NATIONAL QUALITY FORUM

Measure Submission and Evaluation Worksheet 5.0

This form contains the information submitted by measure developers/stewards, organized according to NQF's measure evaluation criteria and process. The evaluation criteria, evaluation guidance documents, and a blank online submission form are available on the submitting standards web page.

NQF #: 2026   **NQF Project:** Neurology Project
(for Endorsement Maintenance Review) **Original Endorsement Date:**   **Most Recent Endorsement Date:**   **Last Updated Date:** May 02, 2016
BRIEF MEASURE INFORMATION
De.1 Measure Title: Hospital 30-day, all-cause, risk-standardized mortality rate (RSMR) following an acute ischemic stroke hospitalization
Co.1.1 Measure Steward: Centers for Medicare & Medicaid Services
De.2 Brief Description of Measure: The measure estimates a hospital-level, risk-standardized mortality rate (RSMR) for patients 18 and older discharged from the hospital with a principal diagnosis of acute ischemic stroke. Mortality is defined as death from any cause within 30 days of the index admission date for patients discharged from the hospital with a principal diagnosis of acute ischemic stroke.
2a1.1 Numerator Statement: The outcome for this measure is 30-day all-cause mortality. We define mortality as death from any cause within 30 days from the index admission date for patients 18 and older discharged from the index hospital with a principal diagnosis of acute ischemic stroke.
2a1.4 Denominator Statement: 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 includes admissions for patients age 65 years or older discharged from the hospital with a principal diagnosis of acute ischemic stroke (ICD-9-CM codes 433.x1, 434.x1, 436) and with a complete claims history for the 12 months prior to admission.
2a1.8 Denominator Exclusions: An index admission is the hospitalization considered for mortality outcome. The measure excludes admissions for patients: • transferred from another acute care hospital (because the death is attributed to the hospital where the patient was initially admitted); • with inconsistent or unknown mortality status or other unreliable data (e.g. date of death precedes admission date). • who were discharged alive and against medical advice (AMA) (because providers did not have the opportunity to deliver full care and prepare the patient for discharge); For Medicare FFS patients, the measure additionally excludes admissions for patients: • enrolled in the Medicare Hospice program any time in the 12 months prior to the index hospitalization including the first day of the index admission (since it is likely these patients are continuing to seek comfort measures only). Although this exclusion currently applies to Medicare FFS patients, it could be expanded to include all-payer data if an acceptable method for identifying hospice patients outside of Medicare becomes available.

See Guidance for Definitions of Rating Scale: H=High; M=Moderate; L=Low; I=Insufficient; NA=Not Applicable

1.1 Measure Type: Outcome
2a1. 25-26 Data Source: Administrative claims, Other
2a1.33 Level of Analysis: Facility

1.2-1.4 Is this measure paired with another measure? No

De.3 If included in a composite, please identify the composite measure (*title and NQF number if endorsed*)**:**
This measure is not formally paired with another measure; however, this measure is harmonized with a measure of hospital-level, all-cause, 30-day, risk-standardized readmission following acute ischemic stroke hospitalization.

STAFF NOTES (*issues or questions regarding any criteria*)
Comments on Conditions for Consideration:
Is the measure untested?   Yes⬤ No⬤   If untested, explain how it meets criteria for consideration for time-limited endorsement:
1a. Specific national health goal/priority identified by DHHS or NPP addressed by the measure (*check De.5*)**:**   **5. Similar/related endorsed or submitted measures** (*check 5.1*)**:**   **Other Criteria:**
Staff Reviewer Name(s):

1. IMPACT, OPPORTUNITY, EVIDENCE - IMPORTANCE TO MEASURE AND REPORT

Importance to Measure and Report is a threshold criterion that must be met in order to recommend a measure for endorsement. All three subcriteria must be met to pass this criterion. See guidance on evidence.
***Measures must be judged to be important to measure and report in order to be evaluated against the remaining criteria.* (evaluation criteria)**

1a. High Impact: H⬤ M⬤ L⬤ I ⬤
(*The measure directly addresses a specific national health goal/priority identified by DHHS or NPP, or some other high impact aspect of healthcare.*)

De.4 Subject/Topic Areas (*Check all the areas that apply*)**:**   Neurology, Neurology : Stroke/Transient Ischemic Attack (TIA)
De.5 Cross Cutting Areas (*Check all the areas that apply*)**:**   Safety

1a.1 Demonstrated High Impact Aspect of Healthcare: Affects large numbers, A leading cause of morbidity/mortality, High resource use, Patient/societal consequences of poor quality, Severity of illness

1a.2 If "Other," please describe:

1a.3 Summary of Evidence of High Impact (*Provide epidemiologic or resource use data*)**:**
Affects Large Numbers
Stroke is a priority area for outcomes measure development as it is a relatively common condition with potentially debilitating effects. Approximately 7 million Americans have experienced a stroke (AHA, 2012). Stroke affects approximately 795,000 people each year in the US. Of these strokes, about 610,000 are first attacks and 185,000 are recurrent attacks (AHA, 2012). By 2030, it is projected than an additional 4 million people will have had a stroke, a 24.9% increase in prevalence from 2010 (AHA, 2012).

Leading Cause of Morbidity/Mortality
Stroke is the fourth most common cause of death after heart disease, cancer, and CLRD (AHA, 2012; Towfighi 2011). In 2008, 134,138 people died from stroke (AHA 2012). Approximately 8-12% of ischemic strokes are fatal (AHA, 2012).

Severity of Illness
Stroke survivors frequently experience significant, long-term disability, (e.g. decline in or loss of mobility, memory, speech, and vision) which can lead to increased dependency on the health care system and higher subsequent costs associated with this care (AHA, 2010). In 2005, nearly 1.1 million stroke survivors reported difficulty performing basic activities of daily life (CDC, 2009). As measured by Disability-Adjusted Life Years, the burden of stroke relative to other diseases is anticipated to continue to increase worldwide from 6th in 1990 to 4th in 2020 (Murray 1996).

High Resource Use
The estimated direct and indirect cost of cerebrovascular disease for 2010 is $ 73.7 billion. The mean lifetime cost of ischemic stroke in the United States is estimated at $140,048. This includes inpatient care, rehabilitation and follow-up care necessary for lasting deficits (AHA, 2012). Inpatient hospital costs for an acute stroke event account for 70% of first-year poststroke costs (AHA, 2012). Further, with higher incidence in older populations, stroke is one of the top 20 conditions contributing to Medicare costs (AHA, 2009). As of 2006, the average length of stay for discharges with stroke as the first listed diagnosis was 4.9 days (AHA, 2010).

1a.4 Citations for Evidence of High Impact cited in 1a.3: American Heart Association, Heart Disease and Stroke Statistics - 2012 Update. American Heart Association, Circulation 2012, 125:e2-e220. .

Towfighi A, Saver JL. Stroke declines from third to fourth leading casue of death in the United States: historical perspective and challenges ahead. Stroke 2011; 42:2351-2355.

American Heart Association. Heart Disease and Stroke Statistics – 2010 Update. Dallas, Texas: American Heart Association; 2010. ©2010, American Heart Association.

CDC. Prevalence and most common causes of disability among adults—United States, 2005. MMWR 2009;58(16):421–426.

Murray CJL, Lopez AD, Harvard School of Public Health., World Health Organization., World Bank. The global burden of disease : A comprehensive assessment of mortality and disability from diseases, injuries, and risk factors in 1990 and projected to 2020. Cambridge, MA: Published by the Harvard School of Public Health on behalf of the World Health Organization and the World Bank ; Distributed by Harvard University Press; 1996.

1b. Opportunity for Improvement: H⦿ M⦿ L⦿ I ⦿
(*There is a demonstrated performance gap - variability or overall less than optimal performance*)

1b.1 Briefly explain the benefits (improvements in quality) envisioned by use of this measure:
The goal of this measure is to improve patient outcomes by providing patients, physicians, and hospitals with information about hospital-level, risk-standardized mortality rates following hospitalization for acute ischemic stroke. Measurement of patient outcomes allows for a broad view of quality that encompasses more than what can be captured by individual process-of-care measures. Complex and critical aspects of care, such as communication between 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. The goal of outcomes measurement is to risk-adjust for

NQF #2026 Hospital 30-day, all-cause, risk-standardized mortality rate (RSMR) following an acute ischemic stroke hospitalization, Last Updated Date: May 02, 2016

patients' conditions at the time of hospital admission and then evaluate patient outcomes. This mortality measure was developed to identify institutions whose performance is better or worse than would be expected based on their patient case-mix, and therefore promote hospital quality improvement and better inform consumers about care quality.

1b.2 Summary of Data Demonstrating Performance Gap *(Variation or overall less than optimal performance across providers)*: **[***For Maintenance** – Descriptive statistics for performance results for this measure - distribution of scores for measured entities by quartile/decile, mean, median, SD, min, max, etc.***]** The stroke literature demonstrates clear opportunities for improvement in stroke care. Geographic variation in patient outcomes has been shown within the US and between countries (Glymour, 2009; El-Saed, 2006; Weir, 2001). Studies have also indicated that even the day of the week on which a patient is admitted to the hospital may influence outcomes (Saposnik, 2007).

Recent studies have demonstrated both variation in the quality of care and overall opportunities for improvement in the process of stroke care (Fonarow, 2010). Furthermore, recent work in the VA supports the relationship between improved processes of care and improved risk-adjusted outcomes for patients (Bravata, 2010).

Our data show a range of patient outcomes consistent with the literature with unadjusted mortality rates at the hospital ranging from 9.1% - 21.4% (25th and 75th percentile, respectively).

1b.3 Citations for Data on Performance Gap: [*For Maintenance** – Description of the data or sample for measure results reported in 1b.2 including number of measured entities; number of patients; dates of data; if a sample, characteristics of the entities included***]**
Bravata DM, Wells CK, Lo AC, Nadeau SE, Melillo J, Chodkowski D, Struve F, Williams LS, Peixoto AJ, Gorman M, Goel P, Acompora G, McClain V, Ranjbar N, Tabereaux PB, Boice JL, Jacewicz M, Concato J. Processes of care associated with acute stroke outcomes. Arch Intern Med. 2010 May 10;170(9):804-10.

El-Saed A, Kuller L, Newman A, Lopez O, Costantino J, McTigue K, Cushman M, Kronmal R. Geographic Variations in Stroke Incidence and Mortality Among Older Populations in Four US Communities Stroke 2006; 37:1975-9.

Fonarow GC, Reeves MJ, Smith EE, Saver JL, Zhao X, Olson DW, Hernandez AF, Peterson ED, Schwamm LH; GWTG-Stroke Steering Committee and Investigators. Characteristics, performance measures, and in-hospital outcomes of the first one million stroke and transient ischemic attack admissions in get with the guidelines-stroke. Circ Cardiovasc Qual Outcomes. 2010 May;3(3):291-302.

Glymour M, Kosheleva A, Boden-Albala B. Birth and adult residence in the Stroke Belt independently predict stroke mortality. Neurology 2009 73: 1858-65.

Saposnik G, Baibergenova A, Bayer N, Hachinski V. Weekends: A Dangerous Time for Having a Stroke? Stroke. 2007;38:1211-15.

Weir, N.U., et al., Variations between countries in outcome after stroke in the International Stroke Trial (IST). Stroke, 2001. 32(6): p. 1370-7

1b.4 Summary of Data on Disparities by Population Group: [*For Maintenance** –Descriptive statistics for performance results for this measure by population group***]**
Disparities in stroke incidence and mortality have been reported in populations of varying age, gender, and ethnicity.

See Guidance for Definitions of Rating Scale: H=High; M=Moderate; L=Low; I=Insufficient; NA=Not Applicable
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Age
The incidence of stroke in adults is strongly age dependent, and the rate of adverse outcomes and complications associated with stroke increases with advanced age (Davenport, 1996). Nearly three-quarters of all strokes occur in people over the age of 65. The risk of having a stroke more than doubles each decade after the age of 55. Moreover, about 86 percent of stroke deaths occur in people age 65 and older (CDC 2007; AHA 2010).

Gender
The stroke incidence rate is higher for men compared with women at younger ages, but not at older ages. (AHA 2010) Women are older at stroke onset compared with men (75 years compared with 71 years; AHA, 2012). The absolute number of strokes in the population is greater for women because of the increasing risk of stroke with advancing age, combined with women's longer life expectancy.

Race/Ethnicity
The overall death rate for stroke is higher among black patients compared with white (NCHS). However, our initial hospital-level analyses do not indicate that performance varies greatly by the demographic characteristics of the patient population served by a hospital. We therefore, consistent with NQF guidelines, do not expect to stratify the measure by sociodemographic characteristics.

Race
We used the Medicare Provider Analysis and Review (MEDPAR) File for 2007 to calculate the percentage of African-American patients at each hospital, using all patients admitted to each hospital. We examined hospital-level RSMRs with the 2006-2008 sample across hospitals which were grouped by quintile of percentage of African-American patients they cared for. There was a slight decrease in RSMRs by quintile. The distributions for the RSMRs overlapped, and some hospitals caring for the highest percentage of African-American patients performed well on the measure. The median weighted RSMR for hospitals with the highest proportion of African-American patients was 14.6% compared with 15.8% for hospitals with the lowest proportion of African-American patients. In comparison to the national average (15.2%), hospitals with high proportions of African-American patients do not have worse 30-day RSMRs.

SES
We determined a SES level for each hospital, by calculating the percentage of patients with dual eligibility for Medicare and Medicaid for each hospital, using all patients admitted to each hospital. Using the 2006-2008 sample, we grouped hospital into quintiles by percentage of dual-eligible patients and examined hospital-level RSMRs across quintiles. There were no differences in RSMRs across quintile. The distributions for the RSMRs overlapped, and many hospitals in the lowest quintile performed well on the measure. The median weighted RSMR was 15.1% for hospitals in the lowest and 14.7% for the highest quintiles. In comparison to the national average (15.2%), hospitals with higher proportions of dual-eligible patients do not have worse 30-day RSMRs.

1b.5 Citations for Data on Disparities Cited in 1b.4: [*For <u>Maintenance</u> – Description of the data or sample for measure results reported in 1b.4 including number of measured entities; number of patients; dates of data; if a sample, characteristics of the entities included*]
Davenport RJ, Dennis MS, Wellwood I, Warlow CP. Complications after acute stroke. Stroke. 1996;27:415-420

American Heart Association. Heart Disease and Stroke Statistics – 2010 Update. Dallas, Texas: American Heart Association; 2010. ©2010, American Heart Association.
Centers for Disease Control and Prevention (CDC). Prevalence of stroke: United States, 2005. MMWR Morb Mortal Wkly Rep. 2007;56:469–474.

See Guidance for Definitions of Rating Scale: H=High; M=Moderate; L=Low; I=Insufficient; NA=Not Applicable

National Center for Health Statistics. Health Data Interactive File, 1981–2006. Hyattsville, MD: National Center for Health Statistics. Available at: http://205.207.175.93/hdi/ReportFolders/ReportFolders.aspx?IF_ActivePath_P,21.

Reeves MJ, Fonarow GC, Zhao X, Smith EE, Schwamm LH; Get With The Guidelines-Stroke Steering Committee & Investigators. Quality of care in women with ischemic stroke in the GWTG program. Stroke. 2009 Apr;40(4):1127-33.

Schwamm LH, Reeves MJ, Pan W, Smith EE, Frankel MR, Olson D, Zhao X, Peterson E, Fonarow GC. Race/ethnicity, quality of care, and outcomes in ischemic stroke. Circulation. 2010 Apr 6;121(13):1492-501.

1c. Evidence (*Measure focus is a health outcome OR meets the criteria for quantity, quality, consistency of the body of evidence.*)
Is the measure focus a health outcome?   Yes⦿ No⦿   If not a health outcome, rate the body of evidence.

Quantity: H⦿ M⦿ L⦿ I ⦿   Quality: H⦿ M⦿ L⦿ I ⦿   Consistency: H⦿ M⦿ L⦿ I ⦿

Quantity	Quality	Consistency	Does the measure pass subcriterion1c?
M-H	M-H	M-H	**Yes⦿**
L	M-H	M	**Yes⦿** IF additional research unlikely to change conclusion that benefits to patients outweigh harms: otherwise **No⦿**
M-H	L	M-H	**Yes⦿** IF potential benefits to patients clearly outweigh potential harms: otherwise **No⦿**
L-M-H	L-M-H	L	**No ⦿**

Health outcome – rationale supports relationship to at least one healthcare structure, process, intervention, or service	**Does the measure pass subcriterion1c?** **Yes⦿** IF rationale supports relationship

1c.1 Structure-Process-Outcome Relationship (*Briefly state the measure focus, e.g., health outcome, intermediate clinical outcome, process, structure; then identify the appropriate links, e.g., structure-process-health outcome; process- health outcome; intermediate clinical outcome-health outcome*)**:**
N/A This is an outcomes measure, not a process measure. The goal is to directly affect patient outcomes by measuring risk-standardized rates of mortality.

1c.2-3 Type of Evidence (*Check all that apply*)**:**
Other
N/A This is an outcomes measure, not a process measure.

1c.4 Directness of Evidence to the Specified Measure (*State the central topic, population, and outcomes addressed in the body of evidence and identify any differences from the measure focus and measure target population*)**:**
N/A This is an outcomes measure, not a process measure.

1c.5 Quantity of Studies in the Body of Evidence (*Total number of studies, not articles*)**:** N/A This is an outcomes measure, not a process measure.

1c.6 Quality of Body of Evidence (*Summarize the certainty or confidence in the estimates of benefits and harms to patients across studies in the body of evidence resulting from study factors. Please address: a) study design/flaws; b) directness/indirectness of the evidence to this measure (e.g., interventions,*

comparisons, outcomes assessed, population included in the evidence); and c) imprecision/wide confidence intervals due to few patients or events): N/A This is an outcomes measure, not a process measure.

1c.7 Consistency of Results <u>across Studies</u> *(Summarize the consistency of the magnitude and direction of the effect)*: N/A This is an outcomes measure, not a process measure.

1c.8 Net Benefit *(Provide estimates of effect for benefit/outcome; identify harms addressed and estimates of effect; and net benefit - benefit over harms)*:
N/A This is an outcomes measure, not a process measure.

1c.9 Grading of Strength/Quality of the Body of Evidence. Has the body of evidence been graded? No

1c.10 If body of evidence graded, identify the entity that graded the evidence including balance of representation and any disclosures regarding bias: N/A This is an outcomes measure, not a process measure.

1c.11 System Used for Grading the Body of Evidence: Other

1c.12 If other, identify and describe the grading scale with definitions: N/A This is an outcomes measure, not a process measure.

1c.13 Grade Assigned to the Body of Evidence: N/A This is an outcomes measure, not a process measure.

1c.14 Summary of Controversy/Contradictory Evidence: N/A This is an outcomes measure, not a process measure.

1c.15 Citations for Evidence other than Guidelines*(Guidelines addressed below)*:
N/A This is an outcomes measure, not a process measure.

1c.16 Quote verbatim, <u>the specific guideline recommendation</u> *(Including guideline # and/or page #)*:
N/A This is an outcomes measure, not a process measure.

1c.17 Clinical Practice Guideline Citation: N/A This is an outcomes measure, not a process measure.

1c.18 National Guideline Clearinghouse or other URL: N/A This is an outcomes measure, not a process measure.

1c.19 Grading of Strength of Guideline Recommendation. Has the recommendation been graded? No

1c.20 If guideline recommendation graded, identify the entity that graded the evidence including balance of representation and any disclosures regarding bias:

1c.21 System Used for Grading the Strength of Guideline Recommendation: Other

1c.22 If other, identify and describe the grading scale with definitions: N/A This is an outcomes measure, not a process measure.

1c.23 Grade Assigned to the Recommendation: N/A This is an outcomes measure, not a process measure.

1c.24 Rationale for Using this Guideline Over Others: N/A This is an outcomes measure, not a process

measure.

Based on the NQF descriptions for rating the evidence, what was the <u>developer's assessment</u> of the quantity, quality, and consistency of the body of evidence?
1c.25 Quantity: High   **1c.26** Quality: High**1c.27** Consistency**:** High
1c.28 Attach evidence submission form**:**
1c.29 Attach appendix for supplemental materials**:**

Was the threshold criterion, *Importance to Measure and Report*, met?
(*1a & 1b must be rated moderate or high and 1c yes*)   Yes⭘ No⭘
Provide rationale based on specific subcriteria:

For a new measure if the Committee votes NO, then STOP.
For a measure undergoing endorsement maintenance, if the Committee votes NO because of 1b. (no opportunity for improvement), it may be considered for continued endorsement and all criteria need to be evaluated.

2. RELIABILITY & VALIDITY - SCIENTIFIC ACCEPTABILITY OF MEASURE PROPERTIES

Extent to which the measure, <u>as specified</u>, produces consistent (reliable) and credible (valid) results about the quality of care when implemented. **(evaluation criteria)**
Measure testing must demonstrate adequate reliability and validity in order to be recommended for endorsement. Testing may be conducted for data elements and/or the computed measure score. Testing information and results should be entered in the appropriate field. Supplemental materials may be referenced or attached in item 2.1. See guidance on measure testing.

S.1 Measure Web Page *(In the future, NQF will require measure stewards to provide a URL link to a web page where current detailed specifications can be obtained)*. Do you have a web page where current detailed specifications for <u>this</u> measure can be obtained? No

S.2 If yes, provide web page URL:

2a. RELIABILITY. Precise Specifications and Reliability Testing: H⭘ M⭘ L⭘ I ⭘

2a1. Precise Measure Specifications. (*The measure specifications precise and unambiguous.*)

2a1.1 Numerator Statement *(Brief, narrative description of the measure focus or what is being measured about the target population, e.g., cases from the target population with the target process, condition, event, or outcome)***:**
The outcome for this measure is 30-day all-cause mortality. We define mortality as death from any cause within 30 days from the index admission date for patients 18 and older discharged from the index hospital with a principal diagnosis of acute ischemic stroke.

2a1.2 Numerator Time Window *(The time period in which the target process, condition, event, or outcome is eligible for inclusion)***:**
We define this as death from any cause within 30 days from the admission date for the index acute ischemic stroke hospitalization.

2a1.3 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, codes with descriptors, and/or specific data collection items/responses)***:**
This outcome measure does not have a traditional numerator and denominator like a core process measure (e.g., percentage of adult patients with diabetes aged 18-75 years receiving one or more hemoglobin A1c tests per year); thus, we are using this field to define the outcome.

See Guidance for Definitions of Rating Scale: H=High; M=Moderate; L=Low; I=Insufficient; NA=Not Applicable

Measure includes deaths from any cause within 30 days from admission date of the index hospitalization.

Identifying deaths in the FFS measure

We identify deaths for FFS Medicare patients 65 years and older in the Medicare Enrollment Database.

Identifying deaths in the all-payer measure

For the purposes of development 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).

2a1.4 Denominator Statement *(Brief, narrative description of the target population being measured)*:
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 includes admissions for patients age 65 years or older discharged from the hospital with a principal diagnosis of acute ischemic stroke (ICD-9-CM codes 433.x1, 434.x1, 436) and with a complete claims history for the 12 months prior to admission.

2a1.5 Target Population Category *(Check all the populations for which the measure is specified and tested if any)*: Senior Care

2a1.6 Denominator Time Window *(The time period in which cases are eligible for inclusion)*:
This measure was developed with 12 months of data.

2a1.7 Denominator Details (*All information required to identify and calculate the target population/denominator such as definitions, codes with descriptors, and/or specific data collection items/responses)*:
Note: This outcome measure does not have a traditional numerator and denominator like a core process measure (e.g., percentage of adult patients with diabetes aged 18-75 years receiving one or more hemoglobin A1c tests per year). We therefore use this field to define the measure cohort.

The denominator includes patients 18 and over hospitalized for acute ischemic stroke. The measure was developed in a cohort of patients 65 years and older who were enrolled in Medicare FFS and admitted to non-federal hospitals. To be included in the Medicare FFS cohort the inclusion criteria required that the patient be continuously enrolled in Medicare FFS Parts A and B for the 12 months prior to the index hospitalization.

Acute ischemic stroke is defined by the following ICD-9-CM and ICD-10-CM codes:

ICD-9-CM codes used to define ischemic stroke:
433.01 Occlusion and stenosis of precerebral arteries, Basilar artery with
        cerebral infarction
433.11 Occlusion and stenosis of precerebral arteries, Carotid artery with
        cerebral infarction
433.21 Occlusion and stenosis of precerebral arteries, Vertebral artery with
        cerebral infarction
433.31 Occlusion and stenosis of precerebral arteries, Multiple and bilateral
        with cerebral infarction
433.81 Occlusion and stenosis of precerebral arteries, Other specified

precerebral artery with cerebral infarction

433.91 Occlusion and stenosis of precerebral arteries, Unspecified precerebral artery with cerebral infarction, Precerebral artery NOS

434.01 Occlusion of cerebral arteries, Cerebral thrombosis with cerebral infarction, thrombosis of cerebral arteries

434.11 Occlusion of cerebral arteries, Cerebral embolism with cerebral infarction

434.91 Occlusion of cerebral arteries, Cerebral artery occlusion, unspecified, with cerebral infarction

436   Acute, but ill-defined, cerebrovascular disease

ICD-10-CM codes used to define ischemic stroke:

I6322   Cerebral infarction due to unspecified occlusion or stenosis of basilar arteries

I63139 Cerebral infarction due to embolism of unspecified carotid artery

I63239 Cerebral infarction due to unspecified occlusion or stenosis of unspecified carotid arteries

I63019 Cerebral infarction due to thrombosis of unspecified vertebral artery

I63119 Cerebral infarction due to embolism of unspecified vertebral artery

I63219 Cerebral infarction due to unspecified occlusion or stenosis of unspecified vertebral arteries

I6359   Cerebral infarction due to unspecified occlusion or stenosis of other cerebral artery

I6320   Cerebral infarction due to unspecified occlusion or stenosis of unspecified precerebral arteries

I6330   Cerebral infarction due to thrombosis of unspecified cerebral artery

I6340   Cerebral infarction due to embolism of unspecified cerebral artery

I6350   Cerebral infarction due to unspecified occlusion or stenosis of unspecified cerebral artery

I678   Other specified cerebrovascular diseases

2a1.8 Denominator Exclusions *(Brief narrative description of exclusions from the target population)***:**
An index admission is the hospitalization considered for mortality outcome.

The measure excludes admissions for patients:
• transferred from another acute care hospital (because the death is attributed to the hospital where the patient was initially admitted);
• with inconsistent or unknown mortality status or other unreliable data (e.g. date of death precedes admission date).
• who were discharged alive and against medical advice (AMA) (because providers did not have the opportunity to deliver full care and prepare the patient for discharge);

For Medicare FFS patients, the measure additionally excludes admissions for patients:
• enrolled in the Medicare Hospice program any time in the 12 months prior to the index hospitalization including the first day of the index admission (since it is likely these patients are continuing to seek comfort measures only). Although this exclusion currently applies to Medicare FFS patients, it could be expanded to include all-payer data if an acceptable method for identifying hospice patients outside of Medicare becomes available.

2a1.9 Denominator Exclusion Details *(All information required to identify and calculate exclusions from the denominator such as definitions, codes with descriptors, and/or specific data collection items/responses)***:**
Transfers from other acute care facilities 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;

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'.

Discharges Against Medical Advice (AMA) are identified using the discharge disposition indicator.

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.

2a1.10 Stratification Details/Variables *(All information required to stratify the measure results including the stratification variables, codes with descriptors, definitions, and/or specific data collection items/responses)***:**
N/A

2a1.11 Risk Adjustment Type *(Select type. Provide specifications for risk stratification in 2a1.10 and for statistical model in 2a1.13)***:** Statistical risk model   **2a1.12 If "Other," please describe:**

2a1.13 Statistical Risk Model and Variables *(Name the statistical method - e.g., logistic regression and list all the risk factor variables. Note - risk model development should be addressed in 2b4.)***:**
Our approach to risk adjustment was 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".1

The measure employs a hierarchical logistic regression model to create a hospital-level 30-day RSMR. In brief, the approach simultaneously models two levels (patient and hospital) to account for the variance in patient outcomes within and between hospitals (Normand & Shahian, 2007). At the patient level, each model adjusts the log-odds of mortality within 30 days of admission for age and selected clinical covariates. The second level models the hospital-specific intercepts as arising from a normal distribution. The hospital intercept represents the underlying risk of mortality, after accounting for patient risk. See section 2a1.20. Calculation Algorithm/Measure Logic for more detail.

Candidate and Final Risk-adjustment Variables: The measure was initially developed using Medicare FFS 2007 claims data. Candidate variables were patient-level risk adjustors that were expected to be predictive of mortality, 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 Medicare claims extending 12 months prior to and including the index admission. The model adjusts for case mix differences based on the clinical status of patients at the time of admission. We used condition categories (CCs), which are clinically meaningful groupings of more than 15,000 ICD-9-CM diagnosis codes, and combinations of CCs as candidate variables. A file which contains a list of the ICD-9-CM codes and their groupings into CCs is available on www.qualitynet.org (http://www.qualitynet.org/dcs/ContentServer?c=Page&pagename=QnetPublic%2FPage%2FQnetTier3&cid=1182785083979)

We did not risk-adjust for CCs that were possible adverse events of care and that were only recorded in the index admission. Only comorbidities that conveyed information about the patient at that time or in the 12 months prior, and not complications that arose during the course of the hospitalization were included in the risk-adjustment.

Following initial model development, in response to suggestions from our working group and Technical Expert Panel (TEP) members, we evaluated the mortality rates of patients admitted for stroke after having been evaluated at a different hospital's emergency department (ED). Our experts expressed concern that such patients may be at higher risk and that the admitting hospital would not have had the opportunity to evaluate and treat such patients at first presentation. They also felt that certain hospitals may receive

substantially greater proportions of patients transferred from outside EDs. Based on our analyses, we updated the measure to include a risk factor that indicates if a patient was transferred in from an outside ED, that is, the patient was seen in a different hospital's ED prior to being admitted for the index admission. This revision was done using 2008 data.

Frequencies and odds ratios for the model are presented below (2008 Medicare FFS patients aged 65 and older; n=175,267 admissions):

Final set of risk-adjustment variables:

Variable//Frequency (%)//Odds Ratio (95% confidence interval)

• Transfer from another ED/Frequency= 5.64/OR (95% CI)= 1.37 (1.29-1.45)

Demographic
• Age-65 (continuous)/mean (SD)=15.31 (7.93)/OR (95% CI)= 1.069 (1.067-1.07)
• Male /Frequency= 40.28/OR (95% CI)= 0.99 (0.96-1.03)

Cardiovascular/Cerebrovascular
• Congestive Heart Failure /Frequency= 26.03/OR (95% CI)= 1.38 (1.34-1.43)
• Valvular and Rheumatic Heart Disease /Frequency= 23.03/OR (95% CI)= 0.87 (0.84-0.89)
• Congenital Cardiac/Circulatory Defects /Frequency= 2.04/OR (95% CI)= 0.71 (0.64-0.8)
• Hypertensive Heart Disease /Frequency= 6.54/OR (95% CI)= 0.83 (0.78-0.88)
• Specified Heart Arrhythmias /Frequency= 29.37/OR (95% CI)= 1.59 (1.54-1.64)
• Cerebral Hemorrhage /Frequency= 1.88/OR (95% CI)= 1.16 (1.06-1.27)
• Ischemic or Unspecified Stroke /Frequency= 24.81/OR (95% CI)= 1.00 (0.96-1.03)
• Precerebral Arterial Occlusion and Transient Cerebral Ischemia /Frequency= 22.83/OR (95% CI)= 0.82 (0.8-0.85)
• Cerebral Atherosclerosis and Aneurysm /Frequency= 10.67/OR (95% CI)= 0.83 (0.80-0.87)
• Hemiplegia/Hemiparesis /Frequency= 5.60/OR (95% CI)= 1.17 (1.10-1.24)

Comorbidities
• History of Infection/Frequency= 26.72/OR (95% CI)= 1.15 (1.11-1.18)
• Metastatic Cancer and Acute Leukemia and Other Major Cancers /Frequency= 3.65/OR (95% CI)= 2.77 (2.61-2.95)
• Lymphatic, Head and Neck, Brain, Breast, Colorectal and Other Major Cancers/Frequency= 23.92/OR (95% CI)= 0.92 (0.89-0.95)
• Protein-Calorie Malnutrition /Frequency= 5.42/OR (95% CI)= 1.69 (1.61-1.77)
• Other Significant Endocrine and Metabolic Disorders /Frequency= 75.98/OR (95% CI)= 0.75 (0.72-0.77)
• Other Gastrointestinal Disorders /Frequency= 43.64/OR (95% CI)= 0.90 (0.88-0.93)
• Disorders of the Vertebrae and Spinal Discs /Frequency= 17.06/OR (95% CI)= 0.89 (0.86-0.93)
• Osteoarthritis of Hip or Knee /Frequency= 10.36/OR (95% CI)= 0.82 (0.78-0.86)
• Other Musculoskeletal and Connective Tissue Disorders /Frequency= 63.50/OR (95% CI)= 0.86 (0.84-0.89)
• Iron Deficiency and Other/Unspecified Anemia and Blood Disease /Frequency= 31.86/OR (95% CI)= 1.09 (1.05-1.12)
• Dementia or senility /Frequency= 28.64/OR (95% CI)= 1.24 (1.20-1.28)
• Major Psychiatric Disorders /Frequency= 9.12/OR (95% CI)= 1.08 (1.04-1.13)
• Quadriplegia, Other Extensive Paralysis /Frequency= 1.54/OR (95% CI)= 1.39 (1.26-1.53)
• Multiple Sclerosis /Frequency= 10.27/OR (95% CI)= 0.83 (0.79-0.87)
• Seizure Disorders and Convulsions /Frequency= 6.92/OR (95% CI)= 1.27 (1.21-1.33)

• Hypertension /Frequency= 88.00/OR (95% CI)= 0.77 (0.74-0.81)
• Peripheral Vascular Disease /Frequency= 23.02/OR (95% CI)= 1.07 (1.04-1.11)
• Chronic Obstructive Pulmonary Disease /Frequency= 21.92/OR (95% CI)= 1.06 (1.03-1.10)
• Pneumonia /Frequency= 17.36/OR (95% CI)= 1.49 (1.44-1.54)
• Pleural Effusion/Pneumothorax /Frequency= 6.92/OR (95% CI)= 1.13 (1.07-1.18)
• Other Eye Disorders /Frequency= 19.34/OR (95% CI)= 0.91 (0.88-0.94)
• Other Ear, Nose, Throat, and Mouth Disorders /Frequency= 26.99/OR (95% CI)= 0.87 (0.84-0.90)
• Dialysis Status /Frequency= 1.47/OR (95% CI)= 1.38 (1.24-1.52)
• Renal Failure /Frequency= 15.45/OR (95% CI)= 1.16 (1.12-1.21)
• Urinary Tract Infection /Frequency= 21.55/OR (95% CI)= 1.14 (1.10-1.18)
• Male Genital Disorders /Frequency= 11.95/OR (95% CI)= 0.78 (0.74-0.82)
• Decubitus Ulcer of Skin /Frequency= 2.52/OR (95% CI)= 1.29 (1.20-1.39)
• Chronic Ulcer of Skin, Except Decubitus /Frequency= 5.52/OR (95% CI)= 1.16 (1.10-1.23)
• Other Dermatological Disorders /Frequency= 29.38/OR (95% CI)= 0.92 (0.89-0.95)

References:
1. 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.
2. Normand S-LT, Shahian DM. 2007. Statistical and Clinical Aspects of Hospital Outcomes Profiling. Stat Sci 22 (2): 206-226.

2a1.14-16 Detailed Risk Model Available at Web page URL (or attachment). Include coefficients, equations, codes with descriptors, definitions, and/or specific data collection items/responses. Attach documents only if they are not available on a webpage and keep attached file to 5 MB or less. NQF strongly prefers you make documents available at a Web page URL**. Please supply login/password if needed**:
Attachment
Stroke_MortalityMethodologyReport_9.29.10.pdf

2a1.17-18. Type of Score: Rate/proportion

2a1.19 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

2a1.20 Calculation Algorithm/Measure Logic*(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; aggregating data; risk adjustment; etc.)***:**
The proposed measure employs a hierarchical logistic regression model to create a hospital level 30-day RSMR. In brief, the approach simultaneously models two levels (patient and hospital) to account for the variance in patient outcomes within and between hospitals (Normand & Shahian, 2007). At the patient level, each model adjusts the log-odds of mortality within 30 days of admission for age and selected clinical covariates. The second level models the hospital-specific intercepts as arising from a normal distribution. The hospital intercept represents the underlying risk of mortality, after accounting for patient risk. The hospital-specific intercepts are given a distribution in order 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 ratio lower than one indicates lower-than-expected mortality or better quality and a ratio higher than one indicates higher-than-expected mortality or worse quality.

The predicted hospital outcome (the numerator) is the sum of predicted probabilities of death for all patients at a particular hospital. The predicted probability of each patient in that hospital is calculated using the hospital-specific intercept and patient risk factors. The expected number of deaths (the denominator) is the sum of expected probabilities of death for all patients at a hospital. The expected probability of each patient in a hospital is calculated using a common intercept and patient risk factors.

Please see attachment for more details on the calculation algorithm.

References:
Normand S-LT, Shahian DM. 2007. Statistical and Clinical Aspects of Hospital Outcomes Profiling. Stat Sci 22 (2): 206-226.

2a1.21-23 Calculation Algorithm/Measure Logic Diagram URL or attachment:
Attachment
Stroke_Mortality_Calculation_Algorithm.pdf

2a1.24 Sampling (Survey) Methodology. If measure is based on a sample (or survey), provide instructions for obtaining the sample, conducting the survey and guidance on minimum sample size (response rate)**:**
N/A –This measure is not based on a sample or survey.

2a1.25 Data Source (*Check all the sources for which the measure is specified and tested*). If other, please describe**:**
 Administrative claims, Other

2a1.26 Data Source/Data Collection Instrument (*Identify the specific data source/data collection instrument, e.g. name of database, clinical registry, collection instrument, etc.*)**:** To apply the measure to Medicare FFS patients, Medicare Part A inpatient and outpatient claims are used. To apply the measure to a non-Medicare population, inpatient claims data are used.

The Medicare data sources used to create the measure were:
1. Medicare Part A inpatient and Part B outpatient claims: This database 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, and hospice care, as well as inpatient and outpatient 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 dataset 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 measure was subsequently tested in 2006 California Patient Discharge Data, a large, linked all-payer database of patient hospital admissions. Records are linked by a unique patient identification number, allowing us to determine patient history from previous hospitalizations. In addition, the unique patient ID number is used to link with state vital statistics records to assess 30-day mortality.

Reference:
Fleming C, Fisher ES, Chang CH, Bubolz TA, Malenda 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): 377-391.

2a1.27-29 Data Source/data Collection Instrument Reference Web Page URL or Attachment:

2a1.30-32 Data Dictionary/Code Table Web Page URL or Attachment:

2a1.33 Level of Analysis (*Check the levels of analysis for which the measure is specified and tested*)**:**
Facility

2a1.34-35 Care Setting (*Check all the settings for which the measure is specified and tested*)**:**
Hospital/Acute Care Facility

2a2. Reliability Testing. (*Reliability testing was conducted with appropriate method, scope, and adequate demonstration of reliability.*)

2a2.1 Data/Sample (*Description of the data or sample including number of measured entities; number of patients; dates of data; if a sample, characteristics of the entities included*)**:**
In measure development and testing, we used Medicare Part A and Part B claims data for calendar years 2006, 2007, and 2008 to test model reliability among Medicare FFS patients. The 2006 cohort included 191,275 admissions; the 2007 cohort included 181,395 admissions; and the 2008 cohort included 175,267 admissions.

2a2.2 Analytic Method (*Describe method of reliability testing & rationale*)**:**
Data Element Reliability
In constructing the measure in Medicare FFS patients, we aim to utilize only those data elements from the claims that have both face validity and reliability. We avoid the use of fields that are thought to be coded inconsistently across hospitals or providers. Specifically, we use fields that are consequential for payment and which are audited. We identify such variables through empiric analyses and our understanding of CMS auditing and billing policies and seek to avoid variables which do not meet this standard. For example, "discharge disposition" is a variable in Medicare claims data that is not thought to be a reliable variable for identifying a transfer between two acute care facilities. Thus, we derive a variable using admission and discharge dates as a surrogate for "discharge disposition" to identify hospital admissions involving transfers. This allows us to identify these admissions using variables in the claims data which have greater reliability than the "discharge disposition" variable.
In addition, CMS has in place several hospital auditing programs used to assess overall claims code accuracy, to ensure appropriate billing, and for overpayment recoupment. CMS routinely conducts data analysis to identify potential problem areas and detect fraud, and audits important data fields used in our measures, including diagnosis and procedure codes and other elements that are consequential to payment. Finally, we assess the reliability of the data elements by comparing model variable frequencies and odds

ratios in three years of data.

Measure Result Reliability
The reliability of a measurement is the degree to which repeated measurements of the same entity agree with each other. For measures of hospital performance, the measured entity is naturally the hospital, and reliability is the extent to which repeated measurements of the same hospital give similar results. Accordingly, our approach to assessing reliability is to consider the extent to which assessments of a hospital using different but randomly selected subsets of patients produce similar measures of hospital performance. That is, we take a "test-retest" approach in which hospital performance is measured once using a random subset of patients, then measured again using a second random subset exclusive of the first, and the agreement of the two resulting performance measures compared across hospitals.1
For test-retest reliability of the measure in Medicare FFS patients aged 65 and older, we combined index admissions from successive measurement periods into one dataset, randomly sampled half of patients within each hospital, calculated the measure for each hospital, and repeated the calculation using the second half. Thus, each hospital is measured twice, but each measurement is made using an entirely distinct set of patients. To the extent that the calculated measures of these two subsets agree, we have evidence that the measure is assessing an attribute of the hospital, not of the patients. As a metric of agreement we calculated the intra-class correlation coefficient2, and assessed the values according to conventional standards3. Specifically, we used a combined 2006-2008 sample, randomly split it into two approximately equal subsets of patients, and calculated the RSMR for each hospital for each sample. The agreement of the two RSMRs was quantified for hospitals in each sample using the intra-class correlation as defined by ICC (2,1) by Shrout and Fleiss.2
Using two independent samples provides an honest estimate of the measure's reliability, compared with using two random but potentially overlapping samples which would exaggerate the agreement. Moreover, because our final measure is derived using hierarchical logistic regression, and a known property of hierarchical logistic regression models is that smaller volume hospitals contribute less ´signal´, a split sample using a single measurement period would introduce extra noise, potentially underestimating the actual test-retest reliability that would be achieved if the measure were reported using three years of data.
References:
1. Rousson V, Gasser T, Seifert B. "Assessing intrarater, interrater and test–retest reliability of continuous measurements," Statistics in Medicine, 2002, 21:3431-3446.
2. Shrout P, Fleiss J. Intraclass correlations: uses in assessing rater reliability. Psychological Bulletin, 1979, 86, 420-3428.
3. Landis J, Koch G, The measurement of observer agreement for categorical data, Biometrics, 1977;33:159-174.

2a2.3 Testing Results *(Reliability statistics, assessment of adequacy in the context of norms for the test conducted)***:**
Data Element Reliability
Overall, risk factor frequencies changed very little across the three-year period, and there were no notable differences in the odds ratios across years of data.

Measure Result Reliability
There were 547,892 admissions in the combined three-year sample, with 273,946 in each randomly selected sample. The agreement between the two RSMRs for each hospital was 0.4, which according to the conventional interpretation is "moderate."1 The intra-class correlation coefficient is based on a split sample of 3 years of data, resulting in a volume of patients in each sample equivalent to only 1.5 years of data, whereas the measure is likely to be reported with a full three years of data. Based on our experiences with similar measures using split sample, with 4 years (and volume equivalent to 2 years), the intra-class correlation coefficient would be higher.

References:
1. Landis J, Koch G, The measurement of observer agreement for categorical data, Biometrics, 1977;33:159-174.

2b. VALIDITY. Validity, Testing, <u>including all Threats to Validity</u>:   H⦿ M⦿ L⊙ I ⦿

2b1.1 Describe how the measure specifications *(measure focus, target population, and exclusions)* **are consistent with the evidence cited in support of the measure focus (***criterion 1c***) and identify any differences from the evidence:**
N/A

2b2. Validity Testing. (*Validity testing was conducted with appropriate method, scope, and adequate demonstration of validity.*)

2b2.1 Data/Sample *(Description of the data or sample including number of measured entities; number of patients; dates of data; if a sample, characteristics of the entities included)*:
We validated the administrative model by comparing it to a medical record model in a matched cohort of admissions for which stroke medical record data and administrative claim data were available. To build the medical record model, we used the Medicare Health Care Quality Improvement Program's National Stroke Project (NSP) data. The NSP data is medical record-abstracted data that was collected as part of a national quality improvement project. The data comes from a representative population of patients hospitalized with stroke from all states (plus Puerto Rico and the District of Columbia) during March 1, 1998-March 31, 1999 and July 1, 2000-June 30, 2001. Based on the principal discharge diagnosis, up to 750 stroke discharges per state were identified. Two clinical abstraction centers abstracted the corresponding medical records with computerized abstraction tools, and the sample was checked for reliability of abstraction.

2b2.2 Analytic Method *(Describe method of validity testing and rationale; if face validity, describe systematic assessment)*:
We sought to validate our administrative stroke model against the medical record model in the same cohort of patients for which stroke medical record data were available.

We developed a medical record measure to compare with the administrative measure. We developed a measure cohort with the medical record data using the inclusion/exclusion criteria and risk-adjustment strategy that was consistent with the claims-based administrative measure but using chart-based risk adjusters, such as speech and motor deficits present at admission, not available in the claims data. To select variables for the model, a team of clinicians and health services researchers reviewed the list of potential candidate variables in the NSP dataset. Based on clinical sensibility, knowledge from the medical literature, and consensus amongst the team, we selected potentially important predictors of mortality. We also identified clinically important variables that could capture the severity of a stroke and should be retained in the model regardless of statistical significance. Using a backwards step-wise approach, the final stroke mortality medical record risk-adjusted model included 32 variables

We then matched a sample of the same patients in the administrative data for comparison. The suitability of the state-level comparison is supported by the fact that there is notable variation in quality and outcomes for stroke among states, as documented in prior research and our findings.1-4 We estimated state-level RSMRs using the corresponding administrative and medical record models for the matched cohort. We then examined the linear relationship between the two sets of estimates using regression techniques and weighting by the total number of cases in each state. We compared the output of the two measures, that is the state performance results, in the same group of patients.

ICD-9 to ICD-10 Conversion

Statement of Intent

See Guidance for Definitions of Rating Scale: H=High; M=Moderate; L=Low; I=Insufficient; NA=Not Applicable

[X] Convert measure to the new code set, but there are no changes to the measure.
[ ] Take advantage of new specific code set for the measure with changes.
[ ] The intent of the measure has changed.

Process of Conversion

We enlisted the help of clinicians with expertise in relevant areas to select and evaluate which ICD-10 codes map to the ICD-9 codes currently in use for this measure. The conversion of ICD-9 to ICD-10 is currently ongoing and the codes we have selected cannot yet be finalized since we lack sufficient ICD-10 data to evaluate the accuracy of coding/prevalence of ICD-10 codes. Once ICD-10 codes are officially in place and more data is available we will be able to provide a more accurate crosswalk.

References:
1. Jencks SF, Huff ED, Cuerdon T. Change in the Quality of Care Delivered to Medicare Beneficiaries, 1998-1999 to 2000-2001. The Journal of the American Medical Association 2003;289:305-12.

2.Bravata DM, Ho SY, Meehan TP, Brass LM, Concato J. Readmission and death after hospitalization for acute ischemic stroke: 5-year follow-up in the Medicare population. Stroke 2007;38:1899-904.

3. Glymour MM, Avendano M. Can Self-Reported Strokes Be Used to Study Stroke Incidence and Risk Factors?: Evidence From the Health and Retirement Study. Journal of the American Heart Association 2009:873-9.

4. Lichtman, J.H., Naert, L., Allen, N.B., Watanabe, E., Jones, S.B., Barry, L.C., Bravata, D.M., & Goldstein, L.B. (2011). Use of antithrombotic medications among elderly ischemic stroke patients. Circulation: Cardiovascular Quality & Outcomes, 4(1):30-8.

2b2.3 Testing Results (*Statistical results, assessment of adequacy in the context of norms for the test conducted; if face validity, describe results of systematic assessment*)**:**
The matched sample of patients included 38,074. We compared the output of the medical record model with that of the administrative model.

The medical record model showed good discrimination and fit. They were similar with respect to predictive ability. For the administrative model, the predicted mortality rate ranges from 4.36% in the lowest predicted decile to 37.14% in the highest predicted decile, a range of 32.78%. For the medical record model, the corresponding range is wider, 2.57% to 56.83%, a range of 54.26%. The mortality medical record model had a c-statistic of 0.80. The correlation coefficient was 0.80.

POTENTIAL THREATS TO VALIDITY. (*All potential threats to validity were appropriately tested with adequate results.*)

2b3. Measure Exclusions. (*Exclusions were supported by the clinical evidence in 1c or appropriately tested with results demonstrating the need to specify them.*)

2b3.1 Data/Sample for analysis of exclusions (*Description of the data or sample including number of measured entities; number of patients; dates of data; if a sample, characteristics of the entities included*)**:**
In measure development, we used all stroke admissions in 2007 Medicare fee-for-service data (initial cohort which included 195,529 admissions) for patients age 65 and over. We used 36,982 stroke admissions in the 2006 all-payer California data for the 18 and over model.

2b3.2 Analytic Method (*Describe type of analysis and rationale for examining exclusions, including exclusion related to patient preference*)**:**

All exclusions (detailed in section 2a1.8. "Denominator Exclusions") were determined by careful clinical review and have been used based on clinically relevant decisions. These exclusions are consistent with similar NQF-endorsed mortality measures.

2b3.3 Results *(Provide statistical results for analysis of exclusions, e.g., frequency, variability, sensitivity analyses):*
For the 65 and over model, we examined overall frequencies and proportions of the admissions excluded for each exclusion criterion in all stroke admissions in 2007 Medicare fee-for-service data. The initial cohort included 195,529 admissions. The final cohort, after exclusion, included 181,395 admissions. Categories are not mutually exclusive.

1) Transfer-in patients (n=3,592, 1.84%)
3) Inconsistent or unknown mortality status (n=15, 0.01%)
4) Medicare Hospice enrollment (n=1,570, 0.80%)
5) Patients who leave hospital against medical advice (AMA) (n=482, 0.25%)
6) Unreliable Data (n=3, 0.00%)
7) Excluded based on random selection of one hospitalization per patient per
   year (n=8,505, 4.48%)

For the 18 and over model, we examined overall frequencies and proportions of admissions excluded for each exclusion criterion in all stroke admissions in 2006 California Patient Discharge Data. The initial cohort included 36,982 admissions. The final cohort, after exclusion, included 33,702 admissions. The exclusion categories are not mutually exclusive.

1)   Transfers into the hospital (n=1,457, 3.94%)
2)   Inconsistent or unknown vital statistics (n=0, 0.00%)
3)   Unreliable data (n=2, 0.01%)
4)   Discharges against medical advice (AMA) (n=299, 0.81%)
5)   Excluded based on random selection of one hospitalization per patient
     per year (n=1,533, 4.35%)

2b4. Risk Adjustment Strategy. *(For outcome measures, adjustment for differences in case mix (severity) across measured entities was appropriately tested with adequate results.)*

2b4.1 Data/Sample *(Description of the data or sample including number of measured entities; number of patients; dates of data; if a sample, characteristics of the entities included)***:**
Measure Development and Validation in Medicare FFS:
For development, we randomly divided the 2007 Medicare cohort derived above into a measure development cohort (N=90,709 admissions from 4,288 hospitals) and a measure validation cohort (N=90,686 admissions from 4,307 hospitals).

Assessment of Temporal Trends in Risk Factors and Model Performance (2006-2008):
We used Medicare cohorts from 2006 through 2008. The 2006 cohort included 191,275 admissions; the 2007 cohort included 181,395 admissions; and the 2008 cohort included 175,267 admissions.

Limiting Risk-adjustment data to Inpatient Claims:
In testing other administrative claims-data measures developed in Medicare FFS data, including mortality and readmission measures for acute myocardial infarction (AMI), heart failure, pneumonia and chronic obstructive pulmonary disease (COPD), we have validated both the accuracy of the CPD Data in capturing Medicare claims as well as the use of only inpatient data for risk adjustment. For all measures, the c-statistic was also qualitatively similar between the two approaches. Moreover, when comparing the models using full history data with a model using only inpatient claims data, hospital-level risk-standardized rates

were highly correlated. Based on this reassuring data across measures, we did not repeat these analyses for the stroke mortality and readmission measures, but rather assumed that inpatient claims data would provide adequate risk adjustment information for application of the measures in all-payer data.

Applying the Measure to Patients Aged 18 and Older:
To test the model in all=payer data, we used 33,702 cases aged 18 and older in the 2006 California Patient Discharge Data.

2b4.2 Analytic Method (*Describe methods and rationale for development and testing of risk model or risk stratification including selection of factors/variables)***:**
Measure Development and Validation in Medicare FFS:
This measure is fully risk-adjusted using a hierarchical logistic regression model to calculate hospital RSMRs accounting for differences in hospital case-mix. (See section 2a1.13. "Statistical risk model and variables" for additional details.)

Approach to Assessing Model Performance:
During measure development using Medicare data for FFS patients 65 and older, we computed four summary statistics for assessing model performance (Harrell and Shih, 2001) for the development and validation cohort:

(1) predictive ability
(2) area under the receiver operating characteristic (ROC) curve
(3) distribution of residuals
(4) model chi-square (a test of statistical significance usually employed for
   categorical data to determine whether there is a good fit between the
   observed data and expected values; i.e., whether the differences between
   observed and expected values are attributable to true differences in
   characteristics or instead the result of chance variation).

Assessment of Temporal Trends in Risk Factors and Model Performance (2006-2008):
We examined the frequency and effect of the parameter estimates for risk-adjustment variables and model performance (C statistic) across years of data.

Applying the Measure to Patients Aged 18 and Older:
To help determine whether the measure could be applied to a population of patients aged 18+ (i.e., including younger patients aged 18-64), we examined the interaction terms between age (18-64 vs. 65+) and each of the other risk factors in 2006 California Patient Discharge Data. Specifically, we fit the model in all patients 18+ with and without interaction terms and (a) conducted a reclassification analysis to compare risk prediction at the patient level; (b) compared the C statistic; and (c) compared hospital-level risk-standardized rates (scatterplot, ICC) to assess whether the model with interactions is different from the current model in profiling hospital rates.
--
Reference: Harrell FE, Shih YCT. Using full probability models to compute probabilities of actual interest to decision makers. Int J Technol Assess Health Care. 2001;17:17–26.

2b4.3 Testing Results (*Statistical risk model: Provide quantitative assessment of relative contribution of model risk factors; risk model performance metrics including cross-validation discrimination and calibration statistics, calibration curve and risk decile plot, and assessment of adequacy in the context of norms for risk models. Risk stratification: Provide quantitative assessment of relationship of risk factors to the outcome and differences in outcomes among the strata)***:**
Measure Development and Validation in Medicare FFS:

Performance Metrics for 2007 Development Cohort
The mean RSMR was 15.5%. In the development cohort, the model has strong discrimination and fit. Results are presented below:

Residuals lack of fit: <-2 = 0.00%; [-2, 0) = 84.54%; [0, 2) = 8.19%; [2+ = 7.27%
Model Chi-square [# of covariates]: 7248.04 [41]
Predictive ability (lowest decile %, highest decile %): (2.89, 38.97)
Area under the ROC curve = 0.736

Performance Metrics for 2007 Validation Cohort
The mean RSMR was 15.0%. In the validation cohort, the model has strong discrimination and fit. Results are presented below:

Residuals lack of fit: <-2 = 0.01%; [-2, 0) = 84.82%; [0, 2) = 7.83%; [2+ = 7.34%
Model Chi-square [# of covariates]: 7024.55 [41]
Predictive ability (lowest decile %, highest decile %): 2.94% - 38.49%
Area under the ROC curve = 0.732

Of note, the model including the ED transfer indicator (developed with 2008 data) has a c-statistic of 0.734.

Assessment of Temporal Trends in Risk Factors and Model Performance (2006-2008):
Parameter estimates for risk-adjustment variables were consistent across years. In addition, model performance was also consistent across years of data; the C statistic ranged from 0.728 – 0.736.

Applying the Measure to Patients Aged 18 and Older:
When the model was applied to all patients aged 18+ in 2006 California Patient Discharge Data, overall discrimination was good (C statistic=0.753). In addition, there was good discrimination and predictive ability in both those aged 18-64 and those aged 65+. Moreover, the distribution of Pearson residuals was comparable across the patient subgroups. When comparing the model with and without the interaction terms, (a) the reclassification analysis demonstrated that nearly all patients were found to be in a similar risk category; (b) the C statistic was nearly identical (0.758 vs. 0.753); and (c) hospital-level risk-standardized rates were highly correlated (ICC= 0.998). Thus, the inclusion of the interactions did not substantively affect either patient-level model performance or hospital-level results.

Therefore, the measure can be applied to all payer patients 18 and older.

2b4.4 If outcome or resource use measure is not risk adjusted, provide rationale and analyses to justify lack of adjustment: The measure is risk-adjusted.

2b5. Identification of Meaningful Differences in Performance. (*The performance measure scores were appropriately analyzed and discriminated meaningful differences in quality.*)

2b5.1 Data/Sample (*Describe the data or sample including number of measured entities; number of patients; dates of data; if a sample, characteristics of the entities included*)**:**
We used Medicare claims data (2007) and the development sample included 90,709 discharges. (See denominator and numerator details for sample description.)

2b5.2 Analytic Method (*Describe methods and rationale to identify statistically significant and practically/meaningfully differences in performance*)**:**
The method for discriminating hospital performance has not been determined. For three publicly reported mortality measures of hospital outcomes developed with similar methodology, CMS currently estimates an

interval estimate for each risk-standardized rate to characterize the amount of uncertainty associated with the rate, compares the interval estimate to the national crude rate for the outcome, and categorizes hospitals as "better than," "worse than," or "no different than" the US national rate. However, the decision to publicly report this measure and the approach to discriminating performance has not been determined.

See Calculation Algorithm attachment for description of analytic method.

2b5.3 Results (*Provide measure performance results/scores, e.g., distribution by quartile, mean, median, SD, etc.; identification of statistically significant and meaningfully differences in performance*):
Using the 2007 CMS development cohort, the unadjusted median hospital mortality rate is 14.9% and the interquartile range is 10.6% to 19.4%.

The hospital risk-standardized rates for the development cohort, calculated via the hierarchical logistic regression model, are normally distributed with a median of 15.3%, and range from 10.7%-23.5%. The interquartile range is 14.4% to 16.4%.

The variation in rates suggests there are meaningful differences in the quality of care received for patients following hospitalization for an acute ischemic stroke.

2b6. Comparability of Multiple Data Sources/Methods. (*If specified for more than one data source, the various approaches result in comparable scores.*)

2b6.1 Data/Sample (*Describe the data or sample including number of measured entities; number of patients; dates of data; if a sample, characteristics of the entities included*)**:**
The measure performs well in both Medicare FFS data and all-payer data.

2b6.2 Analytic Method (*Describe methods and rationale for testing comparability of scores produced by the different data sources specified in the measure*)**:**
See above.

2b6.3 Testing Results (*Provide statistical results, e.g., correlation statistics, comparison of rankings; assessment of adequacy in the context of norms for the test conducted*)**:**
See above.

2c. Disparities in Care: **H**⊙ **M**⊙ **L**⊙ **I** ⊙ **NA**⊙ (*If applicable, the measure specifications allow identification of disparities.*)

2c.1 If measure is stratified for disparities, provide stratified results (*Scores by stratified categories/cohorts*)**:** Measure is not stratified for disparities.

2c.2 If disparities have been reported/identified (e.g., in 1b), but measure is not specified to detect disparities, please explain:
Consistent with NQF guidelines, we did not adjust for socioeconomic status, gender, race, or ethnicity because hospitals should not be held to different standards of care based on the demographics of their patients.

2.1-2.3 Supplemental Testing Methodology Information:
Attachment
Stroke_All-payer_Data_Report_8-24-12_for_NQF-634826589817302314.pdf

Steering Committee: Overall, was the criterion, *Scientific Acceptability of Measure Properties***, met?** (*Reliability and Validity must be rated moderate or high*) **Yes**⊙ **No**⊙
Provide rationale based on specific subcriteria:

If the Committee votes No, STOP

3. USABILITY

Extent to which intended audiences (e.g., consumers, purchasers, providers, policy makers) can understand the results of the measure and are likely to find them useful for decision making. (**evaluation criteria**)

C.1 Intended Actual/Planned Use (*Check all the planned uses for which the measure is intended*):   Public Reporting, Quality Improvement with Benchmarking (external benchmarking to multiple organizations)

3.1 Current Use (*Check all that apply; for any that are checked, provide the specific program information in the following questions*):   Not in use

3a. Usefulness for Public Reporting: H⦿ M⦿ L⦿ I ⦿
(*The measure is meaningful, understandable and useful for public reporting.*)

3a.1. Use in Public Reporting - disclosure of performance results to the public at large (*If used in a public reporting program, provide name of program(s), locations, Web page URL(s)*). If not publicly reported in a national or community program, state the reason AND plans to achieve public reporting, potential reporting programs or commitments, and timeline, e.g., within 3 years of endorsement: [**For *Maintenance*** – *If not publicly reported, describe progress made toward achieving disclosure of performance results to the public at large and expected date for public reporting; provide rationale why continued endorsement should be considered.*]
This measure is designed for use in public reporting but is not yet in use.

3a.2.Provide a rationale for why the measure performance results are meaningful, understandable, and useful for public reporting. If usefulness was demonstrated (e.g., focus group, cognitive testing), describe the data, method, and results: During the measure development process, developers received critical input from an advisory working group comprised of physicians with expertise in neurology, measure methodology, and quality improvement. We also received feedback from a TEP. Meetings were held throughout the development process and we received input and feedback on key methodological and clinical decisions to ensure the measure is meaningful and useful. In addition, similar measures for acute myocardial infarction (AMI) and heart failure underwent consumer testing prior to being publicly report and were found to be useful for publicly reporting outcomes.

3.2 Use for other Accountability Functions (payment, certification, accreditation). If used in a public accountability program, provide name of program(s), locations, Web page URL(s): The measure is not currently used in a public accountability program.

3b. Usefulness for Quality Improvement: H⦿ M⦿ L⦿ I ⦿
(*The measure is meaningful, understandable and useful for quality improvement.*)

3b.1. Use in QI. If used in quality improvement program, provide name of program(s), locations, Web page URL(s):
[**For *Maintenance*** – *If not used for QI, indicate the reasons and describe progress toward using performance results for improvement*].
Measure is not currently used in a QI program.

3b.2. Provide rationale for why the measure performance results are meaningful, understandable, and useful for quality improvement. If usefulness was demonstrated (*e.g., QI initiative*), describe the data, method and results:
A hospital-level, 30-day mortality measure for stroke patients may create incentives for hospitals to improve

quality of care for this high-risk population.

Overall, to what extent was the criterion, *Usability*, met? H⦿ M⦿ L⦿ I ⦿
Provide rationale based on specific subcriteria:

4. FEASIBILITY

Extent to which the required data are readily available, retrievable without undue burden, and can be implemented for performance measurement. **(evaluation criteria)**

4a. Data Generated as a Byproduct of Care Processes: H⦿ M⦿ L⦿ I ⦿

4a.1-2 How are the data elements needed to compute measure scores generated? *(Check all that apply).*
Data used in the measure are**:**
Coded by someone other than person obtaining original information (e.g., DRG, ICD-9 codes on claims)

4b. Electronic Sources: H⦿ M⦿ L⦿ I ⦿

4b.1 Are the data elements needed for the measure as specified available electronically *(Elements that are needed to compute measure scores are in defined, computer-readable fields)***:** ALL data elements are in a combination of electronic sources

4b.2 If ALL data elements are not from electronic sources, specify a credible, near-term path to electronic capture, OR provide a rationale for using other than electronic sources:

4c. Susceptibility to Inaccuracies, Errors, or Unintended Consequences: H⦿ M⦿ L⦿ I ⦿

4c.1 Identify susceptibility to inaccuracies, errors, or unintended consequences of the measurement identified during testing and/or operational use and strategies to prevent, minimize, or detect. If audited, provide results:
Effect of patient-preferences regarding end-of-life care:
Stroke can be a sudden and devastating disease and, in a small proportion of cases, may result in patients being so disabled and debilitated that they and their families elect not to continue aggressive treatment. In such cases, the best quality care may ultimately be that which supports patients' goals and comfort at the end of life rather than that which prolongs life.

When used in Medicare FFS data, the mortality measure excludes patients who are in Medicare hospice care prior to, or on the day of, their admission to the hospital. Also, the measures account for a number of severe illnesses that may indicate end of life including protein-calorie malnutrition, metastatic cancer, dementia, and age so that hospitals treating older, sicker patients can be compared fairly with hospitals that have a healthier case mix. However, consistent with guidelines for health care quality outcomes measures, the measures do not exclude patients who transitioned to hospice or palliative care during their hospital admission because such transitions may be the result of quality failures that have led to poor clinical outcomes, and, thus, excluding these patients could mask quality problems.

We performed analyses to assess whether hospitals with palliative care programs had higher RSMRs. We stratified the sample by hospitals with and without palliative care programs, and calculated RSMRs for each sample. The RSMRs for hospitals with palliative care programs did not differ from those without palliative care programs. Median weighted RSMR for hospitals with palliative care programs was 15.27% versus 15.17% for hospitals without palliative care programs.

Finally, it should be noted that the intent of a mortality rate is not to convey that all deaths are the result of poor care. It is not the goal to have zero deaths. In certain cases, the best quality care may ultimately be

that which supports patients´ goals and comfort at the end of life rather than that which prolongs life. The premise is that there are many preventable deaths. The mortality measure is a relative measure of mortality. Knowledge of how an institution performs compared with what might be expected given their case mix is helpful in encouraging efforts to improve outcomes.

References:
1. Krumholz HM, Wang Y, Mattera JA, Wang Y-F, Han LF, Ingber MJ, Roman S, Normand SL. An administrative claims model suitable for profiling hospital performance based on 30-day mortality rates among patients with an acute myocardial infarction. Circulation. 2006 Apr 4;113(13):1683-92.
2. Krumholz HM, Lin Z, Drye EE, Desai MM, Han LF, Rapp MT, Mattera JA, Normand SL. An administrative claims measure suitable for profiling hospital performance based on 30-day all-cause readmission rates among patients with acute myocardial infarction. Circulation: Cardiovascular Quality and Outcomes. 2011 Mar 1;4(2):243-52.
3. Krumholz HM, Wang Y, Mattera JA, Wang Y-F, Han LF, Ingber MJ, Roman S, Normand SL. An administrative claims model suitable for profiling hospital performance based on 30-day mortality rates among patients with heart failure. Circulation. 2006 Apr 4;113(13):1693-701.
4. Keenan PS, Normand SL, Lin Z, Drye EE, Bhat KR, Ross JS, Schuur JD, Stauffer BD, Bernheim SM, Epstein AJ, Wang Y-F, Herrin J, Chen J, Federer JJ, Mattera JA, Wang Y, Krumholz HM. An administrative claims measure suitable for profiling hospital performance on the basis of 30-day all-cause readmission rates among patients with heart failure. Circulation: Cardiovascular Quality and Outcomes. 2008 Sep;1(1):29-37.
5. Bratzler DW, Normand SL, Wang Y, O´Donnell WJ, Metersky M, Han LF, Rapp MT, Krumholz HM. An administrative claims model for profiling hospital 30-day mortality rates for pneumonia patients. Public Library of Science One. 2011 Apr 12;6(4):e17401.
6. Lindenauer PK, Normand SL, Drye EE, Lin Z, Goodrich K, Desai MM, Bratzler DW, O´Donnell WJ, Metersky ML, Krumholz HM. Development, validation, and results of a measure of 30-day readmission following hospitalization for pneumonia. Journal of Hospital Medicine. 2011 Mar;6(3):142-50.

4d. Data Collection Strategy/Implementation: H⦿ M⦿ L⦿ I ⦿

A.2 Please check if either of the following apply (*regarding proprietary measures*)**:**
4d.1 Describe what you have learned/modified 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 (*e.g., fees for use of proprietary measures*)**:**
The measure is not in operational use.

Overall, to what extent was the criterion, *Feasibility*, met? H⦿ M⦿ L⦿ I ⦿
Provide rationale based on specific subcriteria:

OVERALL SUITABILITY FOR ENDORSEMENT

Does the measure meet all the NQF criteria for endorsement? Yes⦿ No⦿
Rationale:

If the Committee votes No, STOP.
If the Committee votes Yes, the final recommendation is contingent on comparison to related and competing measures.

5. COMPARISON TO RELATED AND 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 before a final recommendation is made.

5.1 If there are related measures *(either same measure focus or target population)* **or competing measures** *(both the same measure focus and same target population)*, **list the NQF # and title of all related and/or competing measures:**
0229 : Hospital 30-day, all-cause, risk-standardized mortality rate (RSMR) following heart failure (HF) hospitalization for patients 18 and older
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

5a. Harmonization

5a.1 If this measure has EITHER the same measure focus OR the same target population as NQF-endorsed measure(s): Are the measure specifications completely harmonized? Yes

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

5b. Competing Measure(s)

5b.1 If this measure has 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

CONTACT INFORMATION

Co.1 Measure Steward (Intellectual Property Owner): Centers for Medicare & Medicaid Services, 7500 Security Boulevard, Baltimore, Maryland, 21244

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 (YNHHSC/CORE), 1 Church Street, 2nd Floor, Suite #200, New Haven, Connecticut, 06510

Co.4 Point of Contact: Susannah, Bernheim, M.D., M.H.S., Susannah.bernheim@yale.edu, 203-764-7231-

Co.5 Submitter: Susannah, Bernheim, M.D., M.H.S., Susannah.bernheim@yale.edu, 203-764-7231-, Yale New Haven Health Services Corporation/Center for Outcomes Research and Evaluation (YNHHSC/CORE)

Co.6 Additional organizations that sponsored/participated in measure development:
MPR: Mathematica Policy Research; RTI: Research Triangle Institute

Co.7 Public Contact: Susannah, Bernheim, M.D., M.H.S., Susannah.bernheim@yale.edu, 203-764-7231-, Yale New Haven Health Services Corporation/Center for Outcomes Research and Evaluation (YNHHSC/CORE)

ADDITIONAL INFORMATION

Workgroup/Expert Panel involved in measure development
Ad.1 Provide a list of sponsoring organizations and workgroup/panel members' names and organizations. Describe the members' role in measure development.

Technical Expert Panel Members:
Joseph V. Agostini, M.D.   Aetna
Mark J. Alberts, M.D.   Northwestern University Feinburg School of Medicine
William Bloom   N/A - Stroke Survivor
Mary George, M.D., M.S.P.H.Centers for Disease Control and Prevention
Robert Holloway, M.D., M.P.H.   University of Rochester Medical Center
Irene Katzan, M.D., M.S.   Cleveland Clinic
Dawn Kleindorfer, M.D.   University of Cincinnati
Elaine Miller, Ph.D., R.N.   Association of Rehabilitation Nurses
Mathew Reeves, Ph.D.   Michigan State University
Joseph Schindler, M.D.   Yale New Haven Stroke Center
Kevin Tabb, M.D.   Stanford Hospital and Clinic
Linda Williams, M.D.   Roudebush VAMC, Indiana University School of Medicine

Working Group Panel Members:
Dawn Bravata, MD   Indiana University School of Medicine; VA Stroke Quality Enhancement Research Initiative (QUERI)
Pierre Fayad, MD   The Nebraska Medical Center
Larry Goldstein, MD   Duke University Medical Center
Ralph Sacco, MD   Miller School of Medicine, University of Miami; American Heart Association; Jackson Memorial Hospital
Lee Schwamm, MD   Harvard Medical School; Massachusetts General Hospital

Ad.2 If adapted, provide title of original measure, NQF # if endorsed, and measure steward. Briefly describe the reasons for adapting the original measure and any work with the original measure steward:

Measure Developer/Steward Updates and Ongoing Maintenance
Ad.3 Year the measure was first released:
Ad.4 Month and Year of most recent revision:
Ad.5 What is your frequency for review/update of this measure?
Ad.6 When is the next scheduled review/update for this measure?

Ad.7 Copyright statement: N/A

Ad.8 Disclaimers:

Ad.9 Additional Information/Comments: Technical Report, calculation algorithm, and all-payer testing report attached

Date of Submission (*MM/DD/YY*): 05/04/2012