ICSI

INSTITUTE FOR CLINICAL SYSTEMS IMPROVEMENT

Health Care Order Set:
Admission for Ischemic Stroke for Patients Not Receiving tPA

Fourth Edition
June 2009

The information contained in this ICSI Health Care Order Set is intended primarily for health professionals and the following expert audiences:

- physicians, nurses, and other health care professional and provider organizations;
- health plans, health systems, health care organizations, hospitals and integrated health care delivery systems;
- medical specialty and professional societies;
- researchers;
- federal, state and local government health care policy makers and specialists; and
- employee benefit managers.

This ICSI Health Care Order Set should not be construed as medical advice or medical opinion related to any specific facts or circumstances. If you are not one of the expert audiences listed above you are urged to consult a health care professional regarding your own situation and any specific medical questions you may have. In addition, you should seek assistance from a health care professional in interpreting this ICSI Health Care Order Set and applying it in your individual case.

This ICSI Health Care Order Set is designed to assist clinicians by providing an analytical framework for the evaluation and treatment of patients, and is not intended either to replace a clinician's judgment or to establish a protocol for all patients with a particular condition. An ICSI Health Care Order Set rarely will establish the only approach to a problem.

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Foreword

Scope and Target Population

This order set pertains to those admission orders from ER or direct admit to the hospital for patients 18 years or older who present with symptoms of recent neurologic dysfunction suggestive of brain ischemia. These orders exclude patients with TIA, hemorrhagic stroke or ischemic stroke receiving thrombolytic therapy.

Clinical Highlights and Recommendations

- Patients presenting with stroke onset who are not candidates for intravenous tissue plasminogen activator (tPA) should promptly be given aspirin, after exclusion of hemorrhage on CT scan.
- Education regarding early stroke symptoms, risk factors, diagnostic procedures, and treatment options should be offered to the patient and family.
- Medical management for prevention of complications within the initial 24-48 hours of diagnosis and initial treatment of ischemic stroke include:
  - continue appropriate blood pressure management;
  - continue to treat hyperthermia;
  - continue to treat hypo- or hyperglycemia;
  - continue IV fluids;
  - initiate deep vein thrombosis prophylaxis;
  - perform swallow evaluation;
  - initiate early rehabilitation; and
  - perform nutritional status assessment.

Priority Aims

1. Increase the percentage of patients presenting within three hours of stroke onset who are evaluated within 10 minutes of arriving in the ED.
2. Increase the percentage of patients receiving appropriate thrombolytic and antithrombotic therapy for ischemic stroke (use of tPA and aspirin).
3. Increase the percentage of non-tPA recipients who have hypertension appropriately managed in the first 48 hours of hospitalization or until neurologically stable.
4. Increase the percentage of patients who receive appropriate medical management for prevention of complications within the initial 24-48 hours of diagnosis:
   - Continue to treat hypoglycemia and hyperglycemia
   - Continue to treat hyperthermia
   - Continue IV fluids
   - Continue to treat hypoxia
   - Initiate deep vein thrombosis prophylaxis

- Perform swallow evaluation
- Initiate early rehabilitation (early mobilization)
- Perform nutritional status assessment

Key Implementation Recommendations

The following system changes were identified by the order set work group as key strategies for health care systems to incorporate in support of the implementation of this order set.

1. Hospitals should consider developing and implementing critical pathways, standing orders and a stroke process to accomplish rapid evaluation and treatment. The process should expedite the evaluation and treatment of patients who are candidates for intravenous tPA and assure uniform, guideline-driven care for all patients with respect to issues like:
   - ongoing antithrombotic therapy,
   - management of blood pressure,
   - early mobilization, and
   - use of appropriate antiembolism treatment in the paralyzed patient.
2. A process should be in place for the patient and family that will rapidly orient them to the suspected diagnosis, ED process, tests to be preformed, tPA treatment and its risks, and other treatment measures to be considered. This could include caregiver face-to-face interactions with the patient and family, as well as teaching tools in written form.

System Improvement

There is evidence that benchmarking can guide and drive quality improvement. Using essentially the same quality indicators as The Joint Commission for the Accreditation of Health Care Organization (TJC) and ICSI, programs like the American Heart Association's Get With The Guidelines-Stroke *(LaBresh, 2008 [C]; Schwamm, 2009 [B])* and the Paul Coverdell National Acute Stroke Registry *(Stoeckle-Roberts, 2006 [C])* have been shown to improve the quality of stroke care.

The Joint Commission (TJC) Primary Stroke Center Certification

TJC offers certification as Primary Stroke Centers to hospitals that meet specific qualifications. The emphasis of the process is on the early recognition and management of stroke, and the scope of accreditation includes integrated efforts in public awareness, emergency medical services, emergency room and hospitalization *(Alberts, 2000 [R])*. The link is http://www.jointcommission.org/CertificationPrograms/PrimaryStrokeCenters. Beginning in October 2009, all TJC-accredited hospitals will have to submit the eight National Quality Forum-endorsed stroke consensus measures. The Centers for Medicare and Medicaid Services (CMS) is also considering the reporting of stroke measures, and in the near future the draft Inpatient Prospective Payment System (IPPS) Rule will be released. IPPS is the venue in which CMS communicates with hospitals and physicians about their future measurement reporting.

Among the requirements for TJC certification as a Primary Stroke Center is ongoing process improvement guided by data and benchmarking. The quality indicators chosen by TJC overlap with those developed by the ICSI Diagnosis and Initial Treatment of Ischemic Stroke guideline work group. The TJC quality indicators are:

1. Deep Vein Thrombosis (DVT) Prophylaxis*
2. Discharged on Antithrombotics*

3. Patients with Atrial Fibrillation Receiving Anticoagulation Therapy*
4. Thrombolytic Therapy Administered (in eligible patients)
5. Antithrombotic Therapy by End of Hospital Day Two
6. Discharged on Cholesterol Reducing Medication
7. Dysphagia Screening
8. Stroke Education
9. Smoking Cessation/Advice Counseling
10. Assessed for Rehabilitation

* Initial standard stroke measure set

Measures 1, 4, 5, 7 and 8 are similar to or identical to those measures listed in this document and within the scope of the guideline.

Related ICSI Scientific Documents

Order Sets

- Admission for Ischemic Stroke for Patients Receiving tPA
- Venous Thromboembolism Prophylaxis in the Medically Ill Patient

Disclosure of Potential Conflict of Interest

ICSI has adopted a policy of transparency, disclosing potential conflict and competing interests of all individuals who participate in the development, revision and approval of ICSI documents (guidelines, order sets and protocols). This applies to all work groups (guidelines, order sets and protocols) and committees (Committee on Evidence-Based Practice, Cardiovascular Steering Committee, Women's Health Steering Committee, Preventive & Health Maintenance Steering Committee and Respiratory Steering Committee).

Participants must disclose any potential conflict and competing interests they or their dependents (spouse, dependent children, or others claimed as dependents) may have with any organization with commercial, proprietary, or political interests relevant to the topics covered by ICSI documents. Such disclosures will be shared with all individuals who prepare, review and approve ICSI documents.

No work group members have potential conflicts of interest to disclose.

Introduction to ICSI Document Development

This document was developed and/or revised by a multidisciplinary work group utilizing a defined process for literature search and review, document development and revision, as well as obtaining and responding to ICSI members.

For a description of ICSI's development and revision process, please see the Development and Revision Process for Guidelines, Order Sets and Protocols at http://www.icsi.org.

Evidence Grading System

A. Primary Reports of New Data Collection:

Class A: Randomized, controlled trial

Class B: Cohort study

Class C: Non-randomized trial with concurrent or historical controls
Case-control study
Study of sensitivity and specificity of a diagnostic test
Population-based descriptive study

Class D: Cross-sectional study
Case series
Case report

B. Reports that Synthesize or Reflect upon Collections of Primary Reports:

Class M: Meta-analysis
Systematic review
Decision analysis
Cost-effectiveness analysis

Class R: Consensus statement
Consensus report
Narrative review

Class X: Medical opinion

Citations are listed in the guideline utilizing the format of *(Author, YYYY [report class])*. A full explanation of ICSI's Evidence Grading System can be found at http://www.icsi.org.

Order Set

This order set pertains to those admission orders from ER or direct admit to the hospital for patients 18 years or older who present with symptoms of recent neurologic dysfunction suggestive of brain ischemia. These orders exclude patients with TIA, hemorrhagic stroke or ischemic stroke receiving thrombolytic therapy.

Legend:
☐ Open boxes are orders that a clinician will need to order by checking the box.
☑ Pre-checked boxes are those orders with strong supporting evidence and/or regulatory requirements that require documentation if not done. *(See Annotation #1)*

Patient Information *(Two are required.)*

Last Name: _____
First Name: _____
Date of Birth: ___/___/_____
Patient's age: _____
ID #: _____

Admitting Data *(See Annotation #2)*

Admit to: ☐ ICU bed
☐ Step down: ☐ with telemetry ☐ without telemetry
☐ Stroke/neurology: ☐ with telemetry ☐ without telemetry
☐ Other _____

Attending physician:_____
How to contact:_____

Primary physician: _____
☐ Contact primary care physician

Poststroke nurse clinicians _____
☐ Notify stroke research team if eligible for stroke research

Diagnosis *(See Annotation #3)*

Admitting Dx: ☐ Acute ischemic infarct
☐ Other_____

Secondary Dx: _____
_____

Patient excluded from thrombolytic therapy (tPA) due to:
☐ Time from onset contraindications ☐ Clinical contraindications ☐ Patient history contraindications
☐ Laboratory contraindications ☐ Radiologic contraindications

Condition
☐ Stable ☐ Unstable ☐ Other _____

Code Status
☐ Full code ☐ DNR/DNI ☐ Unknown

Vitals *(See Annotation #4)*

☑ Telemetry/monitor for first 24 hours:
- ☐ **Notify physician if** ECG or telemetry is suspicious for atrial fibrillation

☐ Telemetry/monitor for 48 hours
- ☐ **Notify physician** if ECG or telemetry is suspicious for atrial fibrillation

☑ Baseline NIHSS check (if not performed in ED)

☑ Vital signs and non-NIHSS neuro check:
- ☑ every hour for 4 hours **then**
- ☑ every 4 hours while awake (if stable)

☐ **Notify physician** for antihypertensives required for blood pressure greater than 220 mmHg systolic or 120 mmHg diastolic

☐ **Notify physician** for antihypertensives required for blood pressure greater than _____ mmHg systolic or mean arterial pressure greater than _____ mmHg after the first 24 hours.

☐ **Notify physician** if blood pressure is less than _____ mmHg or systolic _____ mmHg diastolic
☐ Orthostatic blood pressure check before a patient is mobilized from bed (*lying, sitting, and standing if patient is able to stand)*

☐ Weight on admission and then every day
Patient weight: _____ kg Patient height: _____ cm

☐ Input/output every shift for 24 hours **or** every _____

☐ Temperature every 4 hours for 48 hours while awake

☐ Temp every shift after 48 hours while awake if temp is normal

☐ **Notify physician if** temp greater than 101.3°F (38.5°C)

Activity

☐ Bed rest for 24 hours with turns every two hours
☐ Bed rest for _____ hours with turns every _____ hours
☐ In chair every 12 hours on day two if neurologically stable
☐ Up with assistance

Allergies/Adverse Drug Reactions

☐ None
☐ Yes, Name: _____ Type of reaction: _____
_____ Type of reaction: _____
_____ Type of reaction: _____

Nursing Orders *(See Annotation #5)*

☑ Keep patient with nothing by mouth until nursing bedside swallowing evaluation
☑ Bedside glucose test now (*if not done in ER*)
☑ O_2 saturation monitor until O_2 saturations remains stable. Check with vitals
  ☑ Oxygen 2 liters per minute by nasal cannula if O_2 saturations less than 94%. Titrate O_2 to maintain saturation greater than or equal to 94%
  ☑ **Notify physician** if O_2 saturation is less than 91%
☐ Cough and deep breath every hour while awake

☐ Incentive spirometer every _____ hours while awake

☐ Straight catheter ☐ Every shift if no void ☐ 300 cc by bladder scan
  ☐ **Notify physician** if 2 consecutive straight catheters needed for no void

☐ Bedside glucose checks every 4 hours for 24 hours
  ☐ Initiate insulin management protocol if glucose greater than 150 mg/dL

☐ Bedside glucose checks 4 times a day after 24 hours. Discontinue glucose checks if glucose stable and less than 150 mg/dL

☐ Initiate insulin management protocol if glucose greater than 150 mg/dL

☐ Nursing bedside swallowing evaluation
- More than one swallow to empty mouth
- Wet voice after swallow
- Drooling
- Cough on water

☐ Contact speech therapy for formal evaluation if fail any of the above
☐ Soft care mattress *(if nursing assessment identifies risk of skin breakdown*)
☐ Fall alert (*if nursing assessment identifies risk of falling*)
☐ Heel protection (*if nursing assessment identifies risk of skin breakdown*)

Diet *(Keep patient with nothing by mouth if patient fails swallowing evaluation until speech therapy formal evaluation)*

☐ Nothing by mouth, speech therapy formal evaluation
☐ Pureed diet with medium-thickened liquids, speech therapy formal evaluation
☐ No added salt ☐ As tolerated ☐ Constant carbohydrate (CHO)
☐ _____

IVs **(Avoid use of dextrose 5% in water, especially if hyperglycemic)**

☐ Establish IV saline lock with flush every day as needed
☐ 0.9% NaCl in water at _____ mL/hour
☐ _____ at _____mL/hour

Sedative/Symptom Medication

☐ 50% dextrose 25 mL IV every 15 minutes as needed for glucose level to exceed 70 mg/dL
☐ Acetaminophen 650 mg ☐ By mouth or ☐ Rectal suppository every four hours as needed if temperature greater than 99.5°F (37.5°C)
☐ Sedative _____ _____ mg by mouth at bedtime as needed
☐ Bowel care:
- ☐ Docusate sodium 100 mg by mouth every 12 hours as needed for constipation
- ☐ Magnesium hydroxide (Milk of Magnesia®) _____ mL (*30-60 mL*) by mouth every 12 hours as needed for constipation
- ☐ Bisacodyl 10 mg suppository. Repeat in 1 hour if inadequate results as needed for constipation
- ☐ Enema for one day as needed for constipation

☐ _____
☐ _____

Medications *(See Annotation #6)*

Pharmacologic VTE Prophylaxis (*Aspirin is not recommended as monotherapy.)*

☐ Dalteparin 5,000 units subcutaneous every 24 hours beginning at admission (*Use low-dose unfractionated heparin [LDUH] for creatinine clearance [CRCL] less than 30 mL/min)*

Initiate the following if Dalteparin ordered:
- Platelet count and hemoglobin every other day beginning on day two
- **Discontinue** dalteparin if platelet count drops 50% or more from baseline value and **notify physician**
- Initiate patient education
- **Notify physician** if bleeding occurs

☐ Enoxaparin 40 mg subcutaneous every 24 hours beginning at admission (*Use LDUH for CRCL less than 30 mL/min.)*

Initiate the following if enoxaparin ordered:
- Platelet count and hemoglobin every other day beginning day two
- **Discontinue** enoxaparin if platelet count drops 50% or more from baseline value and **notify physician**
- Initiate patient education
- **Notify physician** if bleeding occurs

☐ Unfractionated heparin 5,000 units subcutaneous every 12 hours beginning at admission.

Initiate the following if unfractionated heparin ordered:
- Platelet count and hemoglobin every other day beginning day two
- **Discontinue** unfractionated heparin if platelet count drops 50% or more from baseline value and **notify physician**
- Initiate patient education
- **Notify physician** if bleeding occurs

Mechanical VTE Prophylaxis

☐ Graded compression stockings: (*remove twice a day for 30 minutes*)
☐ Knee-high ☐ Thigh-high ☐ Foot boots
☐ Pneumatic compression:
☐ Knee-high ☐ Thigh-high ☐ Foot boots

Early Secondary Stroke Prevention *(Document contraindications if not given. Withhold ibuprofen for 30 minutes after aspirin administration.)*

☐ Aspirin _____ mg *(160-325 mg)* **immediately** ☐ By mouth ☐ Coated ☐ Buffered ☐ Rectal suppository
☐ Aspirin _____ mg *(160-325 mg)* daily by mouth ☐ Coated ☐ Buffered ☐ Rectal suppository
☐ _____ mg by mouth every _____

Hypertension Management *(Consider IV regimen if swallow is questionable.)*

BP less than 220/120 mmHg

☐ Observe with vitals.

BP systolic greater than 220 OR diastolic greater than 120

☐ Labetalol 10-20 mg IV over 1-2 minutes. May repeat or double every 10 min. to achieve 10%-15% reduction in blood pressure (*max. dose 300 mg per 24 hours).*

☐ Nicardipine 5 mg/hr. IV infusion initial dose; titrate up 2.5 mg/hr every 5 min. to 15 mg/hr. to achieve 15% reduction in blood pressure *(max. 15 mg/hr)*.

BP diastolic greater than 140 mmHg

☐ Nitroprusside 0.5 mcg/min. IV infusion initial dose with continuous BP monitoring. **Notify physician if** blood pressure not controlled with medication

☐ Labetalol _____ mg (100-200 mg) by mouth initially and _____ mg every two hours as needed to maintain BP less than _____ mmHg (*max. 800 mg per 24 hours*)

☐ Labetalol 10 mg IV over 1-2 minutes. May repeat with 40-80 mg IV every 10-20 minutes as needed to maintain BP less than _____ mmHg (*maximum cumulative dose 300 mg per 24 hours*)

☐ Nitroprusside (Nipride®) _____ mcg/kg/min IV (*suggest 0.3 mcg/kg/min).* Titrate for BP control of _____ mmHg (*maximum 10 mcg/kg/min).*

☐ _____ _____ mg every _____ hours as needed to maintain BP at _____ mmHg

☐ **Notify physician if** systolic BP greater than 220 or diastolic BP greater than 120 (*MAP greater than 130*) with medication.

☐ **Notify physician if** systolic BP greater than _____ or diastolic BP greater than _____ (*MAP greater than _____)* with medication.

GI Prophylaxis

☐ _____ _____ mg every _____ ☐ by mouth ☐ IV

Laboratory/Diagnostics: (those not performed in ED or office)

☐ CBC with platelet count ☐ STAT ☐ Next routine draw *(Refer to unit's protocol.)*

☐ Electrolytes, glucose, BUN, creatinine ☐ STAT ☐ Next routine draw *(Refer to unit's protocol.)*

☐ ALT ☐ AST ☐ GGT ☐ Alk phosphatase ☐ CPK *(Liver and muscle enzymes are important in preparation for statin medication initiation.)*

☐ PT/INR ☐ STAT ☐ Next routine draw *(Refer to unit's protocol.)*
☐ PTT ☐ STAT ☐ Next routine draw *(Refer to unit's protocol.)*

☑ Fasting cholesterol, triglyceride, HDL, LDL

☐ Electrocardiogram

☐ CT of head without enhancement

☐ Magnetic resonance imaging of head *(per protocol)*

☐ Magnetic resonance angiography: ☐ Head ☐ Neck

☐ Carotid Doppler ultrasound
Indication:_____

☐ Transesophageal echocardiogram ☐ With bubble on day _____ (*if suspicion of cardioembolic source when patient is stable for study)*

☐ Transthoracic echocardiogram ☐ With bubble on day _____
☐ _____
☐ _____

Other

Rehabilitation (*Therapies will be discontinued by the specific services when unnecessary. Therapies will be advanced to twice daily as appropriate.*)

☑ Stroke rehab
☑ Physical therapy
☑ Occupational therapy
☑ Speech therapy
☑ Smoking cessation (*for current users)*

Consults

☐ Neurology: reason _____
☐ Hospitalist: reason _____
☐ Neurosurgery: reason _____
☐ Cardiology: reason _____
☑ Physical medicine and rehabilitation: reason_____
☐ Chaplaincy for advanced directive
☐ Nutrition: reason_____
☐ Other: _____

Discharge Planning

☐ Social service consult for assistance in discharge planning
☐ Financial counselor consult

Authorized Prescriber Signature:_____

Printed Name:_____

Date/Time of Orders:_____/_____/_____ _____:_____

Annotations

1. Pre-Checked Orders

ICSI order sets utilize two types of boxes for orders. One is the open box that clinicians will need to check for the order to be carried out. The second box is a pre-checked box and are those orders that have strong evidence and/or are standard of care and require documentation if the clinician decides to "uncheck" the order.

There is increasing evidence that pre-checked boxes are more effective in the delivery of care than physician reminders, even within the computerized medical record environment *(Dexter, 2004 [A])*. Organizations are recognizing the benefit of using pre-checked boxes for other orders to promote efficiency. Organizations are encouraged, through a consensus process, to identify those orders to utilize pre-checked boxes to increase efficiency, reduce calls to clinicians, and to reduce barriers for nursing and other professionals to provide care that is within their scope.

2. Admitting Data

Patient information would be part of the medical record in electronic ordering. Institutions will need to add this section per their organization's policy.

Physician information would not be necessary in electronic ordering. How to contact would not be actionable in electronic ordering.

Stroke research

If the institution has stroke research and/or nurse educators, those items need to be addressed early on in the diagnosis and treatment of stroke.

3. Diagnosis

It is important to assess patients for the option of thrombolytic therapy (tPA) for ischemic stroke. Patients who are not eligible for tPA need to have documentation as to why they were excluded *(Hanson, 2000 [D])*.

There is a variety of contraindications that make a patient ineligible for tPA. These include the following:

Clinical contraindications

- Clearly defined onset of stroke within a three-hour window (4.5 hours in selected patients) prior to planned start of treatment; if the patient awakens with symptoms, onset is defined as the time of the last known baseline neurological status
- Rapidly improving symptoms
- Mild stroke symptoms/signs (National Institutes of Health Stroke Scale [NIHSS] less than four). These include:
  - Sensory symptoms only
  - Ataxia without other deficits
  - Dysarthria without other deficits
  - Mild motor signs (non-disabling)
  - Visual field defect without other deficits

- In the setting of MCA stroke, an obtunded or comatose state may be a relative contraindications
- Seizure at onset of stroke symptoms or within the three hours prior to tPA administration
- Clinical presentation suggestive of subarachnoid hemorrhage, regardless of CT result
- Hypertension – systolic blood pressure (SBP) greater than 185 mmHg or diastolic blood pressure (DBP) greater than 110 mmHg
  - Patients with this BP excluded only if it remains elevated on consecutive measurements. And if aggressive treatment is required to lower BP into appropriate range.

History contraindications

- Minor ischemic stroke within the last month
- Major ischemic stroke or head trauma within the last three months
- History of intracerebral or subarachnoid hemorrhage if recurrence risk is substantial
- Untreated cerebral aneurysm, arteriovenous malformation (AVM), or brain tumor
- Gastrointestinal or genitourinary hemorrhage within the last 21 days
- Arterial puncture at a non-compressible site within the last seven days or lumbar puncture within the last three days
- Major surgery or major trauma within the last 14 days
- Clinical presentation suggestive of acute myocardial infarction (MI) or post-MI pericarditis
- Patient taking oral anticoagulants or INR greater than 1.7
- Patient receiving heparin within the last 48 hours and having an elevated aPTT
- Pregnant, or anticipated pregnant, female
- Known hereditary or acquired hemorrhagic diathesis or unsupported coagulation factor deficiency
- Received tPA less than seven days previously

Laboratory contraindications

Glucose should always be measured prior to giving tPA; other parameters should be checked before treatment if there is reason to believe they may be abnormal (e.g., INR and aPTT should be checked if patient has been exposed recently to warfarin or heparin or if there is history of liver disease).

- Glucose less than 50 mg/dL or greater than 400 mg/dL
- Platelet count less than 100,000 mm^3
- INR greater than 1.7
- Elevated aPTT
- Positive pregnancy test

Radiology contraindications

- Intracranial hemorrhage
- Large area of low attenuation consistent with new or evolving stroke

- Intracranial tumor, aneurysm, arteriovenous malformation (AVM) or other space-occupying lesion

(Adams, 2007 [R]; Adams, 1994 [R]; Hanson, 2000 [D])

4. Vitals

Use of the NIHSS by physicians and nursing staff is encouraged to establish a baseline evaluation for comparison between examiners during the early hours of the stroke evaluation. Ongoing neuro checks may be performed using an abbreviated assessment form (see Diagnosis and Initial Treatment of Ischemic Stroke guideline, Appendix C, "Non-NIHSS Neuro Check").

5. Nursing Orders

Foley Catheters

In general, the regular practice of ordering Foley catheters for patients with stroke should be avoided whenever possible, based on condition of the patient. The work group consensus, to not use catheters unless indicated by the patient's condition, Foley catheters increase the risk of infection.

Mechanical VTE Prophylaxis

Elastic stockings may be considered. Intermittent pneumatic compression is often annoying to the patient and should be reserved for medical patients who are confined to bed and unable to ambulate or have contraindications for pharmacologic prophylaxis.

For patients who can ambulate, encourage early and frequent ambulation with flexion/extension exercises for the ankles *(Geerts, 2004 [R])*. Physical therapy may need to be involved as soon as possible and mobilization will start by sitting and progress to walking if applicable. This should be done every shift or more often, based on how the patient tolerates mobilization.

For more information, see the ICSI Venous Thromboembolism Prophylaxis guideline.

Temperature

The acutely injured brain, whether due to trauma or ischemia, is inordinately susceptible to the damaging effects of brain temperature elevation. This fact is well supported by both animal and human studies *(Ginsberg, 1998 [R])*.

Hyperthermia in acute stroke is associated with increased risk of poor outcome, higher mortality and increased infarct volume *(Azzimondi, 1995 [B]; Castillo, 1998 [D]; Hajat, 2000 [M]; Jorgensen, 1996 [B]; Reith, 1996 [B]; Sharma, 1998 [B]; Terént, 1981 [B]; Wang, 2000 [B])*.

Interventions for patients with a temperature of greater than 99.5ºF (37.5ºC) include appropriate dosing of acetaminophen at 1 gram orally or 650 mg rectally every 4-6 hours, not to exceed 4-6 grams in 24 hours, and regular monitoring of temperature status every 4 hours. For patients with extreme hyperthermia, greater than 103ºF (39.4ºC), aggressive interventions, including cooling blankets and ice packs, are encouraged.

Bedside Glucose Checks

Hyperglycemia may adversely influence clinical outcome. Most observational studies document either increased mortality or decreased functional outcome, or both, with higher glucose levels.

Usual management of hyperglycemia with gentle dosing of subcutaneous insulin in a timely manner during an acute ischemic stroke would seem prudent.

See the ICSI Subcutaneous Insulin Management Order Set for more information.

Perform Swallow Evaluation

Pneumonia is a common finding among patients with acute strokes, its incidence ranging from 6% to 32% *(Perry, 2001 [M])* and is associated with stroke-related dysphagia symptoms. Implementation of a coordinated swallow evaluation on all acute stroke patients has been shown to significantly decrease the incidence of pneumonia among patients with acute stroke *(Odderson, 1995 [D])*. This study used a screening tool consisting of three components: 1) the patient is alert, follows simple requests, has a clear, strong voice, and can produce a strong cough; 2) the patient can handle his/her own secretions without difficulty and can swallow ice chips and sips of ice water briskly; and 3) the larynx elevates completely at the time of swallowing, the voice remains clear after swallow and there is no coughing afterward. (See Appendix A, "Stroke Dysphagia Screen.")

The work group recommends that a bedside swallow test be performed prior to the patient's ingestion of anything by mouth (including oral aspirin or other medications). This screen may be performed by a nurse and should include pre-specified screening questions identifying patients at high risk for aspiration. If result of screening tool is negative, bedside swallow evaluation shall be performed using 2-3 ounces of water. If no clinical signs of aspiration occur, patient may receive medications, including aspirin, by mouth. If result of screening tool is positive or if bedside swallow evaluation reveals clinical signs of aspiration, the patient shall be given nothing by mouth, referred for formal swallow evaluation to be performed by a speech language pathologist, and aspirin administered via nasogastric tube or per rectum. If this swallow screen is not to be performed in the emergency department, aspirin should be administered rectally or via nasogastric tube.

(Perry, 2001 [M]; Odderson, 1995 [B])

6. Medications

Pharmacologic VTE Prophylaxis

Estimated length of stay four days or more

Patients with an anticipated length of stay greater than or equal to four days are at increased risk for developing VTE *(Leizorovicz, 2004 [A]; Mismetti, 2001 [M])*.

VTE pharmacologic prophylaxis

In addition to patient education and early ambulation, patients at high risk for VTE development who do not have contraindications to antithrombotic therapy should receive anticoagulation prophylaxis at admission and continue while risk continues *(Leizorovicz, 2004 [A]; Mismetti, 2001 [M])*.

Pharmacologic prophylaxis is not without risk. Patients should be evaluated for an increase risk of bleeding. The following are contraindications for pharmacologic prophylaxis:

- Extreme thrombocytopenia
- History of heparin-induced thrombocytopenia (HIT) is contraindicated for use of heparins
- Uncontrolled hypertension (systolic greater than 200, diastolic greater than 120)
- Bacterial endocarditis
- Active hepatitis or hepatic insufficiency
- Other conditions that could increase the risk of bleeding

Patients with renal insufficiency (CrCl less than 30 mL/min) should receive low-dose unfractionated heparin. If low-molecular-weight heparin is used, reduce the dose.

For more information, see the ICSI Venous Thromboembolism Prophylaxis guideline.

Heparin-induced thrombocytopenia (HIT)

HIT is an immune-mediated reaction to heparins. It occurs in 2%-3% of patients treated with LDUH and less than 1% of patients treated with LMWH. This syndrome can be associated with paradoxical increased risk for venous and arterial thrombosis. Patients who develop HIT without associated thrombosis will have a significant risk for thrombosis in the subsequent 100 days. Patients with a history of HIT should be not treated with LDUH or LMWH *(Warkentin, 2003 [R])*.

HIT should be suspected in patients who develop a skin lesion reaction at the injection site, have a systemic reaction to a bolus administration of heparin, or develop a greater than 50% decrease in platelet count from baseline labs while on heparin. These patients should have their heparin stopped while antibody testing for HIT is performed. Patients with a high clinical probability of having HIT should be treated with an appropriate alternative anticoagulant before antibody test results are available. Direct thrombin inhibitors (DTIs) are the alternative anticoagulant of choice for patients with HIT. Three brands are FDA approved: lepirudin (Refludan®), argatroban and most recently, bivalirudin (Angiomax®) (*Warkentin, 2003 [R]; Warkentin, 2004a [R]; Warkentin, 2004b [R])*.

Patients with a history of HIT who have a high-risk for VTE or who develop HIT while on heparin prophylaxis should be managed by an anticoagulation expert.

For more information, see the ICSI Anticoagulation Therapy Supplement.

Antiplatelet

Aspirin should promptly be given in a dose of 160-325 mg orally, rectally or by nasogastric tube and should be continued on a similar dose daily. Exceptions would include contraindications to aspirin such as allergy or gastrointestinal hemorrhage. For patients with an allergy to aspirin, 75 mg of clopidogrel may be reasonable.

Aspirin therapy has been proven beneficial for long-term prevention for stroke. Large randomized controlled trials have demonstrated a small but measurable benefit with the use of aspirin in the first 48 hours following ischemic stroke onset *(Bath, 2001 [A]; Chinese Acute Stroke Trial Collaborative Group, 1997 [A]; International Stroke Trial Collaborative Group, 1997 [A]; Sandercock, 1993 [M])*.

The work group considers that if aspirin is appropriate to start within 24 hours, patients should be considered for therapy sooner.

Antihypertensives

Previously, hypertension in patients with stroke was treated aggressively because many considered hypertension in the acute stroke phase to be potentially injurious. However, this has been shown to not be the case *(Adams, 1994 [R]; Powers, 1993 [R]; Strandgaard, 1996 [R])*.

Treat blood pressure if it is greater than 220 systolic or the mean arterial pressure (MAP) is greater than 130 for the first 24 to 48 hours *(Adams, 2007 [R])*.

Use easily titrated agents, choosing those with the least effect on cerebrovasculature (labetolol, nicardipine). Choose oral dosing but if swallowing is affected, intravenous agents should be used. Avoid agents, that tend to cause precipitous drops in blood pressure (e.g., sublingual calcium channel blockers).

In patients who are on an antihypertensive medication program at the time of the ischemic stroke, these medications should generally be withheld for the initial 24 hours. They should be reinstated after 24 hours, assuming that oral or tube administration is possible and hypotension is not present *(Adams, 2007 [R])*. Many potential reasons for deviating from this general principle exist. For example, suspension of a beta-blocker in a patient with coronary heart disease may be dangerous, and discontinuation of clonidine may cause rebound hypertension.

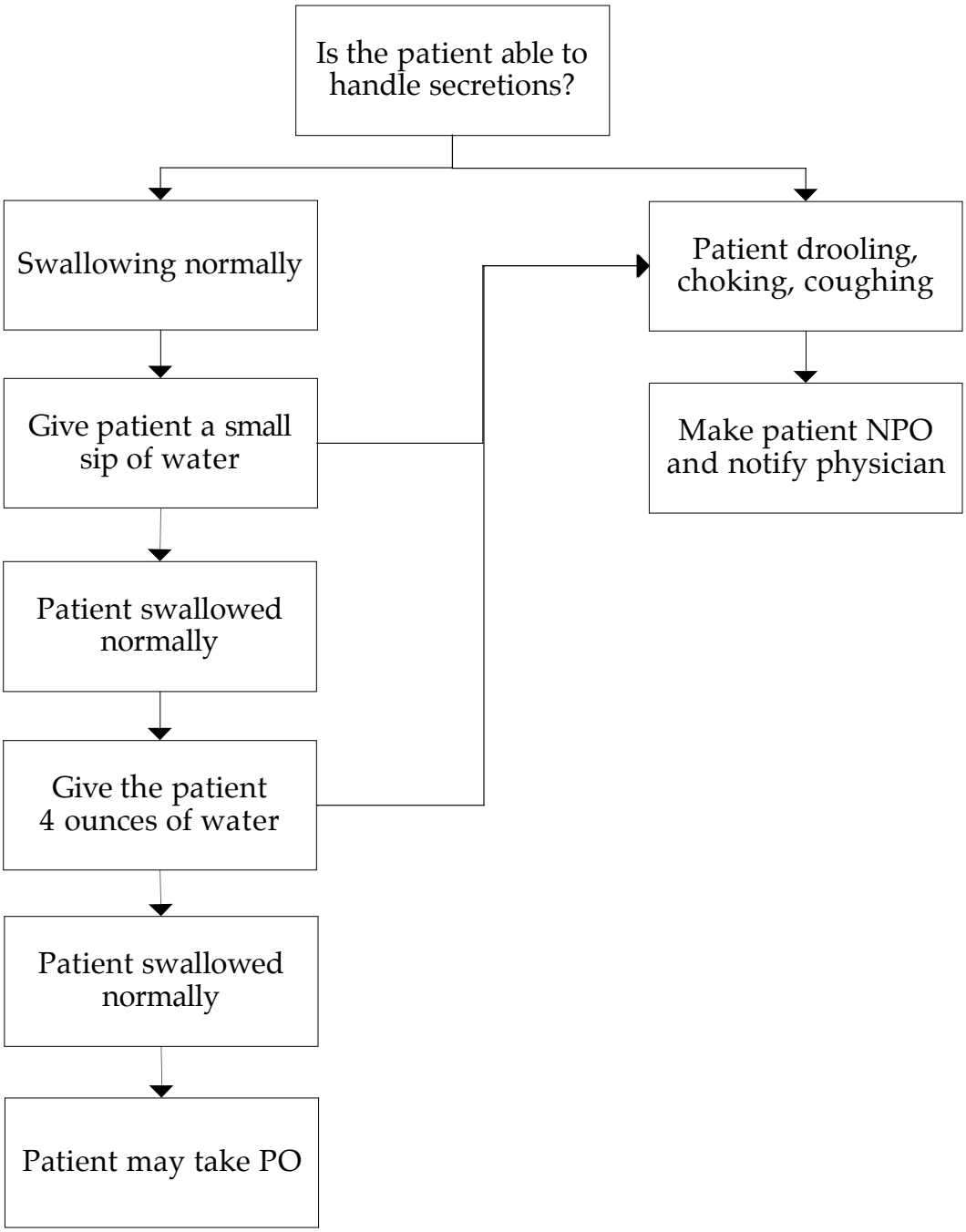
Appendix A – Stroke Dysphagia Screen

Who should be assessed?

Patients who present with TIA, stroke or stroke symptoms.

How do you assess?

Use this algorithm for a quick three-step process!



Provided by HealthPartners Medical Group and Regions Hospital.

ICSI

INSTITUTE FOR CLINICAL SYSTEMS IMPROVEMENT

Supporting Evidence:

Admission for Ischemic Stroke for Patients Not Receiving tPA

Document Drafted Jan – Feb 2005
First Edition Mar 2006
Second Edition Mar 2007
Third Edition Jul 2008
Fourth Edition Begins Jul 2009

Released in June 2009 for Fourth Edition.
The next scheduled revision will occur within 12 months.

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Brief Description of Evidence Grading

Individual research reports are assigned a letter indicating the class of report based on design type: A, B, C, D, M, R, X.

A full explanation of these designators is found in the Foreword of the guideline.

References

Adams Jr HP, del Zoppo G, Alberts MJ, et al. Guidelines for the early management of adults with ischemic stroke: a guideline from the American heart association/American stroke association stroke council, clinical cardiology council, cardiovascular radiology and intervention council, and the atherosclerotic peripheral vascular disease and quality of care outcomes in research interdisciplinary working groups: the American academy of neurology affirms the value of this guideline as an educational tool for neurologists. *Stroke* 2007;38:1655-711. (Class R)

Adams HP, Brott TG, Crowell RM, et al. Guidelines for the management of patients with acute ischemic stroke: a statement for healthcare professionals from a special writing group of the Stroke Council, American Heart Association. *Circulation* 1994;90:1588-1601. (Class R)

Azzimondi G, Bassein L, Nonino F, et al. Fever in acute stroke worsens prognosis: a prospective study. *Stroke* 1995;26:2040-43. (Class B)

Bath PMW, Lindstrom E, Boysen G, et al. Tinzaparin in acute ischaemic stroke (TAIST): a randomized aspirin-controlled trial. *Lancet* 2001;702-10. (Class A)

Castillo J, Dávalos A, Marrugat J, et al. Timing for fever-related brain damage in acute ischemic stroke. *Stroke* 1998;29:2455-60. (Class D)

Catella-Lawson F, Reilly MP, Kapoor SC, et al. Cyclooxygenase inhibitors and the antiplatelet effects of aspirin. *N Engl J Med* 2001;345:1809-17. (Class C)

Chinese Acute Stroke Trial Collaborative Group (CAST). CAST: randomised, placebo-controlled trial of early aspirin use in 20,000 patients with acute ischaemic stroke. *Lancet* 1997;349:1641-49. (Class A)

Dexter PR, Perkins SM, Maharry KS, et al. Inpatient computer-based standing orders vs physician reminders to increase influenza and pneumococcal vaccination rates. *JAMA* 2004;2366-71. (Class A)

Geerts WH, Pineo GF, Heit JA, et al. Prevention of venous thromboembolism: the seventh ACCP conference on antithrombotic and thrombolytic therapy. *Chest* 2004;126:338S-400S. (Class R)

Ginsberg MD, Busto R. Combating hyperthermia in acute stroke: a significant clinical concern. *Stroke* 1998;29:529-34. (Class R)

Hajat C, Hajat S, Sharma P. Effects of poststroke pyrexia on stroke outcome: a meta-analysis of studies in patients. *Stroke* 2000;31:410-14. (Class M)

Hanson SK, Brauer DJ, Brown RD Jr, et al. Should use of tPA for ischemic stroke be restricted to specialized stroke centers? *Stroke* 2000;31:313. (Class D)

International Stroke Trial Collaborative Group. The International Stroke Trial (IST): a randomized trial of aspirin, subcutaneous heparin, both or neither among 19,435 patients with acute ischaemic stroke. *Lancet* 1997;349:1569-81. (Class A)

Jørgensen HS, Nakayama H, Raaschou HO, et al. Stroke in patients with diabetes: The Copenhagen Stroke Study. *Stroke* 1994;25:1977-84. (Class B)

Leizorovicz A, Cohen AT, Turpie AGG, et al. Randomized, placebo-controlled trial of dalteparin for the prevention of venous thromboembolism in acutely ill medical patients. *Circulation* 2004;110:874-79. (Class A)

Malmberg K, for the DIGAMI (Diabetes Mellitus, Insulin Glucose Infusion in Acute Myocardial Infarction) Study Group. Prospective randomised study of intensive insulin treatment on long term survival after acute myocardial infarction in patients with diabetes mellitus. *BMJ* 1997;314:1512-15. (Class A)

Mismetti P, Laporte-Simitsidis S, Tardy B, et al. Prevention of venous thromboembolism in internal medicine with unfractionated or low-molecular-weight heparins: a meta-analysis of randomized clinical trials. *Throm Haemost* 2000;83:14-19. (Class M)

Odderson IR, Keaton JC, McKenna BS. Swallow management in patients on an acute stroke pathway: quality is cost effective. *Arch Phys Med Rehabil* 1995;76:1130-33. (Class B)

Perry L, Love CP. Screening for dysphagia and aspiration in acute stroke: a systematic review. *Dysphagia* 2001;16:7-18. (Class M)

Powers WJ. Acute hypertension after stroke: the scientific basis for treatment decisions. *Neurology* 1993;43:461-67. (Class R)

Reith J, Jørgensen HS, Pedersen PM, et al. Body temperature in acute stroke: relation to stroke severity, infarct size, mortality and outcome. *Lancet* 1996;347:422-25. (Class B)

Sandercock PAG, van den Belt AGM, Lindley RI, Slattery J. Antithrombotic therapy in acute ischaemic stroke: an overview of the completed randomised trials. *J Neurol Neurosurg Psychiatry* 1993;56:17. (Class M)

Schwamm LH, Audebert HJ, Amarenco P, et al. Recommendations for the implementation of telemedicine within stroke systems of care: a policy statement from the American heart association. *Stroke* 2009. (Class R)

Scott JF, Robinson GM, French JM, et al. Glucose potassium insulin infusions in the treatment of acute stroke patients with mild to moderate hyperglycemia: the Glucose Insulin in Stroke Trial (GIST). *Stroke* 1999;30:793-99. (Class A)

Sharma JC, Ross IN. Antipyretic therapy in acute stroke. *Lancet* 1998;352:740-41. (Class B)

Strandgaard S. Hypertension and stroke. *J Hypertens* 1996;14(suppl 3):S23-S27. (Class R)

Terént A, Andersson B. Prognosis for patients with cerebrovascular stroke and transient ischaemic attacks. *Ups J Med Sci* 1981;86:63-74. (Class B)

Wang Y, Lim LLY, Levi C, et al. Influence of admission body temperature on stroke mortality. *Stroke* 2000;31:404-49. (Class B)

Warkentin TE. An overview of the heparin-induced thrombocytopenia syndrome. *Semin Thromb Hemost* 2004b;30:273-83. (Class R)

Warkentin TE. Heparin-induced thrombocytopenia: pathogenesis and management. *Br J Haematol* 2003;121:535-55. (Class R)

Warkentin TE, Greinacher A. Heparin-induced thrombocytopenia: recognition, treatment and prevention: the seventh ACCP conference on antithrombotic and thrombolytic therapy. *Chest* 2004a;126:311S-37S. (Class R)

Support for Implementation:

Admission for Ischemic Stroke for Patients Not Receiving tPA

This section provides resources, strategies and measurement specifications for use in closing the gap between current clinical practice and the recommendations set forth in the order set.

The subdivisions of this section are:

- Priority Aims and Suggested Measures
- Key Implementation Recommendations
- Knowledge Resources
- Resources Available

Priority Aims and Suggested Measures

1. Increase the percentage of patients presenting within three hours of stroke onset who are evaluated within 10 minutes of arriving in the ED.

   Possible measure for accomplishing this aim:

   a. Percentage of patients presenting within three hours of stroke onset who are evaluated by a physician within 10 minutes of arriving in the ED.

2. Increase the percentage of patients receiving appropriate thrombolytic and antithrombotic therapy for ischemic stroke (use of tPA and aspirin).

   Possible measures for accomplishing this aim:

   a. Percentage of patients who are not candidates for tPA treatment who receive aspirin within 24 hours of hospitalization, after a negative CT, unless contraindicated.

   b. Percentage of patients who undergo a CT scan within 25 minutes of arrival in the ED.

3. Increase the percentage of non-tPA recipients who have hypertension appropriately managed in the first 48 hours of hospitalization or until neurologically stable.

   Possible measure for accomplishing this aim:

   a. Percentage of non-tPA patients who have hypertension appropriately managed according to the guideline.

4. Increase the percentage of patients who receive appropriate medical management for prevention of complications within the initial 24-48 hours of diagnosis:

   - Continue to treat hypoglycemia and hyperglycemia
   - Continue to treat hyperthermia
   - Continue IV fluids
   - Continue to treat hypoxia
   - Initiate deep vein thrombosis prophylaxis
   - Perform swallow evaluation
   - Initiate early rehabilitation (early mobilization)
   - Perform nutritional status assessment

   Possible measures for accomplishing this aim:

   a. Percentage of patients who receive appropriate interventions for hypoglycemia and hyperglycemia.

   b. Percentage of patients who receive appropriate intervention for hyperthermia.

   c. Percentage of patients who receive IV fluids.

   d. Percentage of patients who receive appropriate treatment for hypoxia.

   e. Percentage of patients with ischemic stroke paralysis or other reason for immobility receive appropriate prevention of venous thromboembolism (subcutaneous heparin or pneumatic compression device).

f. Percentage of patients who are at risk for aspiration who receive an early swallow evaluation.

g. Percentage of patients mobilized from bed within 48 hours of admission.

h. Percentage of patients who receive a nutritional status assessment within 48 hours of admission.

At this point in development for this order set, there are no specifications written for possible measures listed above. ICSI will seek input from the medical groups on what measures are of most use as they implement the order set. In a future revision of the order set, measurement specifications may be included.

Key Implementation Recommendations

The following system changes were identified by the order set work group as key strategies for health care systems to incorporate in support of the implementation of this order set.

1. Hospitals should consider developing and implementing critical pathways, standing orders and a stroke process to accomplish rapid evaluation and treatment. The process should expedite the evaluation and treatment of patients who are candidates for intravenous tPA and assure uniform, guideline-driven care for all patients with respect to issues like:
   - ongoing antithrombotic therapy,
   - management of blood pressure,
   - early mobilization, and
   - use of appropriate antiembolism treatment in the paralyzed patient.
2. A process should be in place for the patient and family that will rapidly orient them to the suspected diagnosis, ED process, tests to be preformed, tPA treatment and its risks, and other treatment measures to be considered. This could include caregiver face-to-face interactions with the patient and family, as well as teaching tools in written form.

System Improvement

There is evidence that benchmarking can guide and drive quality improvement. Using essentially the same quality indicators as The Joint Commission for the Accreditation of Health Care Organization (TJC) and ICSI, programs like the American Heart Association's Get With The Guidelines-Stroke *(LaBresh, 2008 [C]; Schwamm, 2009 [B])* and the Paul Coverdell National Acute Stroke Registry *(Stoeckle-Roberts, 2006 [C])* have been shown to improve the quality of stroke care.

The Joint Commission (TJC) Primary Stroke Center Certification

TJC offers certification as Primary Stroke Centers to hospitals that meet specific qualifications. The emphasis of the process is on the early recognition and management of stroke, and the scope of accreditation includes integrated efforts in public awareness, emergency medical services, emergency room and hospitalization *(Alberts, 2000 [R])*. The link is http://www.jointcommission.org/CertificationPrograms/PrimaryStrokeCenters. Beginning in October 2009, all TJC-accredited hospitals will have to submit the eight National Quality Forum-endorsed stroke consensus measures. The Centers for Medicare and Medicaid Services (CMS) is also considering the reporting of stroke measures, and in the near future the draft Inpatient Prospective Payment System (IPPS) Rule will be released. IPPS is the venue in which CMS communicates with hospitals and physicians about their future measurement reporting.

Among the requirements for TJC certification as a Primary Stroke Center is ongoing process improvement guided by data and benchmarking. The quality indicators chosen by TJC overlap with those developed by the ICSI Diagnosis and Initial Treatment of Ischemic Stroke guideline work group. The TJC quality indicators are:

1. Deep Vein Thrombosis (DVT) Prophylaxis*
2. Discharged on Antithrombotics*
3. Patients with Atrial Fibrillation Receiving Anticoagulation Therapy*
4. Thrombolytic Therapy Administered (in eligible patients)
5. Antithrombotic Therapy by End of Hospital Day Two

6. Discharged on Cholesterol Reducing Medication
7. Dysphagia Screening
8. Stroke Education
9. Smoking Cessation/Advice Counseling
10. Assessed for Rehabilitation

* Initial standard stroke measure set

Measures 1, 4, 5, 7 and 8 are similar to or identical to those measures listed in this document and within the scope of the guideline.

Knowledge Resources

Criteria for Selecting Resources

The following resources were selected by the Admission for Ischemic Stroke for Patients Not Receiving tPA order set work group as additional resources for providers and/or patients. The following criteria were considered in selecting these resources.

- The site contains information specific to the topic of the order set.
- The content is supported by evidence-based research.
- The content includes the source/author and contact information.
- The content clearly states revision dates or the date the information was published.
- The content is clear about potential biases, noting conflict of interest and/or disclaimers as appropriate.

Resources Available to ICSI Members Only

ICSI has a wide variety of knowledge resources that are ***only*** available to ICSI members (these are indicated with an asterisk in far left-hand column of the Resources Available table). In addition to the resources listed in the table, ICSI members have access to a broad range of materials including tool kits on CQI processes and Rapid Cycling that can be helpful. To obtain copies of these or other Knowledge Resources, go to http://www.icsi.org/improvement_resources. To access these materials on the Web site, you must be logged in as an ICSI member.

The resources in the table on the next page that are not reserved for ICSI members are available to the public free-of-charge.

Resources Available

*	Author/Organization	Title/Description	Audience	Web Sites/Order Information
	ASA (American Stroke Association)	• Comprehensive Web site • Patient education resources	Health Care Providers; Patients and Families	http://www.strokeassociation.org
	Association of Black Cardiologists	• Patient education resources	Health Care Providers; Patients and Families	http://www.abcardio.org
	GLRSN (Great Lakes Regional Stroke Network)	• Comprehensive Web site • Patient education resources	Health Care Providers; Patients and Families	http://tigger.uic.edu/depts/glstrknet/
	Minnesota Stroke Association	• Patient education resources	Patients and Families	http://www.strokemn.org/
	NSA (National Stroke Association)	• Comprehensive Web site • Patient education resources • Links to survivor/caregiver products and services and additional related Web sites	Health Care Providers; Patients and Families	http://www.stroke.org
	NINDS (National Institute of Neurological Disorders and Stroke)	• Links to clinical trials • Contains entire discussion and guidelines for system change to address stroke treatment	Health Care Providers; Patients and Families	http://www.ninds.nih.gov/
	The Brain Attack Coalition	• Contains tools for health care professionals developing systems to enable the rapid diagnosis and treatment of acute stroke • Patient education resources	Health Care Providers; Patients and Families	http://www.stroke-site.org/

* Available to ICSI members only.