

2013 Measure Updates and Specifications Report: Hospital-Level, Risk-Standardized Payment Associated with a 30-Day Episode of Care for AMI (Version 2.0)

Submitted By

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INTRODUCTION

The Centers for Medicare & Medicaid Services (CMS) contracted with Yale New Haven Health Services Corporation/Center for Outcomes Research and Evaluation (YNHHSC/CORE) to develop a hospital-level payment measure for an acute myocardial infarction (AMI) 30-day episode of care. The measure is not intended as a standalone measure, but instead meant to be paired with quality measures such as CMS's 30-day AMI risk-standardized mortality rate (RSMR). This will allow CMS to ascertain the value of care provided for AMI across hospitals. The YNHHSC/CORE team developed the measure using Medicare claims and enrollment data and prepared a technical report, entitled [Hospital-level, Risk-Standardized Payment Associated with a 30-Day Episode of Care for AMI \(Version 1.0\): 2012 Measure Methodology Report](#).

This report is an update to the methodology report and lists the current measure specifications. It describes two revisions to the measure cohort and provides updated payment and measure reliability testing results. For convenience, it also summarizes the current measure specifications.

In brief, the measure updates involve refining the measure cohort to:

- include AMI admissions from hospitals in Maryland and US Territories
- exclude patients with hospice enrollment within one year prior to or on the date of the index admission

UPDATES

1. Measure Cohort

(This is an update to Section 2.3 in the 2012 AMI payment measure methodology report.)

Inclusion of Maryland and US Territories Hospitals

The original measure did not include AMI admissions from hospitals in Maryland or US Territories because CMS reimburses hospitals in Maryland and US Territories using a different mechanism than hospitals in the other 49 states and the District of Columbia. These hospitals are now included in the measure and treated as if they were paid under CMS's Inpatient Prospective Payment System (IPPS).

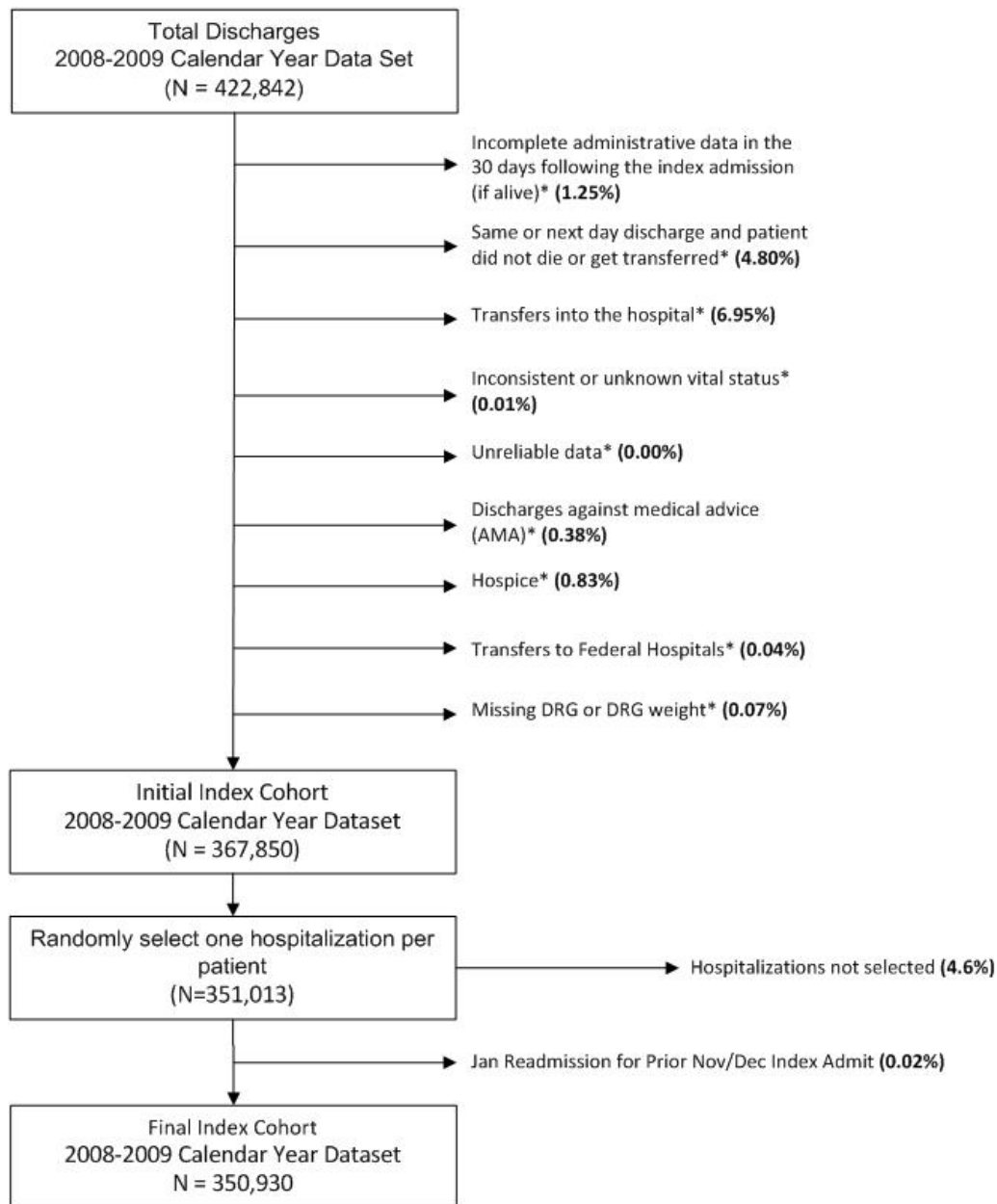
Exclusion of Hospice Patients

The original AMI payment measure did not exclude patients with any hospice assignment due to a desire to include the full breadth of AMI index admissions that met our criteria. This decision was not aligned with CMS's publicly reported 30-day AMI RSMR measure. After discussion with our Technical Expert Panel, we decided to exclude patients with hospice enrollment within one year prior to or on the date of an index admission in order for the AMI payment and RSMR measure cohorts to be aligned as closely as possible. Consistent with CMS's 30-day AMI RSMR measure, we chose to retain patients with hospice assignments after the date of index admission because the hospice assignment may have been related to care received during the index AMI admission.

Effect on Cohort

The inclusion of admissions from hospitals in Maryland and US Territories and the exclusion of patients with hospice enrollment within one year prior to or on the date of an index admission resulted in an increase of 813 patients in the 2008 measure cohort. The updated cohort is seen in Figure 1 below.

Figure 1. Index AMI Payment Cohort for the 2008-2009 Calendar Year Sample



*Categories are not mutually exclusive

2. Updated Results

(This is an update to Section 3 in the 2012 AMI payment measure methodology report.)

The AMI payment measure was originally developed using 2008 Medicare administrative claims data. Since then, we refined the measure cohort and added 2009 data. Below, we recalculated the distribution of unadjusted payments, as well as the estimated payment ratios in the risk-adjustment model, for 2008. We also calculated analogous estimates for the 2009 and combined 2008-2009 cohorts.

We adjusted 2008 payment amounts to 2009 U.S. dollars using the four-quarter moving average percent changes in CMS market baskets for the period ending in the fourth quarter of calendar year 2009. (We used the four-quarter moving average percent changes in CMS market baskets for the period ending in the fourth quarter of calendar year 2010 to deflate January 2010 payments to 2009 dollars for patients with an index admission in December 2009). We used the Inpatient Rehabilitation and Inpatient Psychiatric Facilities Market Basket for all claims from inpatient rehabilitation and inpatient psychiatric facilities, the Long Term Care Hospital (LTCH) Market Basket for all claims from LTCHs, and the End-Stage Renal Disease Market Basket for all claims from renal dialysis facilities. Similarly, we used the Home Health Agency (HHA) Market Basket and the Skilled Nursing Facility (SNF) Market Basket for all claims we considered to be for HHA or SNF services respectively. We used the Medicare Economic Index for all claims we considered to be for physician services, and applied the Prospective Payment System Hospital Market Basket to all other claims.

Updated results can be seen in Table 1 and Table 2 below. Overall, the distribution of unadjusted payments and estimated payment ratios was very similar across all cohorts.

Table 1. Patient-Level Unadjusted AMI Payment Distributions in 2009 Dollars

Summary Statistic	2008 Cohort 181,375 admits (2009 dollars)	2009 Cohort 169,555 admits (2009 dollars)	2008-2009 Cohort 350,930 admits (2009 dollars)
Min	\$3,237	\$3,161	\$3,161
10th Percentile	\$8,413	\$8,155	\$8,305
25th Percentile	\$11,331	\$11,531	\$11,428
Median	\$15,404	\$15,923	\$15,634
Mean (Std. Dev.)	\$20,461 (\$15,084)	\$21,304 (\$16,325)	\$20,868 (\$15,701)
75th Percentile	\$24,300	\$25,482	\$24,885
90th Percentile	\$38,971	\$40,951	\$39,907
Max	\$286,441	\$291,476	\$291,476

Table 2. Payment Ratios for 2008, 2009, and Combined 2008-2009 AMI Payment Cohort

Risk Adjustment Category	Risk Adjustment Variable	2008 Payment Ratio	2009 Payment Ratio	2008-2009 Payment Ratio
Demographics	Age (65-74)	1.258	1.238	1.248
Demographics	Age (75-84)	1.212	1.210	1.211
Demographics	Age (>=85) (reference group)	1.000	1.000	1.000
Cardiovascular	History of Percutaneous Coronary Intervention (PCI)	0.936	0.917	0.927
Cardiovascular	History of Coronary Artery Bypass Grafting (CABG)	0.810	0.796	0.803
Cardiovascular	Congestive Heart Failure (CC 80)	0.955	0.969	0.962
Cardiovascular	Angina Pectoris/Old Myocardial Infarction (CC 83)	0.960	0.957	0.958
Cardiovascular	Heart Infection/Inflammation, Except Rheumatic (CC 85)	1.225	1.242	1.234
Cardiovascular	Valvular and Rheumatic Heart Disease (CC 86)	1.028	1.024	1.025
Cardiovascular	Congenital Cardiac/Circulatory Defect (CC 87-88)	1.110	1.120	1.114
Cardiovascular	Hypertension and Hypertension Complications (CC 89-91)	0.952	0.941	0.947
Comorbid Conditions	Metastatic Cancer and Acute Leukemia and Other Major Cancers (CC 7-8)	0.909	0.898	0.903
Comorbid Conditions	Diabetes and Diabetes Complications (CC 15-19, 119-120)	1.048	1.057	1.053
Comorbid Conditions	Protein-Calorie Malnutrition (CC 21)	1.110	1.150	1.132
Comorbid Conditions	Other Significant Endocrine and Metabolic Disorders (CC 22)	1.049	1.043	1.047
Comorbid Conditions	Obesity/Disorders of Thyroid, Cholesterol, Lipids (CC 24)	0.938	0.917	0.929
Comorbid Conditions	Other Gastrointestinal Disorders (CC 36)	0.956	0.943	0.950
Comorbid Conditions	Osteoporosis and Other Bone/Cartilage Disorders (CC 41)	0.969	0.963	0.966
Comorbid Conditions	Iron Deficiency and Other/Unspecified Anemias and Blood Disease (CC 47)	1.057	1.080	1.069
Comorbid Conditions	Delirium and Encephalopathy (CC 48)	1.035	1.012	1.024
Comorbid Conditions	Dementia (CC 49)	0.894	0.894	0.894
Comorbid Conditions	Drug/Alcohol Psychosis (CC 51)	1.103	1.130	1.116
Comorbid Conditions	Drug/Alcohol Abuse/Dependence (CC 52-53)	0.930	0.925	0.928
Comorbid Conditions	Severe Mental Illness (CC 54-55)	1.030	1.059	1.044
Comorbid Conditions	Reactive and Unspecified Psychosis (CC 56)	0.958	0.968	0.963
Comorbid Conditions	Depression/Anxiety (CC 58-59)	0.964	0.962	0.963
Comorbid Conditions	Precerebral Arterial Occlusion and Transient Cerebral Ischemia (CC 97)	1.045	1.044	1.045
Comorbid Conditions	Vascular Disease and Complications (CC 104-105)	1.022	1.024	1.024
Comorbid Conditions	Other Lung Disorders (CC 115)	1.047	1.063	1.055
Comorbid Conditions	Legally Blind (CC 116)	0.929	0.945	0.936
Comorbid Conditions	Dialysis Status (CC 130)	1.118	1.146	1.132
Comorbid Conditions	Internal Injuries (CC 160)	1.161	1.141	1.151

3. Measure Reliability Testing

(This is an update to Section 3.3.1 in the 2012 AMI payment measure methodology report.)

Since we refined the measure cohort and included an additional year of data, we also decided to calculate the Intraclass Correlation Coefficient (ICC) in order to assess the reliability of the measure. The ICC score can be used to determine the extent to which assessments of a hospital using different but randomly selected subsets of patients produces similar measures of hospital performance. We calculated the risk-standardized payment (RSP) using split-sample combined 2008-2009 data. Thus, we obtained two RSPs for each hospital, using an entirely distinct set of patients from the same time period. To the extent that the calculated measures of these two subsets agree, we have evidence that the measure assesses an attribute of the hospital, not of the patients. As a metric of agreement we calculated the ICC (2,1) as defined by Shrout and Fleiss (1979).¹

The agreement between the two independent assessments of each hospital was 0.785, which, according to the conventional interpretation, is “substantial.”²

CURRENT MEASURE SPECIFICATIONS

An overview of key measure specifications and methodology is shown below. For complete details of the cohort, outcome, and statistical methodology, please see the original 2012 AMI payment measure methodology report.

- **Timeframe:** The measure spans an episode of care starting with admission to 30 days post-admission.
- **Payments:** The measure includes payments for Medicare patients during the 30-day episode of care for the following care settings: inpatient, outpatient, skilled nursing facility, home health, hospice, physician/clinical laboratory/ambulance services, durable medical equipment, prosthetics/orthotics, and supplies.
- **Inclusion Criteria for Index Admission:**
 - Age 65 years or older
 - Continuous enrollment in Medicare fee-for-service (FFS) for the 12 months prior to the index admission
- **Exclusion Criteria for Index Admission:**
 - Fewer than 30 days of post-discharge enrollment in Medicare FFS
 - Same- or next-day discharge (and did not die or get transferred)
 - With principal diagnosis of AMI and transferred in from another acute care facility (the acute episode is included in the measure but episode-of-care payments are attributed to the hospital where the patient was initially admitted rather than the hospital receiving the transferred patient)
 - Inconsistent or unknown patient vital status
 - Unreliable data
 - Discharge against medical advice
 - Hospice assignment within one year prior to or on date of index admission
 - Transfer to federal hospitals
 - Missing DRG or DRG weight for their index hospitalization
 - Admissions within 30 days of a prior index admission
- **Risk Adjustment:** The AMI payment measure adjusts for age, patient case-mix differences across hospitals (i.e., clinical status of the patient, accounted for by adjusting for comorbidities), and history of percutaneous coronary intervention (PCI) and coronary artery bypass grafting (CABG), as described in detail in the 2012 AMI payment measure methodology report. Consistent with National Quality Forum guidelines, the model does not adjust for socioeconomic status (SES) or race.
- **Statistical Modeling:** The measure uses a hierarchical generalized linear model with a log link and an inverse Gaussian error distribution. This strategy accounts for within-hospital correlation of the observed outcomes and accommodates the assumption that underlying differences in quality across hospitals lead to systematic differences in outcomes. The hierarchical generalized linear model is an appropriate statistical approach to measuring payments for Medicare patients when the patients are clustered within hospitals (and therefore the patients' outcomes are not statistically independent) and sample sizes vary across hospitals.
- **Measure Score Calculation:** The RSP is calculated as the ratio of predicted payments to expected payments, multiplied by the national unadjusted average payment for an episode of care.

REFERENCES

1. Shrout P, Fleiss J. Intraclass correlations: uses in assessing rater reliability. *Psychological Bulletin*. 1979; 86:3420-3428.
2. Landis J, Koch G. The measurement of observer agreement for categorical data. *Biometrics*. 1977;33:159-174.