

| EMERGENCY DEPARTMENT POLICIES | | |
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| SUBJECT: | Protocol for the Initial Evaluation and Management of Patients with Ischemic or Hemorrhagic Stroke | NO. 52.1 PAGE NO. 1 of 6 |

Original Date of Issue: 7/12/05

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| Reviewed: | 2.7.07 | 1.20.08 | | | | | |
| Revised: | NA | Yes | | | | | |

Patient Population

| | |
|------------|---|
| Neonate | |
| Pediatric | |
| Adolescent | |
| Adult | √ |
| Geriatric | √ |

Protocol: Initial Evaluation and Management of Patients with Ischemic or Hemorrhagic Stroke

Prehospital Notification

Mount Sinai EMS will give pre-arrival notification via AMAC

FDNY will have the option to notify ED via dispatcher or directly via AMAC

- 1-877-ED Sinai
- ED attending will receive the patch though call from AMAC
- ED attending will relay patient information and ETA to charge and triage / resuscitation room nurse
- Designate a patient bed
- ED attending calls AMAC for Stroke Team Notification** upon patient's arrival

Initial Nursing Triage

1. If there was EMS notification of a possible acute stroke patient, follow the ED attending's pre-arrival instructions.

2. If the patient has a history or Cincinnati Stroke Scale score suggestive of acute stroke without prehospital notification

- Triage nurse immediately notifies the appropriate zone attending (or supervising EM-3) about a possible acute stroke patient.
- Triage immediately to an ED bed or to the Resuscitation Room if vital signs unstable or symptom onset <8 hours.
- Obtain Finger stick blood sugar

Immediate Emergency Department Physician Protocol

1. ABCs
2. Review vitals and FSBS
3. Focused History and PE screening neurological examination
4. Time of symptom onset is assumed as the time that the patient was last known to be symptom-free
5. ****Stroke Team Notification via AMAC at Ext. 43611 within 5 minutes of patient arrival**

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| Neurology Consult | Stroke Beeper 3886 Neurology Beeper 2545 |
| Radiology Staff | M-F 8am to 11:30pm and Sat & Sun 8am to 5pm Extension 44261 or beeper 4444 (NeuroRadiol Fellow) |
| | M-F 11pm to 8am Sat & Sun and Sat & Sun 5pm to 8am Beeper 1490 |
| CT Scan personnel | Extension 47412 |
| Laboratory personnel | Extension 43895 Supervisor 88145 |

EMERGENCY DEPARTMENT POLICIES

| | | |
|-----------------|--|-----------------------------|
| SUBJECT: | Protocol for the Initial Evaluation and Management of Patients with Ischemic or Hemorrhagic Stroke | NO. 52.1 PAGE NO. 2 of 6 |
|-----------------|--|-----------------------------|

7. Determine initial NIH Stroke Scale score (NIHSS) and enter into IBEX chart under Neurological Deficit / CVA Template

Immediate Nursing Assessment

1. Place patient on a cardiac monitor and continuous pulse oximetry.
2. Notify MD if not at bedside
3. Place IV and obtain stat blood work as per standard order set
4. Obtain immediate bedside finger stick blood sugar if not performed at triage
5. ECG
6. NPO including medications until dysphagia screening performed by neurology / stroke service

Initial Management Protocol Stabilization of Vital Functions

1. Initial assessment and treatment should focus on any abnormalities in airway, breathing, circulation, temperature, and blood glucose concentration.
2. Airway
 - a. Evaluate patient for any signs or symptoms of airway obstruction or compromise
 - b. Strongly consider RSI/ETI in patients with depressed levels of consciousness, evidence of potential brain stem stroke, or any other sign of possible airway compromise (RSI Protocol for Stroke)
3. Breathing
 - a. Monitor continuous pulse oximetry.
 - b. Evaluate patient for possible causes of hypoxia including hypoventilation, aspiration pneumonia, and atelectasis
 - c. Supplemental oxygen should be administered if there is evidence of hypoxia. Target oxygen saturation level should be $\geq 95\%$
4. Circulation
 - a. Patient should be immediately placed on a cardiac monitor
 - b. Obtain immediate EKG
 - c. Evaluate patient for any signs of arrhythmias or myocardial infarction and manage as clinically appropriate
 - d. Evaluate patient for signs and symptoms of cardiovascular instability including arterial hypertension and hypotension
 - i. Management of Arterial Hypertension
 1. use a cautious approach to management
 2. follow the guidelines in Appendix A
 - ii. Management of Arterial Hypotension
 1. correct potential causes including volume replacement with normal saline for hypovolemia
 2. consider vasopressors as clinically indicated
 - e. IV x2
5. Blood Glucose
 - a. Immediately obtain finger stick blood glucose level
 - b. Correct hypoglycemia if present
 - c. Cautiously lower markedly elevated glucose levels to <300 mg/dL with insulin and fluids as clinically indicated

EMERGENCY DEPARTMENT POLICIES

| | | |
|-----------------|--|-----------------------------|
| SUBJECT: | Protocol for the Initial Evaluation and Management of Patients with Ischemic or Hemorrhagic Stroke | NO. 52.1 PAGE NO. 3 of 6 |
|-----------------|--|-----------------------------|

6. Temperature
 - a. If fever is present, treat patient with antipyretics and treat any underlying sources of fever

Initial Diagnostic Studies and Laboratory Testing

1. For all patients suspected of acute stroke:
 - a. GEM 3000 – immediately available in ED
 - b. Chem 7
 - c. CBC
 - d. PT/PTT
 - e. Finger stick glucose
 - f. EKG
 - g. CK, MB, troponin
 - h. CT Head- Possible Acute Stroke for ordering head CT
 - i. CXR
2. In selected patients:
 - a. Consider, liver function tests, blood alcohol level, toxicology screen, pregnancy test, CXR, lumbar puncture (if subarachnoid hemorrhage is suspected and head CT is negative for blood), EEG (if seizures are suspected)
3. If a patient is a potential candidate for treatment with rtPA (see Appendix B for indications and contraindications of rtPA in acute ischemic stroke):
 - a. Expedite completion and interpretation of head CT in order to meet the following time targets
 - i. Door to MD evaluation: 10 minutes
 - ii. Door to Stroke Team Activation: 15 minutes
 - iii. Door to CT completion: 25 minutes
 - iv. Door to CT interpretation: 45 minutes
 - v. Door to Rx Treatment 60 minutes
 - b. Ensure rapid advance notification of Radiology Department/CT of potential stroke patient within the treatment window of rtPA

EMERGENCY DEPARTMENT POLICIES

| | | |
|-----------------|--|-----------------------------|
| SUBJECT: | Protocol for the Initial Evaluation and Management of Patients with Ischemic or Hemorrhagic Stroke | NO. 52.1 PAGE NO. 4 of 6 |
|-----------------|--|-----------------------------|

References

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. Harold P. Adams, Jr, MD, FAHA, Chair; Gregory del Zoppo, MD, FAHA, Vice Chair; Mark J. Alberts, MD, FAHA; (*Stroke*. 2007;38:1655-1711.)

Recommendations for the Establishment of Stroke Systems of Care

Recommendations from the American Stroke Association's Task Force on the Development of Stroke Systems Task Force Members

Lee H. Schwamm, MD; Arthur Pancioli, MD; Joe E. Acker III, EMT-P, MPH, MS; Larry B. Goldstein, MD; Richard D. Zorowitz, MD; Timothy J. Shephard, PhD(c), CNRN, CNS; Peter Moyer, MD, MPH; Mark Gorman, MD; S. Claiborne Johnston, MPH, MD, PhD; Pamela W. Duncan, PhD; Phil Gorelick, MD; Jeffery Frank, MD; Steven K. Stranne, MD, JD; (*Circulation*. 2005;111:1078-1091.

Guidelines for the Management of Spontaneous Intracerebral Hemorrhage in Adults: 2007 Update: A Guideline From the American Heart Association/American Stroke Association Stroke Council, High Blood Pressure Research Council and the Quality of Care and Outcomes in Research Interdisciplinary Working Group: The American Academy of Neurology affirms The value of this guideline as an educational tool for neurologists.

Joseph Broderick, Sander Connolly, Edward Feldmann, Daniel Hanley, Carlos Kase, Derk Krieger, Marc Mayberg, Lewis Morgenstern, Christopher S. Ogilvy, Paul Vespa and Mario Zuccarello
Stroke 2007;38:2001-2023; originally published online May 3, 2007;

| EMERGENCY DEPARTMENT POLICIES | | |
|--------------------------------------|--|-----------------------------|
| SUBJECT: | Protocol for the Initial Evaluation and Management of Patients with Ischemic or Hemorrhagic Stroke | NO. 52.1 PAGE NO. 5 of 6 |

Appendix A: Treatment Protocols with Intravenous rtPA

Blood Pressure Level (mm Hg)

Treatment

Approach to Arterial Hypertension in Acute Ischemic Stroke

Indication that patient is eligible for treatment with intravenous rtPA or other acute reperfusion intervention

Blood pressure level Systolic \geq 185 mm Hg or diastolic \geq 110 mm Hg

Labetalol 10 to 20 mg IV over 1 to 2 minutes, may repeat \times 1;

or

Nitropaste 1 to 2 inches;

or

Nicardipine infusion, 5 mg/h, titrate up by 2.5 mg/h at 5- to 15-minute intervals, maximum dose 15 mg/h; when desired blood pressure attained, reduce to 3 mg/h

If blood pressure does not decline and remains \geq 185/110 mm Hg, do not administer rtPA

Management of blood pressure during and after treatment with rtPA or other acute reperfusion intervention

Monitor blood pressure every 15 minutes during treatment and then for another 2 hours, then every 30 minutes for 6 hours, and then every hour for 16 hours

Blood pressure level Systolic 180 to 230 mm Hg or diastolic 105 to 120 mm Hg

Labetalol 10 mg IV over 1 to 2 minutes, may repeat every 10 to 20 minutes, maximum dose of 300 mg;

or

Labetalol 10 mg IV followed by an infusion at 2 to 8 mg/min

Systolic \geq 230 mm Hg or diastolic 121 to 140 mm Hg

Labetalol 10 mg IV over 1 to 2 minutes, may repeat every 10 to 20 minutes, maximum dose of 300 mg;

or

Labetalol 10 mg IV followed by an infusion at 2 to 8 mg/min;

or

Nicardipine infusion, 5 mg/h, titrate up to desired effect by increasing 2.5 mg/h every 5 minutes to maximum of 15 mg/h

If blood pressure not controlled, consider sodium nitroprusside

EMERGENCY DEPARTMENT POLICIES

| | | |
|-----------------|--|-----------------------------|
| SUBJECT: | Protocol for the Initial Evaluation and Management of Patients with Ischemic or Hemorrhagic Stroke | NO. 52.1 PAGE NO. 6 of 6 |
|-----------------|--|-----------------------------|

APPENDIX B: Characteristics of Patients With Ischemic Stroke Who Could Be Treated With rtPA

Diagnosis of ischemic stroke causing measurable neurological deficit
The neurological signs should not be clearing spontaneously.
The neurological signs should not be minor and isolated.
Caution should be exercised in treating a patient with major deficits.
The symptoms of stroke should not be suggestive of subarachnoid hemorrhage.
Onset of symptoms <3 hours before beginning treatment
No head trauma or prior stroke in previous 3 months
No myocardial infarction in the previous 3 months
No gastrointestinal or urinary tract hemorrhage in previous 21 days
No major surgery in the previous 14 days
No arterial puncture at a noncompressible site in the previous 7 days
No history of previous intracranial hemorrhage
Blood pressure not elevated (systolic <185 mm Hg and diastolic <110 mm Hg)
No evidence of active bleeding or acute trauma (fracture) on examination
Not taking an oral anticoagulant or, if anticoagulant being taken, INR <1.7
If receiving heparin in previous 48 hours, aPTT must be in normal range.
Platelet count >100 000 mm³
Blood glucose concentration >50 mg/dL
No seizure with postictal residual neurological impairments
CT does not show a multilobar infarction (hypodensity <1/3 cerebral hemisphere).
The patient or family members understand the potential risks and benefits from treatment.

APPENDIX C: Regimen for Treatment of Acute Ischemic Stroke Intravenous rtPA

Infuse 0.9 mg/kg (maximum dose 90 mg) over 60 minutes with 10% of the dose given as a bolus over 1 minute.
Admit the patient to an intensive care or stroke unit for monitoring.
Perform neurological assessments every 15 minutes during the infusion and every 30 minutes thereafter for the next 6 hours, then hourly until 24 hours after treatment.
If the patient develops severe headache, acute hypertension, nausea, or vomiting, discontinue the infusion (if rtPA is being administered) and obtain emergency CT scan.
Measure blood pressure every 15 minutes for the first 2 hours and subsequently every 30 minutes for the next 6 hours, then hourly until 24 hours after treatment.
Increase the frequency of blood pressure measurements if a systolic blood pressure is \geq 180 mm Hg or if a diastolic blood pressure is \geq 105 mm Hg; administer antihypertensive medications to maintain blood pressure at or below these levels.
Delay placement of nasogastric tubes, indwelling bladder catheters, or intra-arterial pressure catheters.
Obtain a follow-up CT scan at 24 h before starting anticoagulants or antiplatelet agents.