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Becoming an Arkansas Stroke Ready Hospital (ArSRH)

Overview
Requirements
Application Process
**Why Become an ArSRH?**

This toolkit is designed to provide hospitals with the necessary information and requirements to become an Arkansas Stroke Ready Hospital (ArSRH).

**Why become an ArSRH?** The goal of the Arkansas Stroke System of Care is to provide quality and timely emergency care to every stroke patient in the state. This is accomplished through a multi-pronged approach. Beginning with public education to call 911 immediately for concerning symptoms, we hope to minimize the delay in patients seeking emergency evaluation. Through 911-dispatch center and Emergency Medical Services (EMS) training, patients will be screened with standardized protocols allowing dispatchers and medics to recognize and respond to possible strokes as time-critical emergencies. Finally, through regular training, the use of nationally-recognized stroke protocols, and timely consultation with stroke neurologists at Primary Stroke Centers (PSCs) or Comprehensive Stroke Centers (CSCs), facilities will be able to provide rapid, efficient, and optimal emergency stroke care.

The Arkansas Stroke System of Care consists of a “spoke and hub” system, where the “hub” hospitals are Joint Commission certified PSCs or CSCs. Note that at the time of this writing there are no Comprehensive Stroke Centers in Arkansas; however this is expected to change in the future. Hub hospitals function as the expert resource centers for the “spoke” hospitals which are considered to be either (a) Arkansas Stroke Ready Hospitals (ArSRHs) or (b) Joint Commission certified Acute Stroke Ready Hospitals (ASRHs).

Please access the Arkansas Department of Health’s (ADH) website (www.healthy.arkansas.gov) for the most updated list of ArSRHs and Joint Commission certified stroke hospitals in the state.

**What is an ArSRH?** An ArSRH (“spoke” hospital) will provide immediate and time-critical care to the stroke patient, including initial emergency evaluation and screening, stroke scale assessment and, if indicated, thrombolytic treatment. Using standardized and evidence-based protocols, ArSRH’s will be able to provide the optimum level of care to the acute stroke patient. To assist in this evaluation and decision-making, “spoke” hospitals will have 24-hour access to the expert neurologic resources of hub hospitals (PSCs or CSCs) for consultation. Local EMS agencies will be notified that an ArSRH has been identified by the ADH and is “stroke ready” to receive acute stroke patients as identified by EMS personnel in the field. The intent of this approach is to get the patient as quickly as possible to a facility that can provide appropriate acute stroke care.

A hospital of any size and location that meets the attached criteria may apply to become an ArSRH. After receiving an application, the ADH will survey the hospital. If all criteria are met, EMS agencies in the area will then be notified that suspected stroke patients may be transported to this facility. All eligible hospitals are encouraged to complete the implementation and application process.

The standardized pre-hospital stroke screening, treatment, and transportation to stroke-ready PSCs, CSCs, ASRHs or ArSRHs in Arkansas will reduce the time to treatment for patients with acute ischemic strokes who may benefit from thrombolysis. It will also reduce delays and improve the overall care of other stroke patients who may not qualify for thrombolysis (stroke symptoms beyond 3-4.5 hours, hemorrhagic strokes, stuttering strokes [or TIAs], severe hypertension, etc.).

**What’s the Background?** The most recent mortality available for 2014 (Centers for Disease Control and Prevention Wider-ranging Online Data for Epidemiologic Research) indicate that Arkansas’ stroke mortality rate was 45.4 per 100,000 population ranking Arkansas with the 5th highest stroke mortality rate in the
nation. The ADH recognizes that all hospitals do not have the capabilities to become Joint Commission certified sites. However, by becoming an ArSRH, a facility signals to its community that it is committed to the best nationally accepted standards of acute stroke treatment.

Evidence shows that hospitals that have established dedicated stroke programs demonstrate improved treatment, better patient outcomes, and reduced care costs. They have the required infrastructure, training, and written protocols to provide the best emergency care available to acute stroke patients.

**What does this toolkit do?** This toolkit will provide medical professionals and hospital administrators the necessary information to improve their hospital’s acute stroke care and become an ArSRH in Arkansas. Each hospital is invited to review the information contained in this toolkit and plan its ArSRH implementation.
Description of ArSRH Requirements

The following describes the specific requirements to become an ArSRH:

1. **Acute Stroke Team**
   a. Is available 24/7 and includes:
      • A physician trained in evaluation and treatment of acute stroke is available to the bedside within 15 minutes of patient arrival.
      • A call roster of physicians trained to treat strokes.
      • If desired, immediate consultation with an onsite Board Certified Neurologist or a stroke expert at a PSC or CSC may be done using Telestroke technology, as available. The contact information for the PSC or CSC is immediately available.
      • An ED nurse, who is trained and authorized to begin stroke protocol using the standardized forms and protocols.
   b. Utilizes a standardized stroke scale and treatment protocol that:
      • Includes the use of a written protocol for patients eligible to receive intravenous Alteplase
      • Identifies eligible patients for Alteplase that is administered as soon as possible, using National Institute of Neurological Disorders and Stroke (NINDS) criteria and treatment time criteria of eligible patients within 3-4.5 hours of stroke symptom onset.
   c. Protocols that provide information regarding emergency care of acute ischemic strokes, stabilization of vital functions, initial diagnostic tests, initial use of medications and are reviewed at least annually.

2. **Neuroimaging Services**
   • CT scan with interpretation within 45 minutes of stroke patient arrival at the facility.

3. **Laboratory Services**
   • CBC, BMP, PT/PTT/INR completed within 45 minutes patient arrival.

4. **Emergency Department (ED)**
   a. Must be open 24/7.
   b. Personnel should be trained to diagnose and treat acute strokes.
   c. ED should document stroke patient encounter, including time from “last known well”.
   d. Educational activities for ED staff should occur annually to reinforce stroke diagnosis and treatment.
   e. Have a plan in place for transfer of stroke patients, if necessary.

5. **Commitment and Support of Medical Organization**
   a. The ArSRH is to designate an individual to serve as Stroke Coordinator/Facilitator.
   b. Hospital administration is committed to providing financial and logistical resources as an ArSRH.
6. **Outcome and Quality Improvement Activities**  
   a. The ArSRH is to participate in the ADH’s Arkansas Stroke Registry (ASR) by collecting and submitting stroke patient data according to ASR program guidelines

7. **Continuing Education**  
   a. The ArSRH needs to ensure staff receives training on the NIHSS and acute stroke team must complete appropriate continuing stroke education each year.  
   b. The ArSRH is encouraged to hold regular public education programs for community members on stroke risk factors, symptom recognition, prevention, etc.

The following are ADH contacts for the ArSRH Toolkit. Any questions on planning and operations can be directed to:

Appathurai Balamurugan, MD, MPH  
Medical Director  
Chronic Disease Prevention and Control Branch  
Associate Director for Science  
Center for Health Advancement  
Arkansas Department of Health  
4815 W. Markham, Slot #6  
Little Rock, AR  72205  
Phone: 501-280-4055  
appathurai.balamurugan@arkansas.gov  

David Vrudny, CPHQ, MPM, MPH(c)  
Stroke and STEMI Systems of Care Manager  
Chronic Disease Prevention and Control Branch  
Arkansas Department of Health  
4815 W. Markham, Slot #6  
Little Rock, AR  72205  
Phone: 501-661-2096  
david.vrudny@arkansas.gov  

James Bledsoe, MD  
Medical Director  
Emergency Medical Services Section  
Arkansas Department of Health  
4815 W. Markham, Slot 38  
Little Rock, AR  72205  
Phone: 501-280-4351  
james.bledsoe@arkansas.gov  

Tammie Marshall, MSN, MHA, CNE, RN, DNP  
Candidate  
Arkansas Stroke Nurse Coordinator  
Chronic Disease Prevention and Control Branch  
Arkansas Department of Health  
4815 W. Markham, Slot #6  
Little Rock, AR  72205  
Phone: 501-671-1508  
tammie.marshall@arkansas.gov
ArSRH Application Process

1. Hospitals wishing to become an ArSRH must submit a letter of intent (LOI) to the ADH, which states interest in becoming an ArSRH, along with providing a completed ArSRH application (the ArSRH application is included in this document under Appendix M). The LOI and completed application may be provided either via direct mail or e-mail to:

   David Vrudny, CPHQ, MPM, MPH(c)
   Stroke and STEMI System of Care Manager
   Arkansas Department of Health
   4815 W. Markham, Slot #6
   Little Rock, AR 72205

   Phone: 501-661-2096
   david.vrudny@arkansas.gov

2. Upon receipt of the completed application, the ADH will review the application for completeness and schedule a site visit to the applicant hospital.

3. The ADH will assess the applicant’s readiness to become an ArSRH. Upon completion of the visit, the ADH will review its findings with the hospital administrator and/or his or her representatives. Those findings will include the following:
   - Stroke program strengths
   - Areas for Improvement
   - Any recommendations pertinent to the site visit

4. Successful applicants will receive a letter identifying that the hospital has met ArSRH requirements. The ADH will work with the ArSRH to develop a process for periodic review of its status as an ArSRH which is anticipated to be once every three years.

5. Facilities not receiving approval to become an ArSRH will be given the opportunity for a repeat visit as soon as possible.
Medical Treatment and Protocol

EMS Assessment and Management
Emergency Department Initial Evaluation and Treatment

These are recommended “model” protocols for consideration by EMS agencies and Emergency Departments. They are evidence-based recommendations developed by a panel of EMS and stroke experts. They are provided for your guidance and consideration, however, each EMS agency and Emergency Department should adopt or modify them to meet their own individual needs, after consultation with their individual medical and nursing directors.
Prompt stroke recognition and treatment by EMS is a critical component of acute stroke care. As an integral part of the Arkansas Stroke System of Care, EMS will use a standardized prehospital treatment protocol for suspected stroke patients. The following brief model EMS stroke protocol is provided as a guideline. For detailed information, please see Appendix A: Emergency Medical Services Stroke Patient Care Clinical Recommendations, 2015

On Scene:
1. Manage ABCs (Airway, Breathing, and Circulation). Give oxygen if needed.
2. Perform pre-hospital stroke assessment using either the Los Angeles Pre-Hospital Stroke Scale or Cincinnati Pre-Hospital Stroke Scale. If the patient is 45 years of age or younger, the Cincinnati Pre-Hospital Stroke Scale is recommended.

<table>
<thead>
<tr>
<th>Screening Criteria</th>
<th>Yes</th>
<th>No</th>
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<tr>
<td>4. Age over 45 years</td>
<td></td>
<td></td>
</tr>
<tr>
<td>5. No prior history of seizure disorder</td>
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<td></td>
</tr>
<tr>
<td>6. New onset of neurologic symptoms in last 24 hours</td>
<td></td>
<td></td>
</tr>
<tr>
<td>7. Patient was ambulatory at baseline (prior to event)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>8. Blood glucose between 60 and 400</td>
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</tbody>
</table>

9. Exam: *look for obvious asymmetry*

<table>
<thead>
<tr>
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<th>Left</th>
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</table>

<table>
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<th></th>
<th>Drifts Down</th>
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<th>Drifts Down</th>
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</tbody>
</table>

Based on exam, patient has only unilateral (and not bilateral) weakness: Yes No

10. If Yes (or unknown) to all items above LAPSS screening criteria met: Yes No

11. If LAPSS criteria for stroke met, call receiving hospital with “CODE STROKE”, if not then return to the appropriate treatment protocol. (Note: the patient may still be experiencing a stroke if even if LAPSS criteria are not met.)
3. **Establish and record an exact time**, in military time, when patient was “Last Known Well Time.”

**In Transit:**
1. Rapidly transport to closest PSC, CSC, ArSRH or ASRH if available.
2. Bring witness or family member if possible, or record the names and phone numbers of witnesses.
3. Alert the receiving emergency department that a suspected stroke patient is en-route, so they can begin to activate their acute stroke team and be ready on arrival.
4. Check and record blood glucose to assess for hypoglycemia.
5. Check and record blood pressure. Do NOT administer any hypertensive medication without physician approval.
6. Establish cardiac monitoring and IV access with large bore catheter, if possible.
7. Keep NPO.
8. Bring medications or medication list.

Physician Acute Stroke Checklist

TO DETERMINE ALTEPLASE ELIGIBILITY AND ADMINISTER ALTEPLASE

*Note: The physician must be certified in the NIH Stroke Scale*

1. Ensure “Initial ED Nursing Orders for Acute Stroke” (p.12) are initiated.
2. Record exact date and time of stroke onset (defined as the patient’s last known well time)
   
   Date: _, Time: am / pm.

3. Complete brief initial evaluation. Determine if patient has:
   a. Suspected ischemic stroke
   b. Is onset less than 180-270 min? If yes, proceed.
   c. If no, is it less than 8 hours? If yes, call PSC or CSC.

4. Order STAT non-contrast head CT; notify radiologist and technician that this study is for “possible Alteplase therapy in acute stroke.” If a CTA can be performed, order CTA immediately after non-contrast head CT.

5. Ensure STAT labs are drawn (see nursing orders) – CBC with platelets, glucose, PT/PTT/INR, BMP.

6. Order additional laboratory studies in select patients: pregnancy test, drug screen, blood alcohol level, liver function tests, chest x-ray, BUN level and creatinine level.

7. Give NO aspirin, heparin or warfarin for patients being considered for Alteplase therapy.

8. Complete focused history and physical examination.

9. Complete NIH Stroke Scale (Appendix J). Total NIHSS = (time_/am/pm)

10. Complete “Inclusion and Exclusion Criteria for Alteplase” (Appendix C). If all inclusion criteria are “yes” AND all exclusion criteria are “no”, proceed to treatment.

11. Is BP > 185 / 110 mm Hg on two separate measurements? If yes, See Appendix H (Blood Pressure guidelines).

12. Obtain informed consent from family or patient.

13. Determine total dose of Alteplase:

   DO NOT USE CARDIAC DOSE OR RETAVASE→/RETEPLASE!

14. See dosing chart for weight-based dose (Appendix E).

   Weight: ________ kg / pounds (measure in ED)  Total Alteplase Dose: ________mg

15. See mixing and preparation protocol for mixing instructions (Appendix F)

16. Give 10% of total dose of Alteplase over 1 min as IV bolus.

   Bolus: ________mg

17. Start IV infusion of remaining 90% of total dose to run over one hour.

   Infusion Rate: ________mg/hr
Post Alteplase Protocol-Physicians

1. Maintain Systolic BP < 180 mm Hg and Diastolic BP < 105 mm Hg. See Blood Pressure guidelines (Appendix H).

2. Arrange admission to stroke unit or ICU, or transfer to primary stroke center, as per individual hospital protocol.

3. Avoid aspirin, heparin, warfarin, or other anti-platelets and anti-coagulants for 24 hrs post-Alteplase administration.

4. If patient develops severe headache, nausea, or vomiting, stop rt-PA (if being infused) and obtain emergency head CT to evaluate for possible ICH (See “Algorithm for Management of Suspected ICH”, Appendix I).

5. Implement Alteplase / Stroke inpatient orders (per individual hospital protocol).
Initial ED Nursing Orders for Acute Stroke

1. Start continuous cardiac and oxygen saturation monitoring.
2. Oxygen at 2 LPM via nasal cannula: maintain spO2 > 93%.
3. IV access: Normal saline infusion at 75 mL/hr; (can go lower if CHF) as determined by the on-site physician; saline lock in opposite arm.
4. STAT blood draw for:
   a) CBC with platelets
   b) PT, PTT, and INR
   c) Glucose (done at bedside)
   d) Basic Metabolic Panel
5. EKG
6. Patient’s weight_______________ kg or lb (circle one) [MEASURE IN ED]
7. STAT non-contrast head CT. Where applicable a CTA is recommended. A CTA helps identify large vessel occlusions for which endovascular therapy is warranted. The most updated list of hospitals performing endovascular therapy may be found on the Arkansas Department of Health’s website (healthy.arkansas.gov).
8. Do not give aspirin, heparin, or warfarin.
9. Vital signs and focused neurochecks every 15 minutes (every 5 minutes if patient receiving anti-hypertensive IV medications).
10. Obtain temperature; give acetaminophen if febrile.
11. BP alarm should be 185/110 then when Aletplase is initiated 180/105. BP is to be checked every 15 minutes for 2 hours, every 30 minutes for 4 hours, or as deemed by the physician.
12. Obtain IV pump for possible infusion.
ED Nursing Orders for Treating Stroke with Alteplase

1. Confirm total Alteplase dose. See “Dosing Chart for Alteplase” (Appendix E).
2. Prepare Alteplase as a 1:1 dilution. See “Mixing Instructions for Alteplase” (Appendix F).
3. Give Alteplase IV bolus dose. Bolus dose = 0.1 x Total dose (in mg).
4. Start Alteplase IV infusion. Infusion dose = Total dose - Bolus dose, given over 1 hour.
5. Vital signs and neuro checks every 15 minutes for 2 hrs post-Alteplase. If patient is taking IV medication for BP then perform these checks every 5 minutes. Use manual BP cuff to avoid bruising.
6. Notify ED attending physician immediately for:
   a. Any change in level of consciousness or any worsening of neurologic function.
   b. Any abrupt rise in blood pressure.
   c. Any SBP > 180 mm Hg OR DBP > 105 mm Hg.
Stroke Protocol Algorithm

1. Identify signs of possible stroke

Critical EMS assessments and actions

- Support ABCs; give oxygen if needed
- Perform prehospital stroke assessment
- Establish patient’s last known well time (Note: stroke therapies may be available beyond 3 hours from onset)
- Alert Hospital (Hospital Activates Stroke Team)
- Check glucose if possible
- Transport to an ArSRH, ASRH, or PSC/CSC, if available; bring a witness or family member, or get the names and phone numbers of witnesses.

ED Arrival: 10 min
Immediate general assessment and stabilization

- Assess ABCs, vital signs
- Provide oxygen if hypoxemic
- Obtain IV access and blood samples
- Check glucose; treat if indicated
- Perform neurologic screening assessment
- Activate stroke team
- Order emergent CT scan of brain
- Obtain 12-lead ECG

ED Arrival: 25 min
Immediate neurologic assessment by stroke team or designee

- Review patient history
- Establish symptom onset
- Perform neurologic examination (NIHSS)

ED Arrival: 45 min
Does CT scan show any hemorrhage?

No Hemorrhage

Probable acute ischemic stroke; Consider fibrinolytic therapy

- Check for fibrinolytic exclusions
- Repeat neurologic exam: are deficits rapidly improving to normal?

Hemorrhage

Consult neurologist or neurosurgeon; consider transfer if not available

ED Arrival: 60 min
Patient remains candidate for fibrinolytic therapy?

Note: Since time is of the essence for the treatment of acute stroke patients, providing treatment in earlier times than shown are recommended.
Fibrinolytic Candidate

Review risks/benefits with patient and family.
If Acceptable:
• Give Alteplase
• No anticoagulants or antiplatelet treatment for 24 hours

Begin stroke pathway
• Admit to stroke unit if available
• Monitor BP; treat if indicated
• Monitor neurologic status; emergent CT if deterioration
• Monitor blood glucose; treat if needed
• Initiate supportive therapy; treat comorbidities
Quality Improvement and Performance Measures

Hospitals should regularly monitor key performance measures to learn their strengths and needs in training stroke patients. By participating in the Arkansas Stroke Registry, hospitals will be able to monitor a variety of stroke performance data including:

- Length of stay
- Time data (i.e. door-to-CT time, door-to-needle time, etc.)
- Adherence to evidence-based performance measures (i.e. dysphagia screening, etc.)
- Percent of eligible patients treated with Alteplase
- Complications
- Clinical outcomes
Educational Resources

The following websites are recommended for more information on stroke care and treatment:

**American Heart Association**
http://learn.heart.org/
- Distance Learning via Printed Material, DVD, CD-ROM
  - A Clinician’s Guide to Thrombosis DVD and Monograph
  - Stroke: Improving the Chain of Recovery
- Online Courses, Webinars and Webcasts
  - Get With the Guidelines® on-line courses
  - NIHSS Stroke Scale Training and Certification
  - Stroke Pre-hospital care
- Podcasts/Audiocasts
  - Key Findings: An International Stroke Conference Podcast
- Satellite Broadcasts with Web Course Archives
  - Ischemic Stroke: Risk Factors and Primary Prevention Strategies
  - Risk Factor Control for Stroke: Secondary Prevention Strategies

**Brain Attack Coalition**
http://www.stroke-site.org/
- Guidelines and example Hospital Admission Orders, Physician Orders, and pertinent checklists
- Patient Resources

**National Guideline Clearinghouse**
- Diagnosis and initial treatment of ischemic stroke

**National Institute for Neurological Disorders and Stroke**
http://www.ninds.nih.gov/
http://stroke.nih.gov/ - Know Stroke website
- NIH Stroke Scale
- NIH Stroke Scale Training DVD

**National Stroke Association**
www.stroke.org
- Guidelines
  - Building the Case for a Primary Stroke Center: A Resource Guide
- On-line Courses
  - For EMS providers: Stroke rapid response on-line or classroom training
- NIH Stroke Scale Exam, Scoring and Registration Service
- Stroke Nurse Education Modules
  - www.stroke.org/strokenurse
  - Developed in partnership with the American Association of Neuroscience Nurses; these accredited online modules are ideal for those who are new to stroke as well as for seasoned
stroke care providers committed to keeping their stroke knowledge and practice up-to-date

- The completion of all 10 modules will result in the achievement of a minimum of eight contact hours consistent with The Joint Commission’s requirements for core stroke team members

UAMS – Stroke Education for EMS  
cdh.uams.edu
- Look at the Quick link on the right side of the web page and click on the “Continuing Education” link (1 hr. CEU for EMT’s and 2 hr. CEU for paramedics)  
- The link will take you to learnondemand.org where one can register  
- Click on Departments at the top then scroll down to AR SAVES for the modules

Baptist Health Medical Center  
https://www.baptist-health.com/content/stroke
- This page provides access to resources including information about the stroke support group where others from the community who are dealing with similar challenges can be strengthened by conversation, friendship and group problem-solving.

Arkansas Department of Health – Section of EMS  
[insert TBD web link]
- Current listing of Primary Stroke Centers and Stroke Receiving Centers in Arkansas, information and applications for hospitals interested in becoming ArSRHs

References


Appendices

The guidelines listed below are meant to be recommendations for consideration, not a requirement for ArSRH designation.

A: EMS Stroke Patient Care Clinical Recommendations, 2015
B: Transfer Protocol
C: Inclusion and Exclusion Criteria for Alteplase
D: Risks and benefits of Alteplase
E: Dosing Chart for Alteplase
F: Mixing Instructions for Alteplase
G: AHA 2015 Endovascular Therapy Guidelines
H: Blood Pressure Guidelines for Pre-and Post-Alteplase
I: Algorithm for Management of Suspected ICH
J: NIH Stroke Scale
K: Time Target Intervals for a Telestroke Consultation
L: Mercy Code Stroke EMS Protocol
M: Arkansas Stroke Ready Hospital Application
The Arkansas Acute Stroke Care Task Force (ASCTF) and the Arkansas Stroke Registry (ASR) are working jointly to reduce stroke related death and disability in Arkansas. As a part of this broad effort, one important objective is to create a statewide uniform standard-of-care that is based on the most currently accepted, evidence based stroke patient care.

It is universally accepted that Emergency Medical Service (EMS) is an extremely important component of acute stroke patient care. This publication was created to give EMS providers evidence based recommendations for emergent pre-hospital stroke patient care.

It is important to note that this document is intended merely as a reference and is not meant to be an instructional tool for creating EMS protocols. Participation is voluntary and specific treatment options remain at the discretion of the individual EMS Medical Director.

“CODE STROKE” Programs
Some EMS agencies have implemented “CODE STROKE “, or “Stroke Alert “ plans. CODE STROKE plans are Quality Improvement (QI) programs which establish work practice controls designed to promote maximum proficiency in suspected stroke patient care. Stroke Alert plans are often implemented in cooperation with local hospital emergency facilities. Along with establishing stroke patient care protocols and procedures; CODE STROKE plans can also define education goals, and usually include some means of data collection and clinical feedback for quality control. Contact the Arkansas Stroke Registry for more information on creating an EMS CODE STROKE plan.

Education
Perhaps the most crucial element of pre-hospital stroke patient care is provider education. Advances in stroke patient treatment have greatly improved survival rates over the past several years. Tissue plasminogen activator (Alteplase) can reduce the risk of death or permanent disability by 30% or more if administered within 3 hours (up to 4.5 hours for some patients).1 Recent evidence suggests that intra-arterial interventions show even further improve outcomes.2 Advances in surgical intervention will mean that some intracranial bleeds that would have resulted in certain death or permanent disability in the past, may now be survivable with minimal impairment if detected and treated early.

Therefore it is imperative that pre-hospital healthcare professionals possess the ability to quickly recognize that a patient could be experiencing a stroke. Emergency medical dispatchers and care providers alike should be conditioned to evaluate information to quickly recognize patients who are potentially experiencing a stroke. The ASCTF recommends that EMS professionals receive supplemental training initially, and refresher training at least annually, that is designed to enhance the ability to detect stroke signs and symptoms.

Also, while there should be a sense of urgency with any true medical emergency, time management should be stressed above all else for pre-hospital suspected stroke patient care. EMS professionals are skilled healthcare providers who are trained to act independently of direct supervision; and to mitigate many types of medical and traumatic emergencies. Paramedics in particular possess a variety of advanced life saving skills that can be initiated in the field, prior to access to a hospital emergency facility. This means that in many emergency situations it may be more beneficial to the patient to delay transportation in order to more quickly initiate a lifesaving intervention. Because of this it can be necessary to “re-educate” EMS providers in order to help them understand that during suspected stroke emergencies, the most critical intervention that the EMT or Paramedic can provide is rapid access to a stroke-capable emergency facility.
Key Protocol Elements
Since field EMS providers work remotely with no physician present to provide direct medical supervision, care is generally provided based on standing medical orders or “protocols”. In Arkansas, the Medical Director for each individual EMS agency is responsible for developing and maintaining patient care protocols for the respective agency. Because of this, EMS patient care protocols can vary widely by content, format, and design. Also, treatment options vary from agency to agency based on license level (ALS vs. BLS), and on the specific medications kept on hand by each agency.

For this reason, rather than develop a model EMS stroke care protocol, the ASCTF/ASR team has identified essential assessment and treatment components that should be addressed in each stroke protocol. Those key elements are listed below along with a brief rationale for each.

**Early Recognition**

**Pre-hospital Stroke Screening**
As stated previously, the time sensitivity of potential treatments makes it imperative that pre-hospital healthcare providers are proficient at recognizing potential stroke patients. Pre-hospital stroke screens are simple tools that can enhance the ability of the field provider to detect stroke. While there are many pre-hospital stroke screens (PHSS) available, the most commonly used are the Cincinnati Pre-hospital Stroke Scale (CPSS) and the Los Angeles Pre-hospital Stroke Screen (LAPSS).

Both the CPSS and the LAPSS can be done quickly and both are effective at detecting the probability of stroke. The Cincinnati Scale can be performed in seconds and depending on results, has an accuracy rate of about 72% in identifying stroke. The LAPSS typically takes a little longer due to the additional assessment criteria, but is considered to be up to 97% accurate in predicting that the patient is having a stroke.

The ASCTF strongly recommends that routine use of a pre-hospital stroke screen be incorporated into every EMS suspected stroke patient care protocol. However, it is also important to stress to field providers that the absence of abnormal PHSS results does not rule out the possibility of stroke. If the provider suspects stroke even though PHSS criteria is not met, stroke protocol and procedures should be followed including rapid transport and issuing a “Stroke Alert” if the provider believes that such is indicated.

**Time Management**

**Scene Time**
EMS scene time is defined as the time period beginning when the ambulance arrives on the emergency scene, and ending when the ambulance departs the scene with patient on board, en route to the receiving facility. As discussed earlier, the most critical intervention for suspected stroke patients is rapid access to a stroke capable emergency facility. Particularly in areas where EMS transport times tend to be short, Paramedics and EMT’s may feel pressured to delay transport in order to insure that a detailed assessment and all indicated procedures are completed prior to arriving at the destination. For this reason the ASCTF recommends that EMS stroke protocols specify DO NOT DELAY transport for anything other than to correct immediate life threats, such as an obstructed airway. It should be emphasized to pre-hospital providers that transport should not be delayed in order to perform a detailed assessment or to initiate IV’s or other non-immediate life threat procedures.

**Transport in Emergency Mode**
“Transport in Emergency Mode” means driving with all vehicle emergency warning systems, i.e., lights and siren, activated. The trend for the past several years has been to discourage transporting patients in emergency mode. Statistics show that most serious ambulance accidents occur when driving in emergency mode. Also, some studies have shown that the actual amount of time saved by transporting with lights and siren benefits less than 5% of all EMS patients. However for some ischemic stroke patients, minutes, and even seconds, can have profound impact in reducing death and disability. Therefore the ASCTF recommends safe, rapid transport for suspected stroke patients from emergency scenes. Since this could be a departure from normal practice for some EMS agencies, it may be advisable to specify "Transport in Emergency Mode" in the actual stroke patient care protocol.
**Last Known Well Time/Bring the Historian**

“Clot-buster” medications such as Alteplase can offer ischemic stroke patients greatly improved chances of survival and can reduce the risk of long term disability. However, administering beyond the criteria window of 3 hours to 4.5 hours after symptom onset, may not only be ineffective, but also could be dangerous to the patient. Because of this, it is extremely important for pre-hospital healthcare providers to make every attempt to establish the patient’s “Last Known Well Time”, which is when the patient was last known to be symptom free. Whenever possible, EMS providers should encourage a family member or historian to accompany the patient to the emergency facility. If the historian does not ride in the ambulance, providers should attain a valid contact number in the event that questions arise once the patient has reached the receiving facility.

**Airway Management**

Obviously airway management is of critical importance during any medical emergency. However, due in part to potential physiological deficits, as well as mental status changes, stroke patients can be at particularly high risk for aspiration. Stroke patients who aspirate often end up on a ventilator. The prognosis for stroke patients that are placed on manually assisted ventilation is usually poor.

Therefore the ASCTF believes that it is important to stress to pre-hospital providers the importance in increased vigilance in monitoring the airway of suspected stroke patients. Stroke patient care protocols should emphasize this and may specify head elevation and/or other precautions designed to reduce the risk of aspiration.

**Blood Glucose Check**

One of the most common stroke mimics is hypoglycemia. In order to confirm stroke, all other possibilities must be ruled out. This and the fact that hypoglycemia can often be corrected in the pre-hospital setting means that a blood glucose check should be performed on every suspected stroke patient. The ASCTF recommends that blood glucose assessment be included in every stroke care protocol, even when it is otherwise specified as a routine assessment for all patients. Also, due to potentially harmful effects in patients with brain injury, it may be advisable that protocols to specify that non-hypoglycemic suspected stroke patients SHOULD NOT receive dextrose containing fluids.

**Transport to Appropriate Facility**

In order to give suspected stroke patients the best chance at an optimal outcome, it is very important for those patients who meet certain criteria to reach the appropriate emergency facility as quickly as possible. It would be ideal if every suspected stroke patient could be transported directly to a primary stroke center (PSC). However this is not feasible due to the limited number of PSC’s, as well as the many geographical and demographic challenges associated with providing EMS in a rural state.

**Tele-neurology**

Fortunately however, in Arkansas there are numerous hospitals with continuous “telestroke” coverage. Telestroke coverage links participating emergency departments to specially trained vascular neurologists via live, two-way video. Telestroke hospitals are able to administer clot buster medications and qualify as Acute Stroke Ready Hospitals (ASRHs) as recommended by the Brain Attack Coalition. This means that even smaller, rural hospitals with ASRH (or ArSRH) capabilities should be considered appropriate destinations for suspected stroke patients when no PSC or more advanced stroke care facility is closer.

**Destination Protocols**

A variety of circumstances make it extremely difficult to develop a uniform, statewide “destination protocol” for suspected stroke emergencies. Each agency faces its own unique circumstance with regards to access to a stroke care facility. In absence of a statewide destination protocol, the ASCTF recommends that each EMS agency provide its field personnel with clear guidelines on suspected stroke patient destinations. Field providers should be familiar with the stroke treatment capability of each emergency facility located within the agency’s general region.

For suspected stroke patients who potentially meet criteria to receive Alteplase, the ASCTF recommends bypassing facilities with no advanced stroke capability, in favor of transport to an ASRH or ArSRH located within a reasonable distance. **Air-medical transport** should be considered for suspected stroke patients when such could significantly
reduce the time from onset to arrival at a facility with advanced stroke capabilities.

**Early Pre-Notification (“Stroke Alert”)**
Arkansas Department of Health, EMS Rules and Regulations require that EMS providers deliver a pre-arrival report to the receiving hospital for every emergent patient transport. The pre-arrival report may be given by radio, mobile phone, or by other means; and is normally given at least 5 to 10 minutes prior to the patient reaching the facility. For most patients this time is adequate for the facility to make preparations.

However, due to the time sensitive nature of the potential treatment for stroke patients, it is imperative that EMS providers understand that for patients exhibiting signs and symptoms of acute onset stroke, the receiving facility should be notified immediately. Transporting EMS providers should understand that facilities may need to recall stroke team members who are off site, or may need to insure the availability of a CT scanner prior to the patient’s arrival.

The early “Stroke Alert” or “CODE STROKE” activation should merely serve as a “heads up” and may include minimal information. Typically “CODE STROKE” alert information should be limited to the patient’s age and gender; an estimated time of arrival (ETA); and possibly a brief summary of the patient’s signs and symptoms. A detailed pre-arrival report should be given later as time permits.

**Ambulance to CT**
While potentially very effective in reducing death and disability in ischemic stroke patients, Alteplase can be lethal if administered to a patient suffering a brain hemorrhage. Therefore every suspected stroke patient must undergo a computerized tomography (CT) scan prior to receiving Alteplase therapy.

Because of this the ASCTF encourages EMS providers and emergency departments alike to make it a priority for “Stroke Alert” patients to be taken directly to the CT scanner by the transporting EMS staff. Joint EMS/ED “CODE STROKE” plans can help facilitate the transfer of stroke patients arriving by ambulance directly to CT. Much like hospital “Door to CT”, EMS to CT times can be a key quality improvement measurable in improving EMS stroke patient care.

**Summary**
Once again this publication is intended merely as a reference tool which highlights a few key elements that the ASCTF believes should be addressed in every EMS stroke patient care protocol. Of course there are other components that should be considered such as oxygen therapy, cardiac monitoring, and IV therapy. Again, Medical Directors are encouraged to refer to the most currently accepted research and evidence in order to develop an effective stroke care protocol.

For more information on developing pre-hospital stroke care protocols, or for information and assistance with implementing a “CODE STROKE” plan, contact:

Greg Johnson, NREMT-Paramedic
EMS QI Specialist, Arkansas Stroke Registry
1033 EMS Drive
Batesville, AR 72501
870-793-3351
gjohnson@vitallinkems.org

**AR Acute Stroke Care Task Force**
Appathurai Balamurugan, M.D.; Sanjeeya Onteddu, M.D.; T. Mac Bird, Ph.D; Greg Johnson, NREMT-Paramedic; Renee’ Crater; John Bowen; Deborah Gullett, RN; Julie Kettlewell, MPH, BSN, RNP; Rhonda Matteo, MD; Cygnet Schroeder, DO; Gale G. Scott; Margaret Tremwel, M.D., PhD

**References**
1. AHA, *Clot busters limit stroke damage despite age; stroke severity*, Jonathan Emberson, Ph.D., Feb 12, 2014
2. The New England Journal of Medicine; *Randomized Assessment of Endovascular Treatment of Ischemic Stroke*, M. Goyal, M.D., M.D. Hill, M.D.
3. AHA, *Target Stroke*
Suggested Information to be Provided to Primary Stroke Center/Comprehensive Stroke Center When Transferring a Stroke Patient

1) Date/time of report
2) Transferring physician’s name
3) Patient name
4) Patient age
5) Family contact information
   a. Contact name
   b. Contact phone number (preferably cellular)
6) Code status of patient: (dnr/dni?)
7) Time of stroke onset (or last known well time)
8) Brief history
9) Brief past medical history
10) Brief physical exam
11) Brief course in Emergency Department
12) NIH stroke scale
   a. On arrival (time)
   b. Prior to transfer (time)
13) Measured current weight
14) Vital signs (BP, HR, R, T, SaO2)
   a. Initial
   b. Prior to transfer
15) Initial blood sugar measurement
16) Brief summary of treatment in ED (i.e., BP management, medications given, any procedures performed
17) Was Alteplase given?
   a. Dose and time of Alteplase bolus
   b. Dose and time of Alteplase drip completion
18) Attach lab results and ECG
19) Attach CT report and CT images on disk
A. **Inclusion Criteria**

These are from recent American Heart Association/American Stroke Association guidelines statement. Note: Patients outside treatment window for Alteplase therapy may still be eligible for endovascular therapy; refer to Appendix G: AHA 2015 Endovascular Therapy Guidelines.

Inclusion criteria
- Diagnosis of ischemic stroke causing measurable neurological deficit
- Onset of symptoms <3 hour before treatment begins
- Age ≥18 years
Inclusion and Exclusion Criteria for Alteplase (Continued)

Appendix C

B. Exclusion Criteria

- Significant head trauma or prior stroke in the previous 3 mo
- Symptoms suggest SAH
- Arterial puncture at noncompressible site in previous 7 d
- History of previous intracranial hemorrhage
- Intracranial neoplasm, AVM, or aneurysm
- Recent intracranial or intraspinal surgery
- Elevated blood pressure (systolic >185 mm Hg or diastolic >110 mm Hg)
- Active internal bleeding
- Acute bleeding diathesis, including but not limited to
  - Platelet count <100 000/mm³
  - Heparin received within 48 h resulting in abnormally elevated aPTT above the upper limit of normal
  - Current use of anticoagulant with INR >1.7 or PT >15 s
  - Current use of direct thrombin inhibitors or direct factor Xa inhibitors with elevated sensitive laboratory tests (eg, aPTT, INR, platelet count, ECT, TT, or appropriate factor Xa activity assays)
- Blood glucose concentration <50 mg/dL (2.7 mmol/L)
- CT demonstrates multilobar infarction (hypodensity >1/3 cerebral hemisphere)

Relative exclusion criteria

Recent experience suggests that under some circumstances, with careful consideration and weighting of risk to benefit, patients may receive fibrinolytic therapy despite ≥1 relative contraindications. Consider risk to benefit of intravenous rtPA administration carefully if any of these relative contraindications is present:

- Only minor or rapidly improving stroke symptoms (clearing spontaneously)
- Pregnancy
- Seizure at onset with postictal residual neurological impairments
- Major surgery or serious trauma within previous 14 d
- Recent gastrointestinal or urinary tract hemorrhage (within previous 21 d)
- Recent acute myocardial infarction (within previous 3 mo)

Notes

The checklist includes some FDA-approved indications and contraindications for administration of intravenous rtPA for acute ischemic stroke. Recent guideline revisions have modified the original FDA-approved indications. A physician with expertise in acute stroke care may modify this list. In patients without recent use of OACs or heparin, treatment with intravenous rtPA can be initiated before availability of coagulation test results but should be discontinued if INR is >1.7 or PT is abnormally elevated by local laboratory standards. In patients without a history of thrombocytopenia, treatment with intravenous rtPA can be initiated before availability of platelet count but should be discontinued if platelet count is <100000/mm³
Additional exclusion Criteria for Patients With Ischemic Stroke Who Could Be Treated With Intravenous rtPA Between 3-4.5 Hours From Symptom Onset

- Patients >80 years old.
- Those taking oral anticoagulants (OACs) regardless of international normalized ratio (INR)
- Those with a base-line NIHSS score >25, those with imaging evidence of ischemic injury involving more than one third of the middle cerebral artery (MCA) territory, or those with a history of both stroke and diabetes mellitus.

In a large study conducted by the National Institute of Neurological Diseases and Stroke (NINDS Stroke Study), selected patients with stroke were treated with Alteplase or placebo (an inactive substance) by random (chance) assignment within 3 hours of symptom onset. This study showed at least 11 out of 100 patients treated with Alteplase as compared to those receiving placebo had minimal or no disability at 3 months after treatment.

Within the first 36 hours after stroke onset, 6.4% of patients who received Alteplase as compared to 0.6% of patients who received placebo had bleeding in the brain that resulted in worsening of the stroke. Despite this difference in hemorrhage, there was no significant difference in the number of patients among those who died who were treated with Alteplase (17%) and those treated with placebo (21%). Patients treated with Alteplase who had a very severe stroke or were of advanced age (>77 years old) tended to have more symptomatic bleeding. Note: current studies show that with better control of hypertension and other medical factors there are much lower bleeding rates, especially for patients under age 60.

Based on the results of the NINDS study, Alteplase has been approved by the FDA for use in selected stroke patients provided it can be given within 3 hours of stroke onset.

In addition to obtaining informed consent from your patient, patients receiving Alteplase must be admitted to an intensive care unit for at least 24 hours to be observed for any complications related to Alteplase treatment and undergo a CT scan of the head prior to treatment to determine the presence of bleeding within the brain. Follow-up CT scans may be done to determine bleeding complications within the brain.

Alteplase dissolves blood clots, regardless of their location in the body. Therefore, its most frequent side effect is bleeding. Minor bruising and bleeding of blood vessel sites that have been punctured is not uncommon and is generally easily controlled. Occasionally bleeding may be severe enough to require blood transfusions. There is also a risk of serious internal bleeding, which is more difficult to control. Bleeding in the brain may cause stroke. With Alteplase treatment, there is a risk of bleeding in the brain (stroke), which can lead to permanent disability or death. Even without treatment with Alteplase, stroke patients have a risk of bleeding in the brain.

Other side effects that may occur with Alteplase are nausea and/or vomiting, low blood pressure, and fever. These have been reported in patients receiving Alteplase for treatment of a heart attack and may have been related to the heart attack rather than the medication.

Angioedema (with swelling of the airway) or other serious allergic reactions may also occur, particularly in patients who take ACE inhibitors.

Some pregnant patients have received Alteplase without complications. However, little is known regarding potential harm to the fetus from Alteplase.
Alteplase Dose Calculation for Treatment of Acute Stroke

NOTE: DO NOT SUBSTITUTE ANY OTHER THROMBOLYTICS FOR ALTEPLASE OR USE ANY OTHER DOSING CRITERIA WHEN ADMINISTERING ALTEPLASE THERAPY FOR STROKE.

Total Dose = 0.9 mg/kg x weight in kg

Give 10% of Total Dose as IV bolus over 1 minute

Give remaining 90% of Total Dose over 1 hour via IV infusion pump

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<td>19.0</td>
<td>8.1</td>
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<td>200</td>
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<td>18.2</td>
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<td>82.6</td>
<td>17.4</td>
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<td>16.6</td>
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<td>84.2</td>
<td>15.8</td>
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<td>86.0</td>
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<td></td>
<td>66.4</td>
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<td></td>
<td>6.0</td>
<td>6.1</td>
<td>6.1</td>
<td>6.2</td>
<td>6.3</td>
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<tr>
<td></td>
<td>53.8</td>
<td>54.5</td>
<td>55.3</td>
<td>56.0</td>
<td>56.7</td>
</tr>
</tbody>
</table>
Preparation of Alteplase for Acute Ischemic Stroke

Ensure you are using Alteplase – no other thrombolytics are approved in stroke! RECONSTITUTING

Alteplase

a. Activase® is supplied as a powder for reconstitution in a 100 mg vial and is accompanied by a vial of 100 mL of Sterile Water for Injection.*

b. Using aseptic technique, pierce the vial of Sterile Water with the provided transfer device. DO NOT invert the vial of Sterile Water. Holding the vial of Activase® powder upside down, place the center of the stopper over the exposed piercing pin and insert.

c. Now invert the two vials allowing the Sterile Water to flow into the Activase® vial. (May take a couple of minutes.) DO NOT shake; gently swirl only. DO NOT HANG AND INFUSE THE ENTIRE VIAL! Vial contains 100 mg (1 mg/mL) when reconstituted.

*Note: Activase® is also supplied as a powder for reconstitution in a 50 mg vial and is accompanied by a vial of 50 mL of Sterile Water for Injection. The 100mg/mL kit is strongly recommended.

PREPARING BOLUS AND INFUSION

a. Refer to the dosing chart to determine the correct bolus and infusion doses of Alteplase needed based on the patient’s weight.

b. Draw out the exact amount for the **10% bolus** from the Activase® vial into a 10mL syringe. This will be given over 1 minute by peripheral I.V.

c. Withdraw the exact amount for the **infusion** from the vial and put it in an empty IV bag. This will be given over 60 minutes immediately following the bolus dose.

**OR**

For those who prefer to use the Activase® vial instead of an IV bag for infusion, the following procedure may be used:

Draw out the volume that will **NOT** be used from the Activase® vial so that only the exact amount needed for **infusion** is remaining in the vial. **Be sure to label the vial with the correct dose.** This will be given over 60 minutes, immediately following the bolus dose.

d. Document the time the bolus was given and the time the infusion pump was started.

AFTER INFUSION ENDS

When the vial is empty, remove vial from tubing and place 50cc bag of NS then allow the pump to run at same rate for at least 15-30 minutes.

Return any un-used reconstituted medication in the vial to the pharmacy so that they can return the product to Genentech for reimbursement.
RECOMMENDATIONS

Endovascular Interventions

1. Patients eligible for intravenous r-tPA should receive intravenous r-tPA even if endovascular treatments are being considered (*Class I; Level of Evidence A*). (Unchanged from the 2013 guideline)

2. Patients should receive endovascular therapy with a stent retriever if they meet all the following criteria (*Class I; Level of Evidence A*). (New recommendation):
   
   (a) prestroke mRS score 0 to 1,
   
   (b) acute ischemic stroke receiving intravenous r-tPA within 4.5 hours of onset according to guidelines from professional medical societies,
   
   (c) causative occlusion of the internal carotid artery or proximal MCA (M1),
   
   (d) age ≥18 years,
   
   (e) NIHSS score of ≥6,
   
   (f) ASPECTS of ≥6, and
   
   (g) treatment can be initiated (groin puncture) within 6 hours of symptom onset

3. As with intravenous r-tPA, reduced time from symptom onset to reperfusion with endovascular therapies is highly associated with better clinical outcomes. To ensure benefit, reperfusion to TICI grade 2b/3 should be achieved as early as possible and within 6 hours of stroke onset (*Class I; Level of Evidence B-R*). (Revised from the 2013 guideline)

4. When treatment is initiated beyond 6 hours from symptom onset, the effectiveness of endovascular therapy is uncertain for patients with acute ischemic stroke who have causative occlusion of the internal carotid artery or proximal MCA (M1) (*Class IIb; Level of Evidence C*). Additional randomized trial data are needed. (New recommendation)
5. In carefully selected patients with anterior circulation occlusion who have contraindications to intravenous r-tPA, endovascular therapy with stent retrievers completed within 6 hours of stroke onset is reasonable \((Class \ IIa; \ Level \ of \ Evidence \ C).\) There are inadequate data available at this time to determine the clinical efficacy of endovascular therapy with stent retrievers for those patients whose contraindications are time-based or nontime based (eg, prior stroke, serious head trauma, hemorrhagic coagulopathy, or receiving anticoagulant medications). (New recommendation)

6. Although the benefits are uncertain, use of endovascular therapy with stent retrievers may be reasonable for carefully selected patients with acute ischemic stroke in whom treatment can be initiated (groin puncture) within 6 hours of symptom onset and who have causative occlusion of the M2 or M3 portion of the MCAs, anterior cerebral arteries, vertebral arteries, basilar artery, or posterior cerebral arteries \((Class \ IIb; \ Level \ of \ Evidence \ C).\) (New recommendation)

7. Endovascular therapy with stent retrievers may be reasonable for some patients <18 years of age with acute ischemic stroke who have demonstrated large vessel occlusion in whom treatment can be initiated (groin puncture) within 6 hours of symptom onset, but the benefits are not established in this age group \((Class \ IIb; \ Level \ of \ Evidence \ C).\) (New recommendation)

8. Although the benefits are uncertain, use of endovascular therapy with stent retrievers may be reasonable for patients with acute ischemic stroke in whom treatment can be initiated (groin puncture) within 6 hours of symptom onset and who have prestroke mRS score of >1, ASPECTS <6, or NIHSS score <6 and causative occlusion of the internal carotid
artery or proximal MCA (M1) \textit{(Class IIb; Level of Evidence B-R)}. Additional randomized trial data are needed. (New recommendation)

9. Observing patients after intravenous r-tPA to assess for clinical response before pursuing endovascular therapy is not required to achieve beneficial outcomes and is not recommended. \textit{(Class III; Level of Evidence B-R)}. (New recommendation)

10. Use of stent retrievers is indicated in preference to the MERCI device. \textit{(Class I; Level of Evidence A)}. The use of mechanical thrombectomy devices other than stent retrievers may be reasonable in some circumstances \textit{(Class IIb, Level B-NR)}. (New recommendation)

11. The use of proximal balloon guide catheter or a large bore distal access catheter rather than a cervical guide catheter alone in conjunction with stent retrievers may be beneficial \textit{(Class IIa; Level of Evidence C)}. Future studies should examine which systems provide the highest recanalization rates with the lowest risk for nontarget embolization. (New recommendation)

12. The technical goal of the thrombectomy procedure should be a TICI 2b/3 angiographic result to maximize the probability of a good functional clinical outcome \textit{(Class I; Level of Evidence A)}. Use of salvage technical adjuncts including intra-arterial fibrinolysis may be reasonable to achieve these angiographic results, if completed within 6 hours of symptom onset \textit{(Class IIb; Level of Evidence B-R)}. (New recommendation)

13. Angioplasty and stenting of proximal cervical atherosclerotic stenosis or complete occlusion at the time of thrombectomy may be considered but the usefulness is unknown \textit{(Class IIb; Level of Evidence C)}. Future randomized studies are needed.

14. Initial treatment with intra-arterial fibrinolysis is beneficial for carefully selected patients with major ischemic strokes of <6 hours’ duration caused by occlusions of the MCA \textit{(Class}
1. Level of Evidence B-R). However, these data derive from clinical trials that no longer reflect current practice, including use of fibrinolytic drugs that are not available. A clinically beneficial dose of intra-arterial r-tPA is not established, and r-tPA does not have FDA approval for intra-arterial use. As a consequence, endovascular therapy with stent retrievers is recommended over intra-arterial fibrinolysis as first-line therapy (Class I; Level of Evidence E). (Revised from the 2013 guideline)

15. Intra-arterial fibrinolysis initiated within 6 hours of stroke onset in carefully selected patients who have contraindications to the use of intravenous r-tPA might be considered, but the consequences are unknown (Class IIb; Level of Evidence C). (Revised from 2013 guideline)

16. It might be reasonable to favor conscious sedation over general anesthesia during endovascular therapy for acute ischemic stroke. However, the ultimate selection of anesthetic technique during endovascular therapy for acute ischemic stroke should be individualized based on patient risk factors, tolerance of the procedure, and other clinical characteristics. Randomized trial data are needed (Class IIb; Level of Evidence C). (New recommendation)

**Imaging**

1. Emergency imaging of the brain is recommended before initiating any specific treatment for acute stroke (Class I; Level of Evidence A). In most instances, nonenhanced CT will provide the necessary information to make decisions about emergency management. (Unchanged from the 2013 guideline)
2. If endovascular therapy is contemplated, a noninvasive intracranial vascular study is strongly recommended during the initial imaging evaluation of the acute stroke patient but should not delay intravenous r-tPA if indicated. For patients who qualify for intravenous r-tPA according to guidelines from professional medical societies, initiating intravenous r-tPA before noninvasive vascular imaging is recommended for patients who have not had noninvasive vascular imaging as part of their initial imaging assessment for stroke. Noninvasive intracranial vascular imaging should then be obtained as quickly as possible (Class I; Level of Evidence A). (New recommendation)

3. The benefits of additional imaging beyond CT and CTA or MR and MRA, such as CT perfusion or diffusion- and perfusion-weighted imaging, for selecting patients for endovascular therapy are unknown (Class IIb; Level of Evidence C). Further randomized, controlled trials may be helpful to determine whether advanced imaging paradigms employing CT perfusion, CTA, and MRI perfusion and diffusion imaging, including measures of infarct core, collateral flow status, and penumbra, are beneficial for selecting patients for acute reperfusion therapy who are within 6 hours of symptom onset and have an ASPECTS <6. Further randomized, controlled trials should be done to determine whether advanced imaging paradigms using CT perfusion and MRI perfusion, CTA, and diffusion imaging, including measures of infarct core, collateral flow status, and penumbra, are beneficial for selecting patients for acute reperfusion therapy who are beyond 6 hours from symptom onset. (New recommendation)
Systems of Stroke Care

1. Patients should be transported rapidly to the closest available certified primary stroke center or comprehensive stroke center or, if no such centers exist, the most appropriate institution that provides emergency stroke care as described in the 2013 guidelines (Class I; Level of Evidence A). In some instances, this may involve air medical transport and hospital bypass. (Unchanged from the 2013 guideline)

2. Regional systems of stroke care should be developed. These should consist of consisting of:

   (a) Healthcare facilities that provide initial emergency care including administration of intravenous r-tPA, including primary stroke centers, comprehensive stroke centers, and other facilities.

   (b) Centers capable of performing endovascular stroke treatment with comprehensive periprocedural care, including comprehensive stroke centers and other healthcare facilities, to which rapid transport can be arranged when appropriate (Class I; Level of Evidence A). (Revised from the 2013 guideline)

3. It may be useful for primary stroke centers and other healthcare facilities that provide initial emergency care including administration of intravenous r-tPA to develop the capability of performing emergency noninvasive intracranial vascular imaging to most appropriately select patients for transfer for endovascular intervention and reduce time to endovascular treatment (Class IIb; Level of Evidence C). (Revised from the 2013 guideline)

4. Endovascular therapy requires the patient to be at an experienced stroke center with rapid access to cerebral angiography and qualified neurointerventionalists. Systems should be designed, executed and monitored to emphasize expeditious assessment and treatment.
Outcomes on all patients should be tracked. Facilities are encouraged to define criteria that can be used to credential individuals who can perform safe and timely intra-arterial revascularization procedures (Class I; Level of Evidence E). (Revised from the 2013 guideline)

Reference:

### Blood Pressure Guidelines Pre- and Post-Alteplase Treatment

Adhere to the following BP guidelines from AHA/ASA both pre- and post-Alteplase:

Table 3. Blood Pressure Management in Patients With Stroke*

<table>
<thead>
<tr>
<th>Blood Pressure</th>
<th>Treatment</th>
</tr>
</thead>
<tbody>
<tr>
<td>Pretreatment:</td>
<td>Labetalol 10-20 mg IVP repeated every 10-20 minutes</td>
</tr>
</tbody>
</table>

Candidates for fibrinolysis

<table>
<thead>
<tr>
<th>Blood Pressure</th>
<th>Treatment</th>
</tr>
</thead>
<tbody>
<tr>
<td>SBP &gt;185 or DBP &gt;110 mm Hg</td>
<td>Nicardipine 5 mg/h, titrate by 2.5 mg/h every 5-15 min, maximum 15 mg/h; when desired blood pressure reached, lower to 3 mg/h or</td>
</tr>
<tr>
<td></td>
<td>Enalapril 1.25 mg IVP</td>
</tr>
<tr>
<td></td>
<td>Sodium nitroprusside (0.5 mcg/kg/min)</td>
</tr>
</tbody>
</table>

Posttreatment:

<table>
<thead>
<tr>
<th>Blood Pressure</th>
<th>Treatment</th>
</tr>
</thead>
<tbody>
<tr>
<td>DBP &gt;140 mm Hg</td>
<td>Labetalol 10-20 mg IVP and consider labetalol infusion at 1-2 mg/min or nicardipine 5 mg/h IV infusion and titrate</td>
</tr>
<tr>
<td>SBP &gt;230 mm Hg</td>
<td>Nicardipine 5 mg/h, titrate by 2.5 mg/h every 5-15 min, maximum 15 mg/h; when desired blood pressure reached, lower to 3 mg/h or</td>
</tr>
<tr>
<td>DBP 121-140 mm Hg</td>
<td>Nicardipine 5 mg/h, titrate by 2.5 mg/h every 5-15 min, maximum 15 mg/h; when desired blood pressure reached, lower to 3 mg/h or</td>
</tr>
<tr>
<td>SBP 180-230 mm Hg or DBP 105-120 mm Hg</td>
<td>Labetalol 10 mg IVP, may repeat and double every 10 min up to maximum dose of 300 mg</td>
</tr>
</tbody>
</table>
DBP >140 mm Hg  
Sodium nitroprusside 0.5 mcg/kg/min; may reduce approximately 10-20%

SBP >220 or  
Labetalol 10-20 mg IVP over 1-2 min; may repeat and double every 10 min up to maximum dose of 150 mg or nicardipine 5 mg/h IV infusion and titrate

DBP 121-140 mm Hg or

MAP >130 mm Hg or

**Noncandidates for fibrinolysis**

SBP < 220 mm Hg or  
Nicardipine 5 mg/h, titrate by 2.5 mg/h every 5-15 min, maximum 15 mg/h; when desired blood pressure reached, lower to 3 mg/h

DBP 105-120 mm Hg or

MAP < 130 mm Hg

Antihypertensive therapy indicated only if acute myocardial infarction, aortic dissection, severe CHF, or hypertensive encephalopathy present

*Adapted from 2005 Advanced Cardiac Life Support (ACLS) guidelines and 2007 American Stroke Association Scientific Statement

Abbreviations: SBP - systolic blood pressure; DBP - diastolic blood pressure; IVP - IV push; MAP - mean arterial pressure
Algorithm for Management of Suspected ICH

Appendix I

*Symptoms such as neurological deterioration, new headache, acute hypertension, nausea, vomiting
Administer stroke scale items in the order listed. Record performance in each category after each exam. Follow directions provided for each exam technique.

**DATE:______________ TIME:______________**

<table>
<thead>
<tr>
<th>INSTRUCTIONS</th>
<th>SCALE DEFINITION</th>
<th>SCORE</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>1a. Level of Consciousness (LOC):</strong> The physician must choose a response even if a full evaluation is prevented by such obstacles as an endotracheal tube, language barrier or orotracheal trauma/bandages. A 3 is scored only if the patient makes no movement (other than reflexive posturing) in response to noxious stimulation.</td>
<td>0 = Alert; keenly responsive.</td>
<td></td>
</tr>
<tr>
<td>1 = Not alert, but arousable by minor stimulation to obey, answer, or respond.</td>
<td>1 = Not alert, but arousable by minor stimulation to obey, answer, or respond.</td>
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</tr>
<tr>
<td>2 = Not alert, requires repeated stimulation to attend, or is obtunded and requires strong or painful stimulation to make movements (not stereotyped).</td>
<td>2 = Not alert, requires repeated stimulation to attend, or is obtunded and requires strong or painful stimulation to make movements (not stereotyped).</td>
<td></td>
</tr>
<tr>
<td>3 = Responds only with reflex motor or autonomic effects or totally unresponsive, flaccid, areflexic.</td>
<td>3 = Responds only with reflex motor or autonomic effects or totally unresponsive, flaccid, areflexic.</td>
<td></td>
</tr>
<tr>
<td><strong>1b. LOC Questions:</strong> The patient is asked the month and his/her age. The answer must be correct - there is no partial credit for being close. Aphasic and stuporous patients who do not comprehend the questions will score 2. Patients unable to speak because of endotracheal intubation, orotracheal trauma, severe dysarthria from any cause, language barrier or any other problem not secondary to aphasia are given a 1. It is important that only the initial answer be graded and that the examiner not help the patient with verbal or non-verbal cues.</td>
<td>0 = Answers both questions correctly.</td>
<td></td>
</tr>
<tr>
<td>1 = Answers one question correctly.</td>
<td>1 = Answers one question correctly.</td>
<td></td>
</tr>
<tr>
<td>2 = Answers neither question correctly.</td>
<td>2 = Answers neither question correctly.</td>
<td></td>
</tr>
<tr>
<td><strong>1c. LOC Commands:</strong> The patient is asked to open and close the eyes and then to grip and release the non-paretic hand. Substitute another one step command if the hands cannot be used. Credit is given if an unequivocal attempt is made but not completed due to weakness. If the patient does not respond to command the task should be demonstrated to them (PANTOMIME) and score the result (i.e., follows none, one or two commands). Patients with trauma, amputation, or other physical impediments should be given suitable one-step commands. Only the first attempt is scored.</td>
<td>0 = Performs both tasks correctly.</td>
<td></td>
</tr>
<tr>
<td>1 = Performs one task correctly.</td>
<td>1 = Performs one task correctly.</td>
<td></td>
</tr>
<tr>
<td>2 = Performs neither task correctly.</td>
<td>2 = Performs neither task correctly.</td>
<td></td>
</tr>
<tr>
<td><strong>2. Best Gaze:</strong> Only horizontal eye movements will be tested. Voluntary or reflexive (oculocephalic) eye movements will be scored but caloric testing is not done. If the patient has a conjugate deviation of the eyes that can be overcome by voluntary or reflexive activity the score will be 1. If a patient has an isolated peripheral nerve paresis (CN III, IV or VI) score a 1. Gaze is testable in all aphasic patients. Patients with ocular trauma, bandages, pre-existing blindness or other disorder of visual acuity or fields should be tested with reflexive movements and a choice made by the physician. Establishing eye contact and then moving about the patient from side to side will occasionally clarify the presence of a partial gaze palsy.</td>
<td>0 = Normal.</td>
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</tr>
<tr>
<td>1 = Partial gaze palsy. This score is given when gaze is abnormal in one or both eyes, but where forced deviation or total gaze paresis are not present.</td>
<td>1 = Partial gaze palsy. This score is given when gaze is abnormal in one or both eyes, but where forced deviation or total gaze paresis are not present.</td>
<td></td>
</tr>
<tr>
<td>2 = Forced deviation, or total gaze paresis not overcome by the oculocephalic maneuver.</td>
<td>2 = Forced deviation, or total gaze paresis not overcome by the oculocephalic maneuver.</td>
<td></td>
</tr>
<tr>
<td>INSTRUCTIONS</td>
<td>SCALE DEFINITION</td>
<td>SCORE</td>
</tr>
<tr>
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<tr>
<td><strong>3. Visual</strong>: Visual fields are tested by confrontation, using finger counting or visual threat as appropriate. Patient must be encouraged, but if they look at the side of the moving fingers appropriately, this can be scored as normal. If there is unilateral blindness or enucleation, visual fields in the remaining eye are scored. Score only if a clear-cut asymmetry, including quadrantanopia, is found. If patient is blind from any cause score 3. Double simultaneous stimulation is performed at this point. If there is extinction patient receives a 1 and the results are used to answer question 1.</td>
<td>0 = No visual loss. &lt;br&gt; 1 = Partial hemianopia. &lt;br&gt; 2 = Complete hemianopia. &lt;br&gt; 3 = Bilateral hemianopia (blind including cortical blindness).</td>
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<tr>
<td><strong>4. Facial Palsy</strong>: Ask or use pantomime to encourage the patient to show teeth or smile and close eyes. Score symmetry of grimace in response to noxious stimuli in the poorly responsive or non-comprehending patient. If facial trauma/bandages, orotracheal tube, tape or other physical barrier obscures the face, these should be removed to the extent possible.</td>
<td>0 = Normal symmetrical movement. &lt;br&gt; 1 = Minor paralysis (flattened nasolabial fold, asymmetry on smiling). &lt;br&gt; 2 = Partial paralysis (total or near total paralysis of lower face). &lt;br&gt; 3 = Complete paralysis with absence of facial movement in the upper and lower face).</td>
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</tr>
<tr>
<td><strong>5. Motor Arm</strong>: Extend the arms 90 degrees (if sitting) or 45 degrees (if supine). Drift is scored if the arm falls before 10 seconds. The aphasic patient is encouraged using urgency in the voice and pantomime but not noxious stimulation. Each limb is tested in turn, beginning with the non-paretic arm. Score each limb separately.</td>
<td>0 = No drift. Limb holds 90 (or 45) degrees for full 10 seconds. &lt;br&gt; 1 = Drift. Limb holds 90 (or 45) degrees, but drifts down before full 10 seconds; does not hit bed or other support. &lt;br&gt; 2 = Some effort against gravity, limb cannot get to or maintain (if cued) 90 (or 45) degrees, drifts down to bed but has some effort against gravity. &lt;br&gt; 3 = No effort against gravity, limb falls. &lt;br&gt; 4 = No movement</td>
<td></td>
</tr>
</tbody>
</table>

**5a. LEFT ARM**

**5b. RIGHT ARM**
The National Institutes of Health Stroke Scale (NIHSS) cont.

<table>
<thead>
<tr>
<th>INSTRUCTIONS</th>
<th>SCALE DEFINITION</th>
<th>SCORE</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>6. Motor Leg:</strong> Extend the leg 30 degrees (always tested with patient supine). Drift is scored if the leg falls before 5 seconds. The aphasic patient is encouraged using urgency in the voice and pantomime but not noxious stimulation. Each limb is tested in turn, beginning with the non-paretic arm. Score each limb separately.</td>
<td>0 = No drift. Limb holds 30 degrees for full 5 seconds. 1 = Drift. Limb holds 30 degrees, but drifts down before full 5 seconds; does not hit bed or other support. 2 = Some effort against gravity, limb cannot get to or maintain (if cued) 30 degrees, drifts down to bed but has some effort against gravity. 3 = No effort against gravity, limb falls. 4 = No movement</td>
<td>6a. LEFT LEG 6b. RIGHT LEG</td>
</tr>
</tbody>
</table>

| **7. Limb Ataxia:** This item is aimed at finding evidence of a unilateral cerebellar lesion. Test with eyes Open. In case of visual defect, insure testing is done in intact visual field. The finger-nose-finger and heel-shin tests are performed on both sides and ataxia is scored only if present out of proportion to weakness. Ataxia is absent in the patient who cannot understand or is hemiplegic. | 0 = Absent. 1 = Present in one limb. 2 = Present in two limbs. | |

<p>| <strong>8. Sensory:</strong> Sensation or grimace to pinprick when tested, or withdrawal from noxious stimulus in the obtunded or aphasic patient. Only sensory loss attributed to stroke is scored as abnormal and the examiner should test as many body areas (limbs, trunk, face) as needed to accurately check for hemisensory loss. A score of 2, “severe or total”, should only be given when a severe or total loss of sensation can be clearly demonstrated. Stuporous and aphasic patients will therefore probably score 1 or 0. The patient with a brainstem stroke who has bilateral loss of sensation is scored 2. If the patient does not respond and is quadriplegic score 2. Patients in coma (item 1a = 3) are arbitrarily given a 2 on this item. | 0 = Normal; no sensory loss. 1 = Mild to moderate sensory loss; patient feels pinprick is less sharp or is dull on the affected side; or there is a loss of superficial pain with pinprick but patient is aware he/she is being touched. 2 = Severe total sensory loss; patient is not aware of being touched in the face, arm, and leg. | |</p>
<table>
<thead>
<tr>
<th>INSTRUCTIONS</th>
<th>SCALE DEFINITION</th>
<th>SCORE</th>
</tr>
</thead>
<tbody>
<tr>
<td>9. <strong>Best Language</strong>: A great deal of information about comprehension will be obtained during the preceding sections of the examination. The patient is asked to describe the attached picture, to name the items on the attached naming sheet, and to read from the attached list of sentences. Comprehension is judged from responses here as well as to all of the commands in the preceding general neurological exam. If visual loss interferes with the tests, ask the patient to identify objects placed in the hand, repeat, and produce speech. The intubated patient should be asked to write. The patient in coma (question 1 a - 3) will arbitrarily score 3 on this item. The examiner must choose a score in the patient with stupor or limited cooperation, but a score of 3 should be used only if the patient is mute and follows no one-step commands.</td>
<td>0 = No aphasia, normal. 1 = Mild to moderate aphasia; some obvious loss of fluency or facility of comprehension without significant limitation on ideas expressed or form of expression. Reduction of speech and/or comprehension, however, makes conversation about provided material difficult or impossible. For example, in conversation about provided materials, examiner can identify picture or naming card from patient’s response. 2 = Severe aphasia; all communication is through fragmentary expression; great need for inference. Questioning and guessing by the listener. Range of information that can be exchanged is limited; listener carries burden of communication. Examiner cannot identify materials provided from patient’s response. 3 = Mute, global aphasia; no usable speech or auditory comprehension.</td>
<td></td>
</tr>
<tr>
<td>10. <strong>Dysarthria</strong>: If patient is thought to be normal, an adequate sample of speech must be obtained by asking patient to read or repeat words from the attached list. If the patient has severe aphasia, the clarity of articulation of spontaneous speech can be rated.</td>
<td>0 = Normal. 1 = Mild to Moderate: patient slurs at least some words and, at worst, can be understood with some difficulty 2 = Severe: patient’s speech is so slurred as to be unintelligible in the absence of, or out of proportion to, any dysphasia, or is patient mute/anarthric</td>
<td></td>
</tr>
<tr>
<td>11. <strong>Extinction and Inattention (formerly Neglect)</strong>: Sufficient information to identify neglect may be obtained during the prior testing. If the patient has a severe visual loss preventing visual double simultaneous stimulation, and the cutaneous stimuli are normal, the score is normal. If the patient has aphasia but does appear to attend to both sides, the score is normal. The presence of visual or spatial neglect or anosognosia may also be taken as evidence of abnormality. Since the abnormality is scored only if present, the item is never untestable.</td>
<td>0 = No abnormality. 1 = Visual, tactile, auditory, spatial or personal inattention. Extinction to bilateral simultaneous stimulation in one of the three sensory modalities. 2 = Profound hemi-inattention or hemi-inattention to more than one modality. Does not recognize own hand or orients to only one side of space.</td>
<td></td>
</tr>
</tbody>
</table>

**TOTAL SCORE**

**INITIALS OF MD/RN PERFORMING NIHSS**
Pictures to Name for Aphasia Testing (Q9)
The National Institutes of Health Stroke Scale (NIHSS) cont.

Picture to Describe for Aphasia Testing (Q9) and Visual Field Assessment (Qs 3 and 11)
You know how.

Down to earth.

I got home from work.

Near the table in the dining room.

They heard him speak on the radio last night.
Words to speak for Dysarthria (Q10)

- MAMA
- TIP - TOP
- FIFTY - FIFTY
- THANKS
- HUCKLEBERRY
- BASEBALL PLAYER
Note the following suggested Target intervals for a Telestroke Consultation:

### TABLE 3. Suggested Target Intervals
(From Emergency Department Arrival to Activity) for a Telestroke Consultation

<table>
<thead>
<tr>
<th>Activity</th>
<th>Time (min)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Emergency department arrival</td>
<td>0</td>
</tr>
<tr>
<td>Triage nurse assessment</td>
<td>5</td>
</tr>
<tr>
<td>Emergency physician assessment</td>
<td>10</td>
</tr>
<tr>
<td>Laboratory tests and CT of head ordered</td>
<td>15</td>
</tr>
<tr>
<td>Laboratory tests and CT of head conducted</td>
<td>25</td>
</tr>
<tr>
<td>Telestroke hotline activated by spoke hospital</td>
<td>30</td>
</tr>
<tr>
<td>Preliminary telephone communication between hub and spoke hospitals</td>
<td>35</td>
</tr>
<tr>
<td>2-Way audiovisual telestroke consultation commences</td>
<td>40</td>
</tr>
<tr>
<td>Teleradiology review of head CT</td>
<td>45</td>
</tr>
<tr>
<td>Diagnosis of stroke established and eligibility for short-term treatment determined</td>
<td>55</td>
</tr>
<tr>
<td>Treatments recommended and administered</td>
<td>60</td>
</tr>
<tr>
<td>Admission or transfer arranged, marking end of telestroke consultation</td>
<td>65</td>
</tr>
<tr>
<td>Consultation note dictated by hub hospital neurologist</td>
<td>75</td>
</tr>
<tr>
<td>Consultation note transcribed and transmitted to spoke hospital</td>
<td>120</td>
</tr>
</tbody>
</table>

*CT = computed tomography.

Mercy Code Stroke EMS Protocol

Appendix L

<table>
<thead>
<tr>
<th>Patient Name</th>
<th>Date</th>
</tr>
</thead>
<tbody>
<tr>
<td>__________________________</td>
<td>____________________</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Information Gathered From</th>
<th>Time</th>
</tr>
</thead>
<tbody>
<tr>
<td>__________________________</td>
<td>____________________</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Paramedic</th>
<th>Run#</th>
</tr>
</thead>
<tbody>
<tr>
<td>__________________________</td>
<td>____________________</td>
</tr>
</tbody>
</table>

| Last Known Well Date/Time | |
|---------------------------| | |
| __________________________ | ____________________ |

### Contraindications

1. Patient and/or family refusal
2. Have symptoms of Subarachnoid Hemorrhage (worst headache of life, stiff neck, blown pupil)
3. BP 185/110 not responding to treatment
4. Symptoms are minor or rapidly improving
5. History of stroke, head trauma, intracranial, spinal surgery, or other major surgery or vascular surgery
6. Anticoagulation treatment (coumadin, pradaxa, heparin, lovenox, or other bleeding risks.
7. Recent bleeding history
8. Blood Sugar <50mg/dl or >400mg/dl

### BP/GLUCOSE Protocol

1. **Labetalol injection 10 mg, IV**
   - Administer dose if systolic BP greater than 180 or diastolic BP greater than 110.
   - Hold if HR less than 55 and call physician for further orders.
   - If patient does not reach systolic BP goal after receiving 2 doses of labetalol, call physician for further orders.
   - Administered date/time: ______________________

2. **Insulin ASPART, variable dose subcut**
   - If Blood Sugar:
     - 120-300 = no insulin
     - 300-400 = Give 6 units
     - 401-600 = Give 8 units
     - 601-800 = Give 10 units
   - Administered date/time: ______________________

### VS recheck if medication administered:

<table>
<thead>
<tr>
<th>Date/time</th>
<th>Date/time</th>
</tr>
</thead>
<tbody>
<tr>
<td>BP</td>
<td>BP</td>
</tr>
<tr>
<td>Pulse</td>
<td>Pulse</td>
</tr>
<tr>
<td>Resp</td>
<td>Resp</td>
</tr>
<tr>
<td>SPO2</td>
<td>SPO2</td>
</tr>
<tr>
<td>CBG</td>
<td>CBG</td>
</tr>
</tbody>
</table>

### Medications

<table>
<thead>
<tr>
<th>BP</th>
<th>Pulse</th>
<th>Resp</th>
<th>SPO2</th>
<th>CBG</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

### Past Medical History

<table>
<thead>
<tr>
<th>NIHSS/FASST/LASS</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
</tr>
</tbody>
</table>
## 1a. Level of Consciousness
(alert, drowsy, etc.)

<table>
<thead>
<tr>
<th>State</th>
<th>Score</th>
</tr>
</thead>
<tbody>
<tr>
<td>Alert</td>
<td>0</td>
</tr>
<tr>
<td>Drowsy</td>
<td>1</td>
</tr>
<tr>
<td>Stuporous</td>
<td>2</td>
</tr>
<tr>
<td>Coma</td>
<td>3</td>
</tr>
</tbody>
</table>

## 6a. Motor Leg-left
(elevate leg to 30 degrees and score drift or movement)

<table>
<thead>
<tr>
<th>Movement</th>
<th>Score</th>
</tr>
</thead>
<tbody>
<tr>
<td>No Drift</td>
<td>0</td>
</tr>
<tr>
<td>Drift</td>
<td>1</td>
</tr>
<tr>
<td>Can’t resist Gravity</td>
<td>2</td>
</tr>
<tr>
<td>No effort Against Gravity</td>
<td>3</td>
</tr>
<tr>
<td>No Movement</td>
<td>4</td>
</tr>
<tr>
<td>Amputation/Joint Fusion</td>
<td>NS</td>
</tr>
</tbody>
</table>

## 1b. LOC Questions
(month, age)

<table>
<thead>
<tr>
<th>Answer</th>
<th>Score</th>
</tr>
</thead>
<tbody>
<tr>
<td>Answers both correctly</td>
<td>0</td>
</tr>
<tr>
<td>Answers one correctly</td>
<td>1</td>
</tr>
<tr>
<td>Incorrect</td>
<td>2</td>
</tr>
</tbody>
</table>

## 6b. Motor Leg-Right
(elevate leg to 30 degrees and score drift or movement)

<table>
<thead>
<tr>
<th>Movement</th>
<th>Score</th>
</tr>
</thead>
<tbody>
<tr>
<td>No Drift</td>
<td>0</td>
</tr>
<tr>
<td>Drift</td>
<td>1</td>
</tr>
<tr>
<td>Can’t resist Gravity</td>
<td>2</td>
</tr>
<tr>
<td>No effort Against Gravity</td>
<td>3</td>
</tr>
<tr>
<td>No Movement</td>
<td>4</td>
</tr>
<tr>
<td>Amputation/Joint Fusion</td>
<td>NS</td>
</tr>
</tbody>
</table>

## 1c. LOC Commands
(open & close eyes, make fist and let go)

<table>
<thead>
<tr>
<th>Movement</th>
<th>Score</th>
</tr>
</thead>
<tbody>
<tr>
<td>Obeys both correctly</td>
<td>0</td>
</tr>
<tr>
<td>Obeys one correctly</td>
<td>1</td>
</tr>
<tr>
<td>Incorrect</td>
<td>2</td>
</tr>
</tbody>
</table>

## 7. Limb Ataxia
(finger to nose and heel down shin)

<table>
<thead>
<tr>
<th>Movement</th>
<th>Score</th>
</tr>
</thead>
<tbody>
<tr>
<td>Absent</td>
<td>0</td>
</tr>
<tr>
<td>Present in one limb</td>
<td>1</td>
</tr>
<tr>
<td>Present in two limbs</td>
<td>2</td>
</tr>
</tbody>
</table>

## 2. Best Gaze
(eyes open-follows examiners finer to face)

<table>
<thead>
<tr>
<th>Movement</th>
<th>Score</th>
</tr>
</thead>
<tbody>
<tr>
<td>Normal</td>
<td>0</td>
</tr>
<tr>
<td>Partial gaze palsy</td>
<td>1</td>
</tr>
<tr>
<td>Forced Deviation</td>
<td>2</td>
</tr>
</tbody>
</table>

## 8. Sensory
(pin prick to face, arm, trunk, leg & compare side to side)

<table>
<thead>
<tr>
<th>Movement</th>
<th>Score</th>
</tr>
</thead>
<tbody>
<tr>
<td>Normal</td>
<td>0</td>
</tr>
<tr>
<td>Partial Loss</td>
<td>1</td>
</tr>
<tr>
<td>Severe Loss</td>
<td>2</td>
</tr>
</tbody>
</table>

## 3. Visual
(introduce visual stimulus/threat to patients visual field quadrants)

<table>
<thead>
<tr>
<th>Movement</th>
<th>Score</th>
</tr>
</thead>
<tbody>
<tr>
<td>No Visual Loss</td>
<td>0</td>
</tr>
<tr>
<td>Partial Hemianopia</td>
<td>1</td>
</tr>
<tr>
<td>Complete Hemianopia</td>
<td>2</td>
</tr>
<tr>
<td>Bilateral Hemianopia</td>
<td>3</td>
</tr>
</tbody>
</table>

## 9. Best Language
(name items, describe pictures, and read sentences)

<table>
<thead>
<tr>
<th>Movement</th>
<th>Score</th>
</tr>
</thead>
<tbody>
<tr>
<td>No aphasia</td>
<td>0</td>
</tr>
<tr>
<td>Mild to Moderate Aphasia</td>
<td>1</td>
</tr>
<tr>
<td>Near to Unintelligible or worse</td>
<td>2</td>
</tr>
<tr>
<td>Intubated or other physical barrier</td>
<td>3</td>
</tr>
</tbody>
</table>

## 4. Facial Palsy
(show teeth, raise eyebrows, and squeeze eyes shut)

<table>
<thead>
<tr>
<th>Movement</th>
<th>Score</th>
</tr>
</thead>
<tbody>
<tr>
<td>Normal</td>
<td>0</td>
</tr>
<tr>
<td>Minor</td>
<td>1</td>
</tr>
<tr>
<td>Partial</td>
<td>2</td>
</tr>
<tr>
<td>Complete</td>
<td>3</td>
</tr>
</tbody>
</table>

## 10. Dysarthria
(evaluate speech clarity by patient repeating listed words)

<table>
<thead>
<tr>
<th>Movement</th>
<th>Score</th>
</tr>
</thead>
<tbody>
<tr>
<td>Normal Articulation</td>
<td>0</td>
</tr>
<tr>
<td>Mild to Moderate Dysarthria</td>
<td>1</td>
</tr>
<tr>
<td>Near to unintelligible or worse</td>
<td>2</td>
</tr>
<tr>
<td>Intubated or other physical barrier</td>
<td>3</td>
</tr>
</tbody>
</table>

## 5. Motor Arm-left
(elevate arm to 90 degrees and score drift or movement)

<table>
<thead>
<tr>
<th>Movement</th>
<th>Score</th>
</tr>
</thead>
<tbody>
<tr>
<td>No Drift</td>
<td>0</td>
</tr>
<tr>
<td>Drift</td>
<td>1</td>
</tr>
<tr>
<td>Can’t resist gravity</td>
<td>2</td>
</tr>
<tr>
<td>No effort against gravity</td>
<td>3</td>
</tr>
<tr>
<td>No movement</td>
<td>4</td>
</tr>
<tr>
<td>Amputation/Joint Fusion</td>
<td>NS</td>
</tr>
</tbody>
</table>

## 5. Motor Arm-right
(elevate arm to 90 degrees and score drift or movement)

<table>
<thead>
<tr>
<th>Movement</th>
<th>Score</th>
</tr>
</thead>
<tbody>
<tr>
<td>No Drift</td>
<td>0</td>
</tr>
<tr>
<td>Drift</td>
<td>1</td>
</tr>
<tr>
<td>Can’t resist gravity</td>
<td>2</td>
</tr>
<tr>
<td>No effort against gravity</td>
<td>3</td>
</tr>
<tr>
<td>No movement</td>
<td>4</td>
</tr>
<tr>
<td>Amputation/Joint Fusion</td>
<td>NS</td>
</tr>
</tbody>
</table>

## Extinction or Inattention
(use information from prior testing to identify or double simultaneous stimuli testing)

<table>
<thead>
<tr>
<th>Movement</th>
<th>Score</th>
</tr>
</thead>
<tbody>
<tr>
<td>No neglect</td>
<td>0</td>
</tr>
<tr>
<td>Partial neglect</td>
<td>1</td>
</tr>
<tr>
<td>Complete Neglect</td>
<td>2</td>
</tr>
</tbody>
</table>

**Sub Total 6-11**

**Sub Total 1-5**

**Total Score 1-11**

---

**NS- Not scored, patient unable to perform**

---

**Administered by:** ____________________________  **Date** _____________  **Time** ___________
# Arkansas Stroke Ready Hospital Application

## Appendix M

<table>
<thead>
<tr>
<th>Hospital Name</th>
<th>Address</th>
</tr>
</thead>
<tbody>
<tr>
<td>Administrator</td>
<td></td>
</tr>
<tr>
<td>Designated Stroke Coordinator</td>
<td>Phone Number</td>
</tr>
<tr>
<td>Email Address</td>
<td></td>
</tr>
<tr>
<td>Number of Licensed Beds</td>
<td></td>
</tr>
</tbody>
</table>

**THE RESPONSES TO THESE QUESTIONS AND ALL SUBMITTED DATA WILL BE USED EXCLUSIVELY FOR STATE PERFORMANCE IMPROVEMENT PURPOSES.** Please direct any questions to Dr. Tammie Marshall (Tammie.Marshall@arkansas.gov) or David Vrudny (david.vrudny@arkansas.gov)

---

**Approved By:** Appathurai Balamurugan, MD, DrPH  
Medical Director, Chronic Disease Prevention and Control Branch  
Arkansas Department of Health

---

**Approved By:** Tammie Marshall, MSN, MHA, CNE, RN, DNP  
Arkansas Stroke Nurse Coordinator  
Arkansas Department of Health

---

**Approved By:** David Vrudny, CPHQ, MPM, MPH(c)  
Stroke and STEMI System of Care Manager  
Arkansas Department of Health

---

**Approved By:** James Bledsoe, MD, FACS  
Chief Physician Specialist, Section of EMS  
Arkansas Department of Health

---

**Approved By:** Greg Brown, BS, NRP  
Branch Chief, Trauma and Emergency Response  
Arkansas Department of Health
### Arkansas Stroke Ready Hospital Application

#### Appendix M

<table>
<thead>
<tr>
<th>Question</th>
<th>Yes</th>
<th>No</th>
</tr>
</thead>
<tbody>
<tr>
<td>1. Is the Emergency Department staffed with an RN 24/7? <em>Please include a copy of the roster/call schedule for nurses.</em></td>
<td></td>
<td></td>
</tr>
<tr>
<td>2. Is there a designated stroke coordinator/facilitator? <em>Please include a short description of the role and function.</em></td>
<td></td>
<td></td>
</tr>
<tr>
<td>3. Is the Emergency Department staffed with a physician 24/7? <em>Please include copy of ER physician call roster.</em></td>
<td></td>
<td></td>
</tr>
<tr>
<td>• If not, is there a requirement that a physician respond in 30 minutes or less?</td>
<td></td>
<td></td>
</tr>
<tr>
<td>• If not, is the RN authorized to initiate stroke protocol?</td>
<td></td>
<td></td>
</tr>
<tr>
<td>4. Is the Emergency Department staff trained in the use of a standardized assessment tool for stroke severity?</td>
<td></td>
<td></td>
</tr>
<tr>
<td>What assessment tool are they trained to use? <em>Please include a copy of the tool.</em></td>
<td></td>
<td></td>
</tr>
<tr>
<td>5. Does the hospital use a standardized acute ischemic stroke protocol? <em>Please include a copy of the protocol used.</em></td>
<td></td>
<td></td>
</tr>
<tr>
<td>6. Is ACTIVASE stocked in hospital? <em>Please include documentation verifying ACTIVASE is stocked.</em></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

#### Transfer and Transport Protocol

7. Does the hospital have a transport protocol with contingency plans for bad weather, no bed availability, etc? *Please attach a copy of the transport protocol.*

#### Stroke Care and Treatment

8. Is there a physician (ED or neurologist) readily available 24/7 trained to treat acute ischemic stroke? (telestroke access qualifies if available) *Please include a copy of the stroke physician call roster.*

#### CT Availability

9. Does the hospital have CT (with interpretation) available within 45 minutes of patient arrival? *Please include documentation verifying this for the past 6 months.*
### Laboratory Availability

<table>
<thead>
<tr>
<th>Question</th>
<th>Yes</th>
<th>No</th>
</tr>
</thead>
<tbody>
<tr>
<td>10. Is the hospital laboratory staffed 24/7? Please include a copy of the laboratory staff roster.</td>
<td></td>
<td></td>
</tr>
<tr>
<td>11. Are the following test results available within 45 minutes of patient arrival: Please include documentation showing test results are available within this timeframe for the last 6 months.</td>
<td></td>
<td></td>
</tr>
<tr>
<td>• CBC</td>
<td></td>
<td></td>
</tr>
<tr>
<td>• BMP</td>
<td></td>
<td></td>
</tr>
<tr>
<td>• PT/PTT/INR</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

### Quality Improvement Plan

<table>
<thead>
<tr>
<th>Question</th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>12. Will the hospital participate in the Arkansas Stroke Registry (ASR) and submit stroke patient data in accordance with program guidelines? If no, please include proposed plan to participate.</td>
<td></td>
</tr>
<tr>
<td>13. Will acute stroke team staff participate in NIHSS training as well as participate in stroke education programs?</td>
<td></td>
</tr>
<tr>
<td>14. Will the hospital ensure stroke bands are applied to all confirmed stroke patients and record the stroke band ID in the AR Stroke Registry? NOTE: Bands will be provided by the Arkansas Department of Health. EMS to apply the bands on all suspected stroke cases. If stroke is not confirmed by the hospital the band is to be removed. The hospital will ensure bands are applied to all confirmed stroke cases including POV arrivals. Stroke Band ID is recorded in the ASR.</td>
<td></td>
</tr>
<tr>
<td>15. Will staff provide stroke education for local pre-hospital providers? (Highly Recommended)</td>
<td></td>
</tr>
<tr>
<td>16. Will staff provide stroke education for at least 2 outreach events per year in the local community? (Highly Recommended)</td>
<td></td>
</tr>
<tr>
<td>17. Will staff provide feedback to local EMS including final patient diagnosis/outcome each quarter? (Highly Recommended)</td>
<td></td>
</tr>
</tbody>
</table>

### Attachment Checklist

**See the "Arkansas Stroke Ready Hospital Application Examples" Document Which Includes Examples of Items #1-#11**

- #1 Roster/Call Schedule for Nurses
- #2 Stroke Coordinator Description/Function
- #3 ER Physician Call Roster
- #4 Stroke Assessment Tool
- #5 Acute Ischemic Stroke Protocol
- #6 Documentation verifying ACTIVASE is stocked
- #7 Stroke Inter-hospital Transfer/Transport Protocol
- #8 Stroke Physician Call Roster
- #9 CT with Interpretation Documentation
- #10 Laboratory Staff Roster
- #11 Documentation verifying lab test result availability
- #12 [IF NEEDED] Plan to participate in stroke registry
- #13-#17 Plan for each of these items

---

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