

Ischemic Stroke UpToDate *The main goals in the initial phase of acute stroke management are to ensure medical stability, to quickly reverse conditions that are contributing to the patient's problem, to determine if patients with acute ischemic stroke are candidates for thrombolytic therapy, and to begin to uncover the pathophysiologic basis of the neurologic symptoms. (UpToDate)*

Quality Indicators

CMS/TJC NHIQM Quality Indicators:

STK-4: Thrombolytic therapy should be initiated within 3 hours of symptom onset for patients with ischemic stroke

PQRS Quality Indicators:

PQRS 32: Antithrombotic therapy should be prescribed at discharge for patients with a diagnosis of ischemic stroke or transient ischemic attack unless contraindicated

Admit / Transfer

Admit inpatient

Transfer

Condition

Good

Fair

Serious

Critical

Code Status:

Full code

Do not resuscitate

Activity UpToDate

- UpToDate suggests keeping the head of bed flat (0 to 15 degree head-of-bed position) for patients in the acute phase of stroke who are not at risk for elevated intracranial pressure, aspiration, or worsening cardiopulmonary status. (UpToDate)*
- UpToDate recommends keeping the head in neutral alignment with the body and elevating the head of the bed to 30 degrees for patients in the acute phase of stroke who are at risk for any of the following problems: elevated intracranial pressure (ie, intracerebral hemorrhage, deterioration greater than 24 hours from stroke onset in patients with large ischemic infarction); aspiration (eg, those with dysphagia and/or diminished consciousness); and cardiopulmonary decompensation or oxygen desaturation (eg, those with chronic cardiac and pulmonary disease). (UpToDate)*

Bed rest

Elevate head of bed

Patient out of bed; encourage ambulation

Bed rest with bathroom privileges

Bed rest with commode

Up ad lib

Up ad lib with assistance

Up to chair with assistance

Diet UpToDate

- Prevention of aspiration in patients with acute stroke includes initial nulla per os (NPO) status until swallowing function is evaluated. (UpToDate)*

Level I (pureed) dysphagia diet, advance to next level as tolerated

Nothing by mouth

Tube Feedings - Bolus

-
-
-

Tube Feedings - Continuous

-
-
-

Vital Signs UpToDate

Check vital signs

Monitor blood pressure with alteplase blood pressure monitoring protocol

UpToDa

IV

Crystalloid:

Normal saline intravenously and

5% dextrose in half-normal saline intravenously and

Lock IV:

Saline lock intravenous

Other Nursing

Assessments:

Complete fall risk assessment UpToDate

Assess neurologic signs

Complete stroke assessment with National Institutes of Health (NIH) Stroke Scale UpToDate

Obtain weight every morning

Bedside POC Testing:

POC blood glucose

- UpToDate

Cardiac:

- *Current guidelines recommend cardiac monitoring for at least the first 24 hours after the onset of ischemic stroke to look for atrial fibrillation or other potentially serious cardiac arrhythmias. (UpToDate)*

Continuous cardiac monitoring with telemetry

Circulatory:

Peripheral IV line care per protocol

Insert peripheral IV line

sequential compression device

For patients within 72 hours of acute stroke onset who have restricted mobility and no contraindications, UpToDate recommends venous thromboembolism (VTE) prophylaxis with thigh-length intermittent pneumatic compression (IPC) compared with no prophylaxis (Grade 1B). (UpToDate)

Education: UpToDate UpToDate UpToDate

Provide disease/medical condition education

Precautions:

Aspiration precautions

Fall risk precautions

Seizure precautions

Fluid Balance:

Intake and output

Gastrointestinal:

-
-
- Residuals Timing:
-
- Residuals Action:
- Residuals Recheck:
- Residuals Recheck Action:

Nasogastric tube care per protocol

Insert nasogastric tube

Miscellaneous Treatments:

Turn and reposition

Respiratory:

- *Patients with stroke who are hypoxic should receive supplemental oxygen to maintain oxygen saturation greater than 94 percent. Supplemental oxygen should not routinely be given to nonhypoxic stroke victims. (UpToDate)*

Maintain oxygen saturation greater than or equal to 94%

Monitor pulse oximetry

Cough and deep breathe

Urinary:

Catheter care per protocol

Insert catheter

Therapies

Respiratory Therapy Service: UpToDate

Incentive spirometry

oxygen

Speech Pathology Service:

Aspiration assessment

Communication evaluation and treatment

Medications UpToDate

Fibrinolytic Agents: UpToDate UpToDate

- *Before lytic therapy is started, treatment is recommended so that systolic blood pressure is less than or equal to 185 mmHg and diastolic blood pressure is less than or equal to 110 mmHg. The blood pressure should be stabilized and maintained at or below 180/105 mmHg for at least 24 hours after thrombolytic treatment. (UpToDate)*
- *For eligible patients with acute ischemic stroke, UpToDate recommends intravenous alteplase therapy, provided that treatment is initiated within 3 hours of clearly defined symptom onset (Grade 1A). For patients who cannot be treated in less than 3 hours, UpToDate suggests intravenous alteplase therapy, provided that treatment is initiated within 3 to 4.5 hours of clearly defined symptom onset (Grade 2A). (UpToDate)*
- *Vital signs and neurologic status should be checked every 15 minutes for two hours, then every 30 minutes for six hours, then every 60 minutes until 24 hours from the start of alteplase treatment. (UpToDate)*
- *The alteplase dose is calculated at 0.9 mg/kg of actual body weight, with a maximum dose of 90 mg. Ten percent of the dose is given as an intravenous bolus over one minute and the remainder infused over one hour. (UpToDate)*
- *All patients treated with intravenous alteplase for acute ischemic stroke should be admitted to an intensive care unit or dedicated stroke unit for at least 24 hours of close neurologic and cardiac monitoring. (UpToDate)*
- *A dedicated intravenous line is required for alteplase, and all patients should have at least one additional large bore intravenous line. (UpToDate)*
- *Blood pressure must be maintained at or below 180/105 mmHg during the first 24 hours. Anticoagulant and antithrombotic agents, such as heparin, warfarin, or antiplatelet drugs, should not be administered for at least 24 hours after the alteplase infusion is completed. Placement of intra-arterial catheters, indwelling bladder catheters, and nasogastric tubes should be avoided for at least 24 hours if the patient can be safely managed without them. (UpToDate)*
- *For patients who are ineligible for intravenous thrombolysis with angiographically demonstrated acute middle cerebral artery occlusion and associated stroke symptoms but no signs of major early infarction on a baseline computed tomography (CT) or magnetic resonance imaging (MRI) scan, UpToDate suggests intra-arterial alteplase therapy, provided that treatment can be started within 6 hours of clearly defined symptom onset at centers with appropriate expertise (Grade 2B). (UpToDate)*
- *For patients who are ineligible for intravenous thrombolysis with angiographically demonstrated acute basilar artery occlusion and associated stroke symptoms but no signs of major infarction on a baseline computed tomography (CT) or magnetic resonance imaging (MRI) scan, UpToDate suggests intra-arterial thrombolytic therapy with alteplase at centers with appropriate expertise (Grade 2C). (UpToDate)*

Alteplase 0.09 mg/kg via intravenous bolus (push over 1 minute) single dose (not to exceed 9 mg total dose)

Alteplase 0.81 mg/kg intravenously single dose over 60 minutes (not to exceed 81 mg per dose)

Antihypertensives: UpToDate UpToDate

- For patients with ischemic stroke who are not treated with thrombolytic therapy, most consensus guidelines recommend that blood pressure NOT be treated acutely unless the hypertension is extreme (systolic blood pressure greater than 220 mmHg or diastolic blood pressure greater than 120 mmHg), or the patient has active ischemic coronary disease, heart failure, aortic dissection, hypertensive encephalopathy, acute renal failure, or pre-eclampsia/eclampsia. When treatment is indicated, cautious lowering of blood pressure by approximately 15 percent during the first 24 hours after stroke onset is suggested. (UpToDate)

Labetalol HCl 10 mg via intravenous bolus every 10 minutes until desired blood pressure is achieved (not to exceed 2 doses per episode)

Labetalol HCl at 2 mg/minute via intravenous continuous infusion titrate by 0.5 mg/minute until desired blood pressure is achieved (not to exceed 8 mg/minute)

niCARDipine HCl at 5 mg/hour via intravenous continuous infusion titrate by 2.5 mg/hour every 5 minutes until blood pressure is controlled (not to exceed 15 mg/hour)

Nitroprusside sodium at 0.3 mcg/kg/minute via intravenous continuous infusion titrate as needed until desired cardiac response (not to exceed 10 mcg/kg/minute)

Antiplatelet Agents: UpToDate

- For most patients with acute ischemic stroke or transient ischemic attack (TIA) who are not receiving oral anticoagulants, UpToDate recommends early aspirin therapy (160 to 325 mg/day) rather than no aspirin therapy (Grade 1A) or parenteral anticoagulation therapy (Grade 1B). Aspirin should be started as early as possible after the diagnosis of ischemic stroke is confirmed and ideally within 48 hours of stroke onset. However, aspirin should not be given for the first 24 hours following treatment with intravenous or intra-arterial thrombolytic therapy. (UpToDate)
- Aspirin should not be started within the first 24 hours of thrombolytic therapy in patients with acute ischemic stroke. Aspirin should be started for most patients 24 to 48 hours after thrombolytic therapy at an initial dose of 325 mg, and continued thereafter at a dose of 160 to 325 mg/day. (UpToDate)

Aspirin 325 mg orally 1 time per day

Aspirin 162 mg orally 1 time per day

Aspirin 300 mg suppository 1 suppository rectally 1 time per day

Anticoagulants: UpToDate

- In agreement with the national guidelines, UpToDate recommends NOT using full-dose parenteral anticoagulation for treatment of unselected patients with acute ischemic stroke because of limited efficacy and an increased risk of bleeding complications. Instead, UpToDate recommends early aspirin therapy (160 to 325 mg/day) for most patients with acute ischemic stroke or transient ischemic attack (TIA). (UpToDate)
- Although benefit is unproven, UpToDate suggests early parenteral anticoagulation rather than aspirin for select patients with acute cardioembolic ischemic stroke or transient ischemic attack (TIA) who are at high risk for short-term recurrent stroke due to intracardiac thrombus, either in the left ventricle or associated with associated with mechanical or native heart valves. (UpToDate)
- For patients with acute ischemic neurologic symptoms caused by extracranial dissection, UpToDate suggests treatment with antithrombotic therapy using aspirin rather than anticoagulation (Grade 2B). However, some experts prefer anticoagulation rather than aspirin in this setting. Antithrombotic treatment must be delayed until 24 hours after thrombolytic therapy but can be started immediately for those who are ineligible for intravenous thrombolytic therapy.
- Anticoagulation in the setting of acute stroke may only be considered after a brain imaging study has excluded hemorrhage and estimated the size of the infarct. (UpToDate)

Enoxaparin sodium 1 mg/kg subcutaneously every 12 hours

Heparin sodium at 800 units/hour via intravenous continuous infusion UpToDate

Venous Thromboembolism Prophylaxis:

- For patients within 72 hours of acute stroke onset who have restricted mobility and no contraindications, UpToDate recommends venous thromboembolism (VTE) prophylaxis, starting at presentation, with thigh-length intermittent pneumatic compression (IPC) compared with no prophylaxis (Grade 1B). In addition to IPC, for patients within 48 hours of acute ischemic stroke onset who have restricted mobility, UpToDate suggests low-dose anticoagulant therapy, starting at presentation, using either low molecular weight heparin or unfractionated heparin, rather than no prophylaxis (Grade 2B). This recommendation applies only to patients for whom the assessed benefit of anticoagulation is thought to outweigh the risk of bleeding. Anticoagulants should not be used for 24 hours after the administration of thrombolytic therapy. (UpToDate)

Enoxaparin sodium 30 mg subcutaneously 1 time per day Creatinine clearance less than 30 mg/min.

Enoxaparin sodium 40 mg subcutaneously 1 time per day Low dose.

Heparin sodium 5,000 units subcutaneously every 12 hours Low dose.

Antihyperlipidemics: UpToDate

- Based upon limited information, UpToDate suggests continuing statin treatment for patients receiving statin therapy prior to ischemic stroke onset. (UpToDate)
- For patients with transient ischemic attack (TIA) or ischemic stroke of atherosclerotic origin who are able to tolerate statins, UpToDate suggests high-intensity statin therapy, independent of the baseline low density lipoprotein-cholesterol (LDL-C), to reduce the risk of stroke and cardiovascular events. UpToDate suggests treating with atorvastatin 80 mg/day, since this was the agent and dose used in the Stroke Prevention by Aggressive Reduction in Cholesterol Levels (SPARCL) trial that showed a benefit for secondary ischemic stroke prevention. (UpToDate)

Atorvastatin calcium 80 mg orally 1 time per day

Lovastatin 40 mg orally 1 time per day

Rosuvastatin calcium 20 mg orally 1 time per day

Simvastatin 40 mg orally 1 time per day

Diabetes Agents: UpToDate

- *The American Heart Association/American Stroke Association guidelines for acute ischemic stroke recommend treatment for hyperglycemia to achieve serum glucose concentrations in the range of 140 to 180 mg/dL (7.8 to 10 mmol/L). (UpToDate)*
- *For patients who have elevated serum glucose concentrations greater than 180 mg/dL (greater than 10 mmol/L), UpToDate suggests treatment with insulin (Grade 2C). (UpToDate)*

Insulin regular human 0.05 units/kg via intravenous bolus

Insulin regular sliding scale per protocol subcutaneously

Antipyretics:

- *UpToDate suggests maintaining normothermia for at least the first several days after an acute stroke (Grade 2C). (UpToDate)*
- Acetaminophen 325 mg suppository 1 suppository rectally every 4 hours as needed for fever (not to exceed 2,600 mg in 24 hours)
- Acetaminophen 325 mg orally every 4 hours as needed for fever (not to exceed 2,600 mg in 24 hours)
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Laboratory UpToDate

Chemistry:

Comprehensive metabolic panel (serum)

Fasting lipid panel (serum)

Coagulation:

Partial thromboplastin time (plasma)

Prothrombin time/international normalized ratio (plasma)

Thrombin time (blood) *If known or suspected that the patient is taking direct thrombin inhibitor or direct factor Xa inhibitor. (UpToDate)*

Hematology:

CBC with platelets and differential (blood)

Cardiac Markers:

Troponin-I (serum)

Troponin-T (serum)

Immunology:

Cardiolipin antibodies panel (IgA, IgG, IgM), quantitative (blood)

Lupus anticoagulant (blood)

Phospholipid antibodies panel (IgA, IgG, IgM) (blood)

Imaging UpToDate

- *Brain imaging is required to guide the selection of acute interventions to treat patients with stroke. (UpToDate)*
- *Brain imaging in acute ischemic stroke can be obtained with either noncontrast head computed tomography (CT) or conventional magnetic resonance imaging (MRI). Both imaging techniques can be used to exclude acute intracerebral hemorrhage. Brain MRI with diffusion imaging is superior to noncontrast CT for the detection of acute ischemia and the exclusion of some stroke mimics. (UpToDate)*
- *A follow-up noncontrast computed tomography (CT) or magnetic resonance imaging (MRI) brain scan should be obtained 24 hours after alteplase is initiated before starting treatment with antiplatelet or anticoagulant agents. (UpToDate)*
- *Comprehensive neurovascular evaluation should be obtained for most patients suspected of having acute ischemic stroke or transient ischemic attack. Neurovascular imaging is important in acute stroke to determine the potential sources of embolism or low flow in ischemic stroke and to detect possible aneurysms or vessel malformations in hemorrhagic stroke. (UpToDate)*

X-Ray:

Portable inspiration AP (upright) X-ray of the chest today

Routine inspiration PA/lateral X-ray of the chest today

Contrast Study (Non-vascular):

Video pharyngo-esophagram (swallowing study) today

Computed Tomography:

Head CT scan without IV contrast today

Computed Tomography Angiography:

Head CTA scan today

Neck CTA scan

Magnetic Resonance:

Brain MRI today

Magnetic Resonance Angiography:

Head MRA today

Neck MRA today

Ultrasound:

Bilateral carotid artery ultrasounds today

Cerebrovascular arterial intracranial ultrasound today

Cerebrovascular arterial extracranial ultrasound today

Other Tests**Cardiovascular Testing:** UpToDate

- *All patients with suspected embolic stroke should have an echocardiogram. The choice between transthoracic echocardiography (TTE) and transesophageal echocardiography (TEE) as the initial imaging test to identify a source of embolism should be individualized on a case-by-case basis. (UpToDate)*
- *Transesophageal echocardiography (TEE) is often performed to examine the atria, atrial septal region, and the aorta if the TTE and preliminary cardiac and vascular imaging tests do not clarify the cause of brain ischemia. (UpToDate)*

12-lead ECG today

Transthoracic echocardiogram today

Transesophageal echocardiogram

Neurologic Testing:

EEG today *If seizures are suspected. (UpToDate)*

Consultations UpToDate

Cardiology consultation today

Coagulation specialist consultation today

Critical Care Medicine consultation today

Dietitian consultation today

Gerontology consultation today

Interventional Radiology consultation today

Neurology consultation today

Neurosurgery consultation today

Occupational Therapy consultation today

Physical Therapy consultation today

Psychiatry consultation today

Rehabilitation Medicine consultation today

Speech Therapy/Swallowing Therapy consultation today
