Management of Acute Ischemic Stroke in Adult Patients

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INITIAL ASSESSMENT

- Look for signs and symptoms of stroke (See Appendix A)
- STAT finger stick glucose, STAT12-lead EKG
- Inform radiology that patient has a possible acute ischemic stroke
- EMERGENT Non-contrast CT brain scan.
  In cancer patients, if thrombolytic therapy is considered (See Appendix B for contraindications), 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 complete blood count (CBC), PT/INR, aPTT as soon as possible without delaying brain imaging
  - Obtain urine pregnancy test if appropriate

Neurological exam: NIHSS

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

Bleeding on CT or MRI

Greater than 4.5 hours

Symptom Onset?

Less than 4.5 hours

Intracerebral Hemorrhage or Subarachnoid hemorrhage

Consult Neurosurgery

- If no contraindications, give aspirin 325 mg (See Appendix B)
- Management of blood pressure is not recommended for 1st 24 hours unless greater than 220/120 mmHg or in the presence of significant comorbidities
- Transfer to stroke unit

Give aspirin 325mg if no contraindications

Transfer to stroke unit

SBP greater than 185 mmHg or DBP greater than 110 mmHg

- Labetalol 10-20 mg IV over 1-2 minutes, may repeat times 1
  Do not use if heart rate less than 60 beats per minute OR
  - Nicardipine 5 mg/hour IV continuous infusion

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

Administer alteplase per Acute Ischemic Stroke Order Set

See Page 2

Abbreviations
- EKG: Electrocardiogram
- MRI: Magnetic resonance Imaging
- DBP: Diastolic blood pressure
- NIHSS: National Institutes of Health Stroke Scale
- SBP: Systolic blood pressure

Examples of significant comorbidities: severe cardiac failure, aortic dissection, or hypertensive encephalopathy.

Department of Clinical Effectiveness V6

Approved by The Executive Committee of Medical Staff 12/15/2015
Patient develops severe headache, acute hypertension, severe nausea and vomiting?

Yes -> Stop alteplase and obtain STAT CT\(^1\) of brain

No

Patient develops angioedema?

Yes -> Stop alteplase and initiate “Adult Hypersensitivity and Allergic Reaction Order set”

No

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

Patients blood pressure increases to greater than 180/105 mmHg?

Yes

SBP\(^1\) greater than 180 - 230 mmHg or DBP\(^1\) 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

OR

- Nicardipine 5 mg/hour IV continuous infusion titrate by 2.5 mg/hour every 5 minutes to desired effect, max dose 15 mg/hour

No

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Abbreviations

DBP: Diastolic blood pressure
CT: Computed tomography
SBP: Systolic blood pressure

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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
- 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 NIHSS1,2 score greater than 25
- Patients with stroke and diabetes

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1 Abbreviations

EKG: Electrocardiogram  MRI: Magnetic resonance Imaging  DBP: Diastolic blood pressure

CT: Computed tomography  SBP: Systolic blood pressure  NIHSS: National Institutes of Health Stroke Scale

2 See Appendix C for NIHSS
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### APPENDIX C – NATIONAL INSTITUTES OF HEALTH STROKE SCALE (NIHSS)

Best results from rt-PA with score less than 20 and less than 75 years old

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

**Continued on Next Page**
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APPENDIX C – NATIONAL INSTITUTES OF HEALTH STROKE SCALE (NIHSS) - Continued

Best results from rt-PA with score less than 20 and less than 75 years old

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


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DEVELOPMENT CREDITS

This practice consensus algorithm is based on majority expert opinion of the Ischemic Stroke work group at the University of Texas MD Anderson Cancer Center. It was developed using a multidisciplinary approach that included input from the following medical, radiation and surgical oncologists.

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Core Development Team Leads