Candidate Performance Measure Profile

**Performance Measure Name:** CSTK-1 National Institutes of Health Stroke Scale (NIHSS) Score on Arrival

**Description:** Ischemic stroke patients for whom an initial NIHSS score is documented

**Setting:** Inpatient

**Rationale:** A neurological examination of all patients presenting to the hospital emergency department with warning signs and symptoms of stroke should be a top priority and performed in a timely fashion. Use of a standardized stroke scale or scoring tool ensures that the major components of the neurological examination are evaluated. Clinical practice guidelines from the American Heart Association/American Stroke Association recommend The National Institutes of Health Stroke Scale (NIHSS) as the preferred scoring tool for this purpose. Scores obtained aid in the initial diagnosis of the patient, facilitate communication between healthcare professionals, and identify patient eligibility for various interventions and the potential for complications.

In addition to an initial score, evaluation should be repeated several times during the hospital stay, such as 24 hours after acute interventions and at discharge. Changes in the NIHSS score are a strong predictor of stroke outcome.

**Type of Measure:** Process  
**Risk Adjustment:** No  
**Data reported as:** Proportion

**Numerator Statement:** Ischemic stroke patients for whom a NIHSS score is documented within one hour (≤ 60 minutes) of arrival at this hospital

**Included Populations:** As above

**Excluded Populations:** None

**Denominator Statement:** Ischemic stroke patients

**Included Populations:** As above

**Excluded Populations:**
- Patients less than 18 years of age
- Patients admitted for Elective Carotid Intervention
- Patients discharged or transferred to another hospital within one hour of arrival at this hospital
- Patients who expired within one hour of arrival at this hospital
- Patients without warning signs and symptoms of stroke on arrival at this hospital

**Selected References:**

Candidate Performance Measure Profile


**Original Performance Measure Source:** AHA 1
Candidate Performance Measure Profile

Performance Measure Name: CSTK-2 Modified Rankin Score (mRS) at 30 Days

Description: Ischemic stroke patients treated with IV thrombolytic (t-PA) or who undergo an endovascular recanalization procedure for whom a 30 day (≥ 21 days and ≤ 37 days) mRS is obtained via telephone or in-person and documented

Setting: Inpatient

Rationale: The Modified Rankin Scale (mRS) is the accepted standard for assessing recovery post-stroke. As such, it has become the most widely used clinical outcome measure for stroke clinical trials. Scores are used to measure the degree of disability or dependence in activities of daily living. Score reliability and reproducibility are improved through use of a structured interview by a trained evaluator. Interviews may be conducted in-person or over the phone. According to guideline recommendations from the American Heart Association/American Stroke Association, standardized interviews to obtain a mRS score should be conducted for acute ischemic stroke patients treated with intravenous thrombolysis or acute endovascular recanalization at 3 months (90 days); however, recovery may continue well beyond 3 months for many ischemic stroke patients. Since the primary objective is collection of a mRS score or the attempt to collect a score at some point after discharge, data collection at 30 days may be more feasible (i.e., to increase the probability of data capture).

Type of Measure: Outcome  Risk Adjustment: No  Data reported as: Proportion

Numerator Statement: Ischemic stroke patients treated with IV thrombolytic (t-PA) or who undergo an endovascular recanalization procedure for whom a 30 day (≥ 21 days and ≤ 37 days) mRS is obtained via telephone or in-person and documented

Included Populations: As above

Excluded Populations: None

Denominator Statement: Ischemic stroke patients treated with IV thrombolytic (t-PA) or who undergo an endovascular recanalization procedure

Included Populations: As above

Excluded Populations:
- Patients less than 18 years of age
- Patients with a documented mRS of 5 any time prior to this hospital admission

Selected References:

Candidate Performance Measure Profile


**Original Performance Measure Source:** AHA 9
Candidate Performance Measure Profile

Performance Measure Name: CSTK-3 Severity Measurement on Arrival

Description: Subarachnoid hemorrhage (SAH) and intracerebral hemorrhage (ICH) patients for whom an initial severity score [Hunt and Hess Scale, World Federation of Neurological Surgeons Score (WFNS), or the ICH Score] is documented

Setting: Inpatient

Rationale: Subarachnoid hemorrhage (SAH) and intracerebral hemorrhage (ICH) are medical emergencies requiring rapid diagnosis and assessment. Early deterioration is common in the first few hours after onset, and associated with increased mortality rates of > 75% compared to 30-day mortality rates of 35%-52%. More than half of all deaths from these conditions occur within the first two days. According to the American Heart Association/American Stroke Association, the severity of SAHs should be documented with an accepted grading scale, such as the Hunt and Hess Scale or the World Federation of Neurological Surgeons Scale, and the severity of ICHs should be documented with the ICH Score to capture the clinical state of the patient. The severity of initial neurological injury should be determined and documented in the emergency department because it is a useful predictor of outcome and helpful in planning future care with family and physicians.

Type of Measure: Process    Risk Adjustment: No    Data reported as: Proportion

Numerator Statement: SAH and ICH stroke patients for whom a severity score is documented within one hour (≤ 60 minutes) of arrival at this hospital

Included Populations: As above

Excluded Populations: None

Denominator Statement: SAH and ICH stroke patients

Included Populations: As above

Excluded Populations:
- Patients less than 18 years of age
- Patients discharged or transferred to another hospital within one hour of arrival at this hospital
- Patients who expired within one hour of arrival at this hospital
- Patients with traumatic brain injury (TBI), unruptured arteriovenous malformation (AVM), and non-traumatic subdural hematoma

Selected References:


Candidate Performance Measure Profile

Performance Measure Name: CSTK-4 INR Reversal

Description: ICH stroke patients with an international normalized ratio (INR) \( \geq 1.4 \) for whom treatment with a procoagulant (e.g., fresh frozen plasma, recombinant factor VIIa, prothrombin complex concentrates) was initiated within 2 hours (120 minutes) of arrival at this hospital

Setting: Inpatient

Rationale: Intracerebral hemorrhage (ICH) is a life-threatening disorder. Patients receiving oral anticoagulants (OACs), as well as those with an acquired or congenital coagulopathy, are at increased risk for ICH and hemorrhagic expansion with warfarin-associated bleeds comprising 12% to 15% of all spontaneous hemorrhages. Prompt INR reversal with intravenous infusions of vitamin K and fresh-frozen plasma (FFP) has been historically recommended; however, normalization with prothrombin complex concentrates (PCCs) are increasingly recommended because several studies have shown that these agents can rapidly normalize the INR within minutes. Due to a lack of large, well-controlled, randomized trials, the American Society of Hematology has recommended against the routine use of recombinant factor VIIa (rFVIIa) and prothrombin complex concentrates for warfarin reversal. Current guidelines from the American Heart Association/American Stroke Association recommend that patients with ICH whose INR is elevated due to OACs should have their warfarin withheld, receive therapy to replace vitamin K-dependent factors and correct the INR, and receive intravenous vitamin K. Although the risk of thrombotic complications appears relatively low, VTE prophylaxis using intermittent pneumatic compression (IPC) devices in addition to elastic stockings is recommended for these patients. Patients should also be monitored for signs and symptoms of fluid overload secondary to FFP administration.

Type of Measure: Process   Risk Adjustment: No   Data reported as: Proportion

Numerator Statement: ICH stroke patients for whom treatment to reverse the INR with a procoagulant e.g., fresh frozen plasma, recombinant factor VIIa, prothrombin complex concentrates) was initiated within 2 hours (120 minutes) of arrival at this hospital

Included Populations: As above

Excluded Populations: None

Denominator Statement: ICH stroke patients with an INR \( \geq 1.4 \)

Included Populations: As above

Excluded Populations:
- Patients less than 18 years of age
- Patients with Comfort Measures Only documented on day of or after hospital arrival
- Patients enrolled in clinical trials
- Patients with procoagulant therapy initiated prior to hospital arrival
- Patients who expired within two hours of arrival at this hospital
Candidate Performance Measure Profile

Selected References


Candidate Performance Measure Profile


**Original Performance Measure Source:** AHA 19
Performance Measure Name: CSTK-5 Hemorrhagic Complication

Description: Ischemic stroke patients who develop a symptomatic intracranial hemorrhage (clinical deterioration ≥ 4 point increase on NIHSS and finding of parenchymal hematoma on CT or MRI scan) within 36 hours of the onset of treatment with IV or IA pharmacologic thrombolytic therapy, or endovascular reperfusion procedure

Setting: Inpatient

Rationale: Intravenous thrombolytic therapy (IV tPA) for acute ischemic stroke was approved by the US Food and Drug Administration in 1996, following findings from the National Institute of Neurological Disorders and Stroke (NINDS) trial which demonstrated favorable outcomes in 31% to 50% of patients treated with recombinant tissue plasminogen activator (r-tPA), as compared to 20% to 38% of patients treated with placebo. Intra-arterial thrombolytic therapy has shown favorable results in the Prolyse in Acute Cerebral Thromboembolism 2 (PROACT 2) and other trials and its use in select circumstances is recommended in AHA/ASA national guidelines. Intracranial hemorrhage is the major risk of thrombolytic therapy with similar rates reported for both IV and IA routes. The NINDS trial found that 6.4% of patients treated with IV r-tPA experienced symptomatic bleeding. Findings from the PROACT 2 study found the intracranial hemorrhage with neurological deterioration within 24 hours occurred in 10% patients treated with IA recombinant prourokinase. In addition to these agents, other available thrombolytic drugs include: streptokinase, p-anisoylated lys-plasminogen-streptokinase activator, and urokinase. Intracranial hemorrhage with neurological deterioration has also occurred in 8-11% of patients in multicenter studies of FDA-cleared endovascular recanalization devices.

The risk of intracranial hemorrhage in patients with ischemic stroke is greater than the risk of bleeding in patients who receive thrombolytic drugs for management of myocardial ischemia and may be increased in the presence of uncontrolled hypertension. Therefore, thrombolytic therapy is not recommended for patients with a pretreatment systolic blood pressure greater than 185 mm Hg or diastolic blood pressure greater than 110 mm Hg.

Type of Measure: Process  Risk Adjustment: No  Data reported as: Proportion

Numerator Statement: Ischemic stroke patients who develop a symptomatic intracranial hemorrhage (clinical deterioration ≥ 4 point increase on NIHSS and finding of parenchymal hematoma on CT or MRI scan) within 36 hours of the onset of treatment with IV or IA thrombolytic therapy, or endovascular reperfusion procedure

Included Populations: As above

Excluded Populations:

Denominator Statement: Ischemic stroke patients treated with IV or IA pharmacologic thrombolytic therapy or who undergo an endovascular recanalization procedure

Included Populations: As above

Excluded Populations:
  o Patients admitted for Elective Carotid Intervention
  o Patients with onset of treatment > 36 hours prior to hemorrhage
  o Patients with CT finding of hemorrhage prior to IV or IA thrombolytic therapy
Candidate Performance Measure Profile

- Patients transferred following treatment performed prior to arrival at this hospital
- Patients transferred without consultation with the comprehensive stroke center following initiation of treatment

Selected References:


Candidate Performance Measure Profile


*Original Performance Measure Source:* AHA 7
Candidate Performance Measure Profile

Performance Measure Name: CSTK-6 Nimodipine Treatment Initiated

Description: Ruptured aneurysmal subarachnoid hemorrhage (SAH) patients for whom nimodipine treatment was initiated within 24 hours of arrival at this hospital

Setting: Inpatient

Rationale: Cerebral vasospasm is a serious complication following SAH, occurring in 30% to 70% of patients and accounting for nearly 50% of the deaths in patients surviving to treatment. Constriction of the arterial lumen results in diminished cerebral perfusion distal to the affected artery, which produces a delayed neurological deficit that may progress to cerebral infarction without early management of the ruptured aneurysm. The arterial narrowing that occurs in cerebral vasospasm is typically a transient or temporary event, lasting from a few days up to 3 weeks.

The main goal of current treatment is to prevent or limit the severity of cerebral vasospasm. Only two treatments are generally accepted as proven and valuable for the prevention of ischemic stroke and reduction of ischemic complications:

- Treatment with cerebroselective calcium channel blocker nimodipine-Nimotop (60mg po q4h for 21 days after hemorrhage or hospital discharge within 21 days);
- Aggressive hypervolemic - hypertensive therapy with pressor agents and volume expansion (colloids) while monitoring the central venous pressure (CVP) or pulmonary capillary wedge pressure (PCWP), following early clipping of the aneurysm.

Type of Measure: Process  Risk Adjustment: No  Data reported as: Proportion

Numerator Statement: Ruptured aneurysmal SAH patients for whom nimodipine treatment was initiated within 24 hours of arrival at this hospital.

Included Populations: As above

Excluded Populations: None

Denominator Statement: Ruptured aneurysmal SAH patients

Included Populations: As above

Excluded Populations:
- Patients less than 18 years of age
- Patients with Comfort Measures Only documented on day of or after hospital arrival
- Patients enrolled in clinical trials
- Patients who expired within 24 hours of arrival at this hospital
- Patients with a documented reason for not initiating nimodipine treatment

Selected References:

Candidate Performance Measure Profile


**Original Performance Measure Source:** AHA 15
Candidate Performance Measure Profile

**Performance Measure Name:** CSTK-7 Median Time to Recanalization Therapy

**Description:** Median time from arrival to femoral puncture for intra-arterial (IA) thrombolytic infusion and mechanical recanalization therapy in acute ischemic stroke patients.

**Setting:** Inpatient

**Rationale:** Timely recanalization of an occluded intracerebral artery is a strong predictor of improved functional outcome and reduced mortality in patients with an acute ischemic stroke. At this time, administration of intravenous tissue plasminogen activator (IV-tPA) within three hours of time last known well remains the recommended first-line approach. However, the short therapeutic window and low rates of recanalization with IV t-PA has prompted the investigation of alternative approaches via intra-arterial infusion of a thrombolytic drug or mechanical recanalization with a device such as a Merci or Penumbra catheter. Since "time is brain", the overall speed of the recanalization process is an important and appropriate measure. In multcenter clinical trials of catheter therapies, the probability of good outcome decreased as time to angiographic reperfusion increased. To that end, comprehensive stroke centers are encouraged to strive for a goal of 90 minutes similar to recommendations in current cardiology guidelines for door-to-angioplasty time for acute myocardial infarction.

**Type of Measure:** Process  
**Risk Adjustment:** No  
**Data reported as:** Proportion

**Continuous Variable Statement:** Time (in minutes) from hospital arrival to femoral puncture for intra-arterial (IA) thrombolytic infusion and mechanical recanalization therapy in patients with acute ischemic stroke.

**Included Populations:** As above

**Excluded Populations:**
- Patients less than 18 years of age
- Patients admitted for Elective Carotid Intervention
- Patients discharged or transferred to another hospital within 90 minutes of arrival at this hospital
- Patients who expired within 90 minutes of arrival at this hospital

**Selected References:**
Candidate Performance Measure Profile


**Original Performance Measure Source:** AHA 6
Performance Measure Name: CSTK-8 Stroke or Death Within 7 Days or Discharge If Earlier of a Comprehensive Stroke Procedure (Overall Rate)

Description: Patients with stroke or death within 7 days or discharge (if earlier) of a comprehensive stroke procedure

Setting: Inpatient

Rationale: This morbidity and mortality measure complements the existing CSC process of care measures. Risk-standardized morbidity and mortality rates (RSMRs) can provide important additional information about quality of care that is not currently captured by the process measures and is currently unavailable to hospitals. Variation in mortality, after adjusting for case mix, may reflect differences in hospitals' general environments (such as coordination of care, patient safety policies, and staffing) or variation in care processes not measured in the current core measure set. Outcome measures can focus attention on a broader set of healthcare activities that affect patients’ well being. Moreover, improving outcomes is the ultimate goal of quality improvement, and so the inclusion of outcomes measures assists in attaining improvement goals.

This measure is constructed to capture data associated with factors affecting the outcome for patients undergoing carotid endarterectomy (CEA), carotid artery stenting (CAS), endovascular embolectomy, aneurysm clipping and aneurysm embolization procedures, and unruptured aneurysms. Risk factors for each procedure or condition included in the comprehensive stroke population vary, as do rates for neurological and other complications. For example, the risk of stroke or death for patients undergoing CEA is related mainly to the patient's preoperative clinical status with higher rates noted for symptomatic versus asymptomatic patients (OR1.62; P<0.0001), hemispheric versus retinal symptoms (OR 2.31; P<0.001), urgent versus non-urgent operation (OR 4.9; P<0.001), and reoperation versus primary surgery (OR 1.95; P<0.018). On the other hand, McPhee and associates found the stroke rate for asymptomatic octogenarians undergoing CAS to be two-fold higher than that for CEA (i.e., 3% compared to 1%) with similar, low mortality rates for both procedures.

Type of Measure: Process  Risk Adjustment: Yes  Data reported as: Proportion

Numerator Statement: Patients with stroke or death within 7 days or discharge (if earlier) of a comprehensive stroke procedure

Included Populations: As above

Excluded Populations: None

Denominator Statement: All patients undergoing selected comprehensive stroke center procedures.

Included Populations: Patients discharged from the hospital < 24 hours; Patients < 18 years of age

Excluded Populations:
- Patients with inconsistent or unknown mortality status or other unreliable data (e.g. date of death precedes admission date)
- Patients who were transferred from another acute care hospital or VA hospital (because the death is attributed to the hospital where the patient was initially admitted)
Candidate Performance Measure Profile

- 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)
- Patients who were discharged against medical advice (AMA) (because providers did not have the opportunity to deliver full care and prepare the patient for discharge)
- Patients with admissions that were not the first hospitalization in the 30 days prior to death.

Selected References:

**Original Performance Measure Source:** AHA 23