2013 Measure Updates and Specifications Report:
Hospital 30-day Mortality Following an Admission for an Acute Ischemic Stroke (Version 2.0)

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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 30-day measure of mortality after acute ischemic stroke. The YNHHSC/CORE team developed the measure using Medicare claims and enrollment data, and in 2010 prepared a methodology report, *Hospital 30-Day Mortality Following Acute Ischemic Stroke Hospitalization Measure*. YNHHSC/CORE subsequently revised the measure based on stakeholder input.

This report is an update to the 2010 methodology report. It describes two measure revisions and their rationale. For convenience, the report also presents the current measure specifications.

In brief, CMS updated the model by:

- Incorporating a risk-adjustment variable for patients who initially present at one emergency department (ED) but are then admitted to another hospital for their index stroke hospitalization
- Removing International Classification of Diseases 9th Edition Clinical Modification (ICD-9-CM) code 436 from the list of codes defining the stroke measure cohort

2013 MEASURE UPDATES

1. Incorporating Risk Adjustment for Emergency Department-transfer Patients

(This is an update to Section 2.7 in the 2010 stroke methodology report.)

Background

During the course of developing the stroke mortality measure, the members of our Working Group and Technical Expert Panel expressed concerns that certain hospitals may admit a large number of severe stroke patients who are transferred directly from EDs of outside hospitals. The concern expressed was that the proportion of patients who initially present at one ED but are then admitted to another hospital for their index stroke hospitalization may differ by hospital, and such patients may be a particularly high-risk group of patients. Based on analyses described below CMS thus updated the measure to incorporate a risk-adjustment variable to account for ED-transfer status.

Analysis and Rationale for Change

Approximately 5.6% of hospitalizations included in the stroke mortality measure were cared for in an outside ED prior to their ischemic stroke admission. Sixty-three percent of hospitals admitted no ED-transfer patients. Among those that received ED-transfer patients, the range of patients transferred from outside EDs for the majority of hospitals was fewer than 20%, but in rare cases ED-transfer patients comprised over 50% of a hospital's admissions included in the measure.

ED-transfer patients tended to be younger and were more likely to be male than non ED-transfer patients. ED-transfer patients had similar or slightly lower rates of comorbid diseases, but they had a higher observed mortality rate than non ED-transfer patients. We did not find a strong relationship between the proportion of ED-transfer patients a hospital received and performance on the stroke mortality measure. However, for a small proportion of hospitals, risk-

standardized mortality rates (RSMR) are substantially lower when ED-transfer patients are excluded from the measure.

Effect on Measure

The incorporation of a risk-adjustment variable for ED-transfer patients does not change the cohort or outcome of the measure, but for approximately 1% of hospitals the RSMR decreases by 1.5% or more when ED-transfer patients are excluded from the measure.

2. Removal of ICD-9-CM code 436

(This is an update to Section 2.3 in the 2010 stroke methodology report.)

Background and Rationale

During measure development YNHHSC/CORE conducted a literature review and consulted with a technical expert panel to derive a list of ICD-9-CM codes that define an ischemic stroke admission in Medicare inpatient claims. YNHHSC/CORE subsequently determined that ICD-9-CM code 436 is not commonly used to define acute ischemic stroke. The updated measure no longer includes ICD-9-CM code 436 (acute, but ill-defined, cerebrovascular disease) in the list of principal discharge diagnoses that define the measure cohort.

Effect on Cohort

The removal of ICD-9-CM 436 has no major impact on the measure cohort as only 1,332 patients (0.28% of total developmental cohort) are ICD-9-CM 436.

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 2010, *Hospital 30-Day Mortality Following Acute Ischemic Stroke Hospitalization Measure* report.

- **Measure Cohort:** Hospitalizations for patients admitted with acute ischemic stroke.
- **Timeframe**: The measure uses a 30-day outcome timeframe. The timeframe begins at the date of admission for the index hospitalization.
- **All-cause Mortality**: The measure includes deaths from all causes.
- **Inclusion Criteria:**
    - Patient is aged 65 years or older
    - Patient continuously enrolled in Medicare FFS for the 12 months prior to the index admission
- **Exclusion Criteria:**
    - Admissions for patients transferred into the hospital from another acute care facility
    - Admissions for patients with inconsistent or unknown mortality status
    - Admissions for patients enrolled in the Medicare Hospice program any time in the 12 months prior to the index hospitalization including the first date of the index admission
    - Admissions for patients discharged against medical advice
- **Risk Adjustment**: The stroke mortality measure adjusts for case mix differences (age and clinical status of the patient, accounted for by adjusting for comorbidities as described in detail in the measure methodology report) as well as ED-transfer status. Consistent with National Quality Forum guidelines, the model does not adjust for socioeconomic status or race.
- **Statistical Modeling**: The measure uses hierarchical logistic regression to adjust for differences in hospital case mix, and to account for the clustering of patients within a hospital.
- **Measure Score Calculation**: The measure calculates the risk-standardized ratio as the number of predicted deaths to the number of expected deaths. This ratio is multiplied by the national observed mortality rate to get the risk-standardized mortality rate (RSMR).