



**OHSU HEALTH CARE SYSTEM
PRACTICE GUIDELINE**

Acute Stroke Practice Guidelines for Inpatient Management of Ischemic Stroke and Transient Ischemic Attack (TIA), PS 01.14

Last Reviewed Date: April 22, 2011

Policy Statement:

OHSU Hospitals and Clinics have adopted these practice guidelines in order to delineate a consistent, evidence-based approach to treating the patient who presents with signs and symptoms consistent with acute stroke. Although these guidelines assist in guiding care, responsibility to determine appropriate care for each individual remains with the provider themselves.

<p>Outcomes/goals</p>	<ul style="list-style-type: none"> • Create a multi-disciplinary, evidence-based, approach to the management of acute stroke patients. • Patient plan of care to take into consideration the entire continuum of care from emergency department through rehabilitation.
<p>Physician</p>	<p>Determine the appropriate unit for admission.</p> <p>a. Recommended Admission Criteria for Neurosciences ICU</p> <ol style="list-style-type: none"> 1. Acute stroke symptom onset of < 24 hours. 2. Post IV (intravenous) or IA (intra-arterial) thrombolytics or device thrombectomy. 3. Patients with hemispheric stroke in whom impending mental status decline and loss of protective airway reflexes is of concern. 4. Patients with basilar thrombosis or tip of the basilar syndrome. 5. Patients with crescendo TIAs. 6. Patient requiring blood pressure augmentation for a documented area of hypoperfusion. 7. Patients requiring IV blood pressure or heart rate control. 8. Patients requiring continuous cardiac monitoring. 9. Patients requiring every 1-2 hour neurological evaluation depending on symptom fluctuation or if ongoing ischemia is suspected. 10. Patients with worsening neurological status. 11. Patients post interventional neuroradiology procedure. <p>b. Recommended Criteria for Admission to 10K:</p> <ol style="list-style-type: none"> 1. Acute stroke symptom onset > 24 hours and not meeting above criteria. 2. Non-crescendo TIAs where workup not completed.

	<p>c. Complete appropriate physician order set(s):</p> <p>NEU: Stroke/Rule Out Stroke/TIA Admission.</p> <p>NSG: NSICU: Admission</p> <p>Interventional Neuroradiology: Post Procedure Orders</p> <p>Utilize ICU: Sedation Analgesia Delirium order set if sedation and/or mechanical ventilation required for greater than 24 hours.</p>
<p>HUC, Pharmacy, and RN</p>	<p>Process physician orders according to OHSU policy.</p>
<p>RN</p>	<p>Complete admission database and initiate nursing plan of care according to the appropriate OHSU Adult Inpatient Standards of Care:</p> <p>Adult Critical Care Standard of Care Adult Acute Care Inpatient Standard of Care</p>
<p>Physician</p>	<p>Evaluate for loss of airway protection and need for intubation.</p> <p>For all patients who present to the hospital within 12 hours of symptom onset, document whether they were considered for the following therapies:</p> <ol style="list-style-type: none"> Intravenous thrombolysis for symptom onset within 4.5 hours. Intra-arterial thrombolysis for symptom onset within 6 hours. Device thrombectomy for symptom onset within 12 hours. <p>NIHSS completed by Stroke Team physician.</p> <p>If eligible for thrombolytic therapy treat blood pressure prior to tPA administration if Systolic BP >185 OR Diastolic BP >110:</p> <ul style="list-style-type: none"> Labetalol 10–20 mg IV over 1–2 min; may repeat x 1 OR Nitropaste 1–2 inches OR Nicardipine infusion, 5 mg/hr, titrate up by 2.5 mg/hr at 5-15 minute intervals, maximum dose 15 mg/hr. <p>If blood pressure is not reduced and maintained at desired levels (systolic <185 and diastolic <110), do not administer rtPA.</p>
<p>Physician, RN, and RT</p>	<p>Maintain adequate oxygenation and ventilation. Avoid prophylactic or prolonged hyperventilation.</p>
<p>Neurocritical care physician</p>	<p>For patients who have received thrombolytics:</p> <ol style="list-style-type: none"> No anti-coagulation or antiplatelet drugs during the infusion and for 24 hours post infusion. Avoid nasogastric tubes, new IV lines, blood draws, or invasive lines/procedures for 24 hours post infusion, if possible. No intramuscular injections. Head CT or MRI at 24 hours post infusion. <p>Blood pressure management guidelines for patients during and for the first 24hr after having received thrombolytics:</p> <ol style="list-style-type: none"> Goal systolic blood pressure <180 mmHg, diastolic pressure <105 Systolic 180-230 OR Diastolic 105-120: Labetalol 10 mg IV given over 1-2 minutes; may repeat or double labetalol every 10-20 minutes to maximum dose of 300 mg

	<p>or give initial labetalol dose, then start Nicardipine 5 mg/hour IV infusion as initial dose and titrate to desired effect by increasing rate by 2.5 mg/hour every 5 minutes to maximum of 15 mg/hour or consider a labetalol drip at 2-8 mg/min.</p> <p>3. Systolic >230 OR Diastolic 121-140: Labetalol 10 mg IV given over 1-2 minutes; may repeat or double labetalol every 10 minutes to maximum dose of 300 mg, or give initial labetalol dose, then start Nicardipine 5 mg/hour IV infusion as initial dose and titrate to desired effect by increasing rate by 2.5 mg/hour every 5 minutes to maximum of 15 mg/hour or consider a labetalol drip at 2-8 mg/min.</p> <p>If blood pressure is not controlled by labetalol or nicardipine, consider sodium nitroprusside.</p> <p>4. Diastolic >140: Sodium nitroprusside 0.5 mcg/kg/min IV infusion initial dose and titrate to desired blood pressure.</p>
<p>RN</p>	<p>For patients who have received thrombolytics:</p> <ol style="list-style-type: none"> 1. Check with Stroke Team Physician or Stroke Coordinator to identify whether thrombolytic dose has been completed (since the IV t-PA dose is weight-based, there may still be medication left in IV bottle after dose is completed). 2. Starting from beginning of IV tPA infusion perform focused neuro checks based on patient condition & vital signs every 15 minutes for 2 hours, every 30 minutes for 6 hrs., every 1 hour for 16 hours, and then per ICU standard of care. 3. Avoid nasogastric tubes, new IV lines, blood draws, or invasive lines/procedures for 24 hrs. post infusion, if possible. 4. If the patient already has an invasive line upon arrival from another hospital (i.e., arterial or central), observe very carefully for bleeding at the site and apply pressure as needed. 5. Maintain IV's already in place (restart only if necessary). 6. No intramuscular injections. 7. Observe for changes in neurologic exam and any signs/symptoms of intracerebral hemorrhage and document accordingly. Report any of the following immediately to the NSICU Team, pager 17014 and to the Stroke Team, pager 12600: neurologic deterioration, sudden marked changes in vital signs, changes in level of consciousness, nausea, vomiting, diaphoresis, new headache. 8. Observe for any signs of adverse drug reaction and document accordingly. Report any of the following to the NSICU Team and the neurologist on call: gingival oozing, ecchymosis, petechiae, abdominal and/or flank pain, hemoptysis, hematemesis, shortness of breath, rales, rhonchi, arrhythmias. 9. Assess IV/arterial puncture sites, urine, gums, skin, stool, emesis, etc. for bleeding. Report to the NSICU Team and the neurologist if this occurs. 10. Monitor extremities for color, temperature, and sensation.

Neurocritical care physician in direct collaboration with the Stroke Team Physician or Clinical Stroke Coordinator and ICU RN

For patients who have received thrombolytics:

1. If clinical suspicion of intracerebral hemorrhage (e.g., neurological deterioration, new headache, acute hypertension, nausea or vomiting), discontinue t-PA infusion and notify the NSICU Team and the Stroke Team immediately.
2. Obtain STAT CT scan for any neurological deterioration.
3. STAT labs: INR, PTT, platelet count, fibrinogen, type & cross.
4. Prepare for administration of 6-8 units cryoprecipitated fibrinogen & factor VIII. In Epic, one cryo pool equals 5 units of cryoprecipitate.
5. Prepare for administration of 6-8 units platelets. In Epic, one unit of platelet pheresis leukoreduced product equals 6 units of platelets.

Neurocritical care physician and RN

For all patients during the acute phase after ischemic stroke or TIA, and independent of thrombolytic therapy:

Keep Cerebral Perfusion Pressure (CPP) > 70 and Mean Arterial Pressure (MAP) 80-110.

Blood pressure management in patients not eligible for thrombolytic therapy, or for patients 24 hr after tPA:

- Systolic \geq 220 OR Diastolic 121–140:
 - Labetalol 10–20 mg IV over 1–2 min
 - May repeat or double every 10 min (maximum dose 300 mg)or
 - Nicardipine 5 mg/hr IV infusion as initial dose; titrate to desired effect by increasing 2.5 mg/hr every 5 min to maximum of 15 mg/hr
 - Aim for a 10% to 15% reduction of blood pressure
- Diastolic >140
 - Nitroprusside 0.5 mcg/kg/min IV infusion as initial dose with continuous blood pressure monitoring
 - Aim for a 10% to 15% reduction of blood pressure

Optimize physiologic variables:

Isotonic fluids recommended for volume resuscitation. Central venous pressure monitoring with clearly stated goals for volume status is recommended.

Initiate vasopressors, if necessary, to achieve MAP and CPP goals. Continuous arterial pressure monitoring is recommended in patients requiring close titration of vasoactive medications. Central line or PICC recommended if patient receiving more than one vasoactive medication and/or hypertonic saline.

Monitor laboratory values as needed to monitor electrolytes, blood counts, coagulation status, and drug levels.

Maintain glucose levels within normal limits. Maintain glucose levels with sliding scale insulin titrated to blood glucose 120-160 mg/dL. Use Insulin infusion if blood glucose > 180 mg/dL for two consecutive checks. Use ICU: Insulin infusion: Adult order set, as needed.

	<p>Observe for hyponatremia. Administer hypertonic saline as needed.</p> <p>Maintain normothermia. Treat fever by trying to identify source; tailor interventions to possible source(s); provide antibiotics, if indicated; and use of antipyretics. Attempt to achieve goals with acetaminophen, cooling blankets, ice packs, etc.</p> <p>Consider ICP monitoring and/or EVD for patients based on poor neurological status: Glasgow Coma Scale (GCS) score <8 or neurological deterioration with hydrocephalus or any concern for ICP elevation. If EVD placed, ICP goal < 20 with cerebrospinal fluid (CSF) surveillance sampling q 72h by Neurosurgery (more frequent if clinically indicated). If rapid edema formation is suspected or observed consult Neurosurgery Service for initial evaluation in preparation for emergency decompressive craniectomy should it become a therapeutic option.</p>
<p>RN and Rehabilitation Services</p>	<p>Keep head of bed 30 degrees if not contraindicated.</p> <p>Bed rest for 24 hours, then activity as tolerated to promote active exercise, strength training, and gait training.</p> <p>RN to initiate interventions as needed to reduce risk of formation of contractures and minimize edema formation, using bracing/orthotic devices as needed. Consult Rehabilitation Services as indicated for treatment, such as the following: aphasia treatment, cognitive rehabilitation, communication devices, movement therapy, spasticity treatment, and functional adaptation for visual/perceptual deficits and neglect.</p>
<p>RN, Rehabilitation Services, and Nutrition Services</p>	<p>Dysphagia screening to be completed and documented prior to anything by mouth using the Bedside Nurse Swallow Screen. Initiate Speech Language Therapist consult for formal swallow evaluation, as needed, and when patient able to participate. Place dobhoff tube (DHT) within 24h of admission if patient unable to swallow to optimize nutrition needs. Nutrition consult as needed to maximize nutritional support.</p> <p>Initiate dietary interventions to lower LDL's, if greater than 100mg/dL.</p>
<p>Neurocritical care physician and RN</p>	<p>Initiate VTE prophylaxis by end of day two, as appropriate.</p> <p>Ensure patient is receiving anti-thrombotics within 48 hours of admission and upon discharge, unless contraindicated.</p> <p>Ensure that patients with artrial fibrillation are receiving anti-coagulation therapy on discharge, unless contraindicated.</p> <p>Initiate peptic ulcer prophylaxis (PUD) as appropriate.</p> <p>Initiate seizure prophylaxis as appropriate.</p> <p>Obtain Lipid profile within 48 hours of admission. Initiate interventions to lower LDL's if needed.</p> <p>Evaluate need for bowel and bladder training. Initiate a regular toileting schedule.</p>

	Initiate fall reduction and pressure ulcer prevention interventions.
RN, Social Worker (MSW), Case Manager, and Physician	<p>Provide social and psychological support for the patient and their significant others as needed.</p> <p>Case management services to begin upon admission providing ongoing utilization review. Works with multiple disciplines to determine patient's condition and needs/barriers for discharge. Coordinates discharge planning with patient and family (e.g., inpatient rehab, skilled nursing facility, home health, durable medical equipment).</p>
Multi-disciplinary team	<p>Identify patient and family education needs and provide appropriate information and resources found in the stroke education packet. This should include identification of personal modifiable risk factors, such as smoking cessation, alcohol intake, nutrition, exercise, and blood pressure regulation; warning signs for stroke; activation of EMS; need for follow-up after discharge; and medications prescribed.</p> <p>Document education provided in the Patient Education section of the electronic medical record or LIP documentation in progress notes.</p> <p>Perform focused neurological assessments based on patient condition and physician orders, every 1-2 hour while in the Neuroscience ICU and every 2-4 hours in acute care.</p> <p>Changes in patient condition to be reported to the physician in a timely manner.</p>

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- Summers, D., et al. (2009). Comprehensive Overview of Nursing and Interdisciplinary Care of the Acute Ischemic Stroke Patient: A Scientific Statement from the American Heart Association. *Stroke* 40, (8), pp. 2911-2944.

Related Forms and Procedures:

Practice Standards

- [Acute Stroke Practice Standard for the Emergency Department, PS 01.11](#)

- [Intravenous Administration of t-PA in Acute Ischemic Stroke Practice Standard, PS 01.12](#)

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