# Management of Acute Ischemic Stroke in Adult Patients

This practice algorithm has been specifically developed for MD Anderson using a multidisciplinary approach and taking into consideration circumstances particular to MD Anderson, including the following: MD Anderson’s specific patient population; MD Anderson’s services and structure; and MD Anderson’s clinical information. Moreover, this algorithm is not intended to replace the independent medical or professional judgment of physicians or other health care providers. This algorithm should not be used to treat pregnant women.

## INITIAL ASSESSMENT

- Look for signs and symptoms of stroke (see Appendix A)
- STAT finger stick glucose
- STAT 12-lead EKG
- Inform radiology that patient has a possible acute ischemic stroke
- EMERGENT non-contrast CT brain scan
  - In cancer patients, on thrombolytic therapy consider:
  - EMERGENT contrast brain CT
  - or EMERGENT contrast brain MRI (if no contraindications to contrast)
- Consult neurology and case manager for possible transfer to stroke unit
- Obtain a CBC, PT/INR, aPTT as soon as possible without delaying brain imaging
- Obtain urine pregnancy test if appropriate

### Contraindication to thrombolytic therapy?

<table>
<thead>
<tr>
<th>Contraindication to thrombolytic therapy?</th>
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<tbody>
<tr>
<td>Yes</td>
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</table>

### Blood pressure less than 185/110 mmHg?

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<td>Yes</td>
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### Neurological exam using NIHSS

- Avoid inserting foley catheters, nasogastric tubes, or intra-arterial pressure catheters if possible

### EMERGENT contrast CT brain scan

- In cancer patients, on thrombolytic therapy consider:
  - EMERGENT contrast brain CT
  - or EMERGENT contrast brain MRI (if no contraindications to contrast)

### Symptom onset greater than 4.5 hours?

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<td>Yes</td>
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### Bleeding on CT or MRI?

- No

### Give aspirin 325 mg, if no contraindications to aspirin

- Transfer to stroke unit

### Administer alteplase per Acute Ischemic Stroke Initial Management Order Set, see Page 2

### Blood pressure less than 185/110 mmHg and symptom onset less than 4.5 hours?

- Yes

### If no contraindications, give aspirin 325 mg

- Management of blood pressure is not recommended for the first 24 hours unless greater than 220/120 mmHg or in the presence of significant comorbidities

### Transfer to stroke unit

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**EKG** = electrocardiogram  **MRI** = magnetic resonance imaging  **DBP** = diastolic blood pressure  **CT** = computed tomography  **SBP** = systolic blood pressure  **NIHSS** = national institutes of health stroke scale

1. If patient is currently on the following dabigatran (i.e., direct thrombin inhibitor, rivaroxaban, apixaban and edoxaban FXa-inhibitors) consider consulting benign hematology
2. For contraindications to Thrombolytic Therapy, see Appendix B
3. See Appendix C for NIHSS
4. Examples of significant comorbidities: severe cardiac failure, aortic dissection, or hypertensive encephalopathy

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Department of Clinical Effectiveness V7
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1. Consult benign hematology at this point
2. Mechanical and/or pharmacological

Administer alteplase per Acute Ischemic Stroke Order Set

Maintain strict blood pressure control in the first 24 hours after alteplase administration

Patient develops severe headache, acute hypertension, severe nausea and vomiting?

Yes

Stop alteplase and obtain STAT CT of brain

No

Patient develops angioedema?

Yes

Stop alteplase and treat allergic reaction

No

Patient’s blood pressure increases to greater than 180/105 mmHg?

Yes

SBP greater than 180 - 230 mmHg or DBP greater than 105 - 120 mmHg
- Labetalol 10 mg IV then IV continuous infusion at 2-8 mg/minute (Note: Do not use labetalol if heart rate less than 60 beats per minute)
- Nicardipine 5 mg/hour IV continuous infusion titrate by 2.5 mg/hour every 5 minutes to desired effect, maximum dose 15 mg/hour

No

Glucose control
- Stress ulcer prophylaxis
- Deep vein thrombosis prophylaxis at least 24 hours after alteplase administration
- Admit to ICU or transfer to stroke unit

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APPENDIX A: Signs and Symptoms of Acute Ischemic Stroke

### Signs and symptoms of acute ischemic stroke:
- Numbness to face, arm, or leg (especially on one side)
- Sudden confusion
- Trouble seeing in one or both eyes
- Sudden weakness
- Sudden severe headache
- Sudden trouble walking
- Trouble speaking or understanding

### APPENDIX B: Contraindications to Thrombolytic Therapy

#### ABSOLUTE CONTRAINDICATIONS
- Known intracranial neoplasm, leptomeningeal disease, arteriovenous malformation, or aneurysm
- Presentation suggestive of subarachnoid hemorrhage
- Acute myocardial infarction within 3 months
- Postmyocardial infarction pericarditis
- Intracranial or intraspinal surgery within 3 months
- Serious head trauma or previous stroke within 3 months
- Arterial puncture at a noncompressible site in past 7 days
- History of intracranial hemorrhage
- Active internal bleeding or acute trauma
- Witnessed seizure at stroke onset with postictal symptoms
- Platelet count less than 100 K/microliter
- Evidence of multilobar infarction on CT scan
- Evidence of intracranial hemorrhage on CT scan
- Female patient who may be pregnant
- Cerebral infarction size greater than 1/3 of the mid cerebral artery (MCA) territory
- Uncontrolled hypertension at time of treatment (greater than 185/110 mmHg)
- Current anticoagulant use with INR greater than 1.7
- Current use of direct thrombin inhibitors (dabigatran) or direct factor Xa inhibitors (rivaroxaban, apixaban, and edoxaban)
- Therapeutic heparin use within the last 48 hours with an elevated aPTT
- Blood glucose level less than 50 mg/dL or greater than 400 mg/dL

#### RELATIVE CONTRAINDICATIONS
- Only minor or rapidly improving symptoms
- Stroke symptoms clear spontaneously
- Gastrointestinal hemorrhage within 21 days
- Urinary tract hemorrhage within 21 days
- Major surgery within 14 days
- Major trauma within 14 days
- CT scan evidence of early edema or mass effect
- Patients who present with severe deficits
- Seizure at the time of presentation with residual deficits due to ischemia rather than the postictal state

#### ADDITIONAL CONTRAINDICATIONS IF SYMPTOM ONSET 3 to 4.5 HOURS
- Patients greater than 80 years old
- Patients on oral anticoagulation regardless of INR
- Patients with baseline NIHSS score greater than 25
- Patients with stroke and diabetes

1 Consult benign hematology
2 See Appendix C for NIHSS
### APPENDIX C: National Institutes of Health Stroke Scale (NIHSS)

Best results from rtPA with score less than 20 and less than 75 years old

<table>
<thead>
<tr>
<th>Title</th>
<th>Responses</th>
<th>Score</th>
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| **1A** Level of consciousness | 0 – Alert and responsive  
1 – Arousable to minor stimulation  
2 – Arousable to painful stimulation  
3 – Reflex responses or unarousable | Greater than or equal to 25  
Very severe neurological impairment |
| **1B** Orientation questions  
• Ask patients age and month | 0 – Both correct  
1 – One correct (or dysarthria, intubated, foreign language)  
2 – Neither correct | 5 to 24  
Mild to adequately severe neurological impairment |
| **1C** Response to commands  
• Open/close eyes and grip and release hand | 0 – Both correct (ok if impaired by weakness)  
1 – One correct  
2 – Neither correct | Less than 5  
Mild impairment |
| **2** Gaze  
• Horizontal extraocular movement | 0 – Normal  
1 – Partial gaze palsy; abnormal gaze in 1 or both eyes  
2 – Forced eye deviation or total paresis | |
| **3** Visual field  
• Use visual threat if necessary | 0 – No visual loss  
1 – Partial hemianopia, quadrantanopia, extinction  
2 – Complete hemianopia  
3 – Bilateral hemianopia or blindness | |
| **4** Facial movement | 0 – Normal  
1 – Minor facial weakness  
2 – Partial facial weakness  
3 – Complete unilateral palsy (upper and lower face) | |
| **5** Motor function (arm) – arms outstretched for 10 seconds  
• Left  
• Right | 0 – No drift before 5 seconds  
1 – Drift but doesn’t hit bed  
2 – Some antigravity effort, but can’t sustain  
3 – No antigravity effort, but even minimal movement counts  
4 – No movement at all  
X – Unable to assess due to amputation, fusion, fracture | Left:  
Right: |

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APPENDIX C: National Institutes of Health Stroke Scale (NIHSS) - continued

Best results from rtPA with score less than 20 and less than 75 years old

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<td>Motor function (leg) – raise leg 30 degrees supine for 5 seconds</td>
<td>• Left 1 – No drift before 5 seconds 2 – Drift but doesn’t hit bed 3 – Some antigravity effort, but can’t sustain 4 – No antigravity effort, but even minimal movement counts 5 – No movement at all X – Unable to assess due to amputation, fusion, fracture</td>
<td>Left: Greater than or equal to 25 Very severe neurological impairment</td>
</tr>
<tr>
<td>Limb ataxia  • Check finger-nose-finger; heel-shin; and score if only out of proportion to paralysis</td>
<td>0 – No ataxia 1 – Ataxia in upper or lower extremity 2 – Ataxia in upper and lower extremity X – Unable to assess due to amputation, fusion, fracture</td>
<td>Right: 5 to 24 Mild to adequately severe neurological impairment</td>
</tr>
<tr>
<td>Sensory  • Use safety pin</td>
<td>0 – No sensory loss 1 – Mild-moderate unilateral loss but pt aware of touch 2 – Total loss, patient unaware of touch</td>
<td>Less than 5 Mild impairment</td>
</tr>
<tr>
<td>Language  • Name objects; use repeating</td>
<td>0 – Normal 1 – Mild-moderate aphasia 2 – Severe aphasia 3 – Mute, global aphasia, coma</td>
<td></td>
</tr>
<tr>
<td>Articulate  • Read a list of words</td>
<td>0 – Normal 1 – Mild-moderate; slurred but intelligible 2 – Severe; unintelligible or mute X – Intubation or mechanical barrier</td>
<td></td>
</tr>
<tr>
<td>Extinction/neglect  • Simultaneously touch patient on both hands, show fingers in both visual fields, ask about deficit</td>
<td>0 – Normal, non detected 1 – Neglects 1 sensory modality 2 – Profound neglect in more than one modality</td>
<td></td>
</tr>
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</table>
SUGGESTED READINGS


DEVELOPMENT CREDITS

This practice consensus statement is based on majority opinion of the Ischemic Stroke work group experts at the University of Texas MD Anderson Cancer Center for the patient population. These experts included:

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