use of eMeasures developed de novo for use in EHRs. However, as the implementation of these measures may take some time to become a reality in the foreseeable future, we recommend the endorsement of the current measure in addition to the continued endorsement of existing claims-based measures. References: Drye EE, Normand SL, Wang Y, Ross JS, Schreiner GC, Han L, Rapp M, Krumholz HM. Comparison of hospital risk-standardized mortality rates calculated by using in-hospital and 30-day models:

an observational study with implications for hospital profiling. *Ann Intern Med.* 2012 Jan 3;156(1 Pt 1):19-26.

5b. Competing Measures

The measure is superior to competing measures (e.g., is a more valid or efficient way to measure);

OR

Multiple measures are justified.

5b.1. If this measure conceptually addresses both the same measure focus and the same target population as NQF-endorsed measure(s):

Describe why this measure is superior to competing measures (e.g., a more valid or efficient way to measure quality); OR provide a rationale for the additive value of endorsing an additional measure. (Provide analyses when possible.)

N/A

Appendix

A.1 Supplemental materials may be provided in an appendix. All supplemental materials (such as data collection instrument or methodology reports) should be organized in one file with a table of contents or bookmarks. If material pertains to a specific submission form number, that should be indicated. Requested information should be provided in the submission form and required attachments. There is no guarantee that supplemental materials will be reviewed.

Attachment **Attachment:** [AMI_Mortality_eMeasure_Supplemental_materials-635233891919100015.pdf](#)

Contact Information

Co.1 Measure Steward (Intellectual Property Owner): Centers for Medicare & Medicaid Services

Co.2 Point of Contact: Helen, Dollar-Maples, Helen.Dollar-Maples@cms.hhs.gov, 410-786-7214-

Co.3 Measure Developer if different from Measure Steward: Yale New Haven Health Services Corporation – Center for Outcomes Research and Evaluation (CORE)

Co.4 Point of Contact: Susannah, Bernheim, susannah.bernheim@yale.edu, 203-764-5700-

Additional Information

Ad.1 Workgroup/Expert Panel involved in measure development

Provide a list of sponsoring organizations and workgroup/panel members' names and organizations. Describe the members' role in measure development.

The following experts provided insight and guidance during measure development.

American College of Cardiology, the National Cardiovascular Data Registry, and the Duke Clinical Research Institute:

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Office of the National Coordinator for Health Information Technology (ONC):

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#2473 Hybrid hospital 30-day, all-cause, risk-standardized mortality rate (RSMR) following acute myocardial infarction (AMI), Last Updated: Sep 29, 2016

Lauren Richie, MA

Members of Sentara Healthcare, Kaiser Permanente, Veterans Health Affairs, Mid America Heart Institute, Duke Clinical Research Institute, and Statewide Planning and Resource Cooperative System (SPARCS):

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Additionally, researchers at Abt Associates and their subcontractors eSpecified and tested the eMeasure in collaboration with the CORE team.

Measure Developer/Steward Updates and Ongoing Maintenance

Ad.2 Year the measure was first released:

Ad.3 Month and Year of most recent revision:

Ad.4 What is your frequency for review/update of this measure? N/A

Ad.5 When is the next scheduled review/update for this measure?

Ad.6 Copyright statement: N/A

Ad.7 Disclaimers: N/A

Ad.8 Additional Information/Comments: Evidence submission form, measure testing form, feasibility assessment, eMeasure specifications containing denominator details and risk model specifications, risk model coefficients, calculation algorithm, and measure technical report are attached.