Inter-Hospital Transfer of Acute Stroke Patients: What Rural and Critical Access Hospitals Need to Know Regarding Stroke Systems of Care

Kari Moore, MSN, APRN, AGACNP-BC
Director of Outreach and Community Scholarly Engagement
CSC Program Manager
University of Louisville
Department of Neurology

Kristin Howard, BSN, RN
Stroke Coordinator
Saint Joseph Hospital
Objectives

- Discuss stroke designation levels
- Discuss how to package a stroke patient for transfer
- Discuss transfer agreements
- Discuss EMS transport protocols
- Discuss Current Kentucky Stroke Systems of Care Initiatives
Stroke patients are dispatched at the highest level of care
Time between receipt of call and dispatch of response team is < 90 seconds
Turnout time is < 1 minute (unit en route from time of call)
EMS response time is < 8 minutes from time of call to time on scene
On Scene time is < 15 minutes
Travel time is = to trauma or AMI calls
Pre-hospital Stroke Management
Recommended Statewide

- Statewide standardization of telecommunications programs
- Stroke education modules
- Care Protocols
Pre-hospital Stroke Management
In the field and en route

- Utilize validated pre-hospital stroke scale
- Assess and manage ABCs
  - Supplemental oxygen to maintain saturation > 94%
- Initiate Cardiac Monitoring
- Establish IV access per local protocol
- Blood Pressure Management
  - SBP < 120 - stretcher flat and isotonic saline may improve cerebral perfusion
  - SBP > 140 – Routine prehospital BP intervention not proven; consult medical control, extreme hypertension SBP > 220
- Check Blood Glucose and treat accordingly
- Determine Date and Time last known normal; obtain family contact info-cell phone
- Triage and rapidly transport to closest available PSC or CSC; if doesn’t exist to closest hospital who provides stroke care or consider air medical
  - Consider transporting family member along with patient
- Notify hospital of pending stroke patient arrival
Guiding principles for field triage of patients with suspected acute stroke.

<table>
<thead>
<tr>
<th>Patient with abnormal vital functions in need of acute resuscitation</th>
<th>Transport to nearest hospital for stabilization of vital signs</th>
<th>Once vital functions stabilized, transfer to nearest CSC (or PSC if long distances)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Patient with acute onset of stroke symptoms within 6-8 hours</td>
<td>Transport patient to closest PSC or CSC if &lt;15-20 minutes transport time</td>
<td>If PSC and/or CSC &gt;15-20 minutes away, go to closest ASRH</td>
</tr>
<tr>
<td>Patient with acute stroke and seen initially at an ASRH</td>
<td>ASRH might use telemedicine to help evaluate the patient and to make transfer recommendations</td>
<td>Transfer to nearest PSC or CSC based on stroke type, patient's medical condition, treatment options</td>
</tr>
</tbody>
</table>

≥ 50% of US Population is not within 60 Minutes of a PSC

• Primary Stroke Centers - Certification started in 2004
  • 21 in Kentucky
• Comprehensive Stroke Centers – Certification started in 2012
  • 2 in Kentucky (U of L and UK)
Brain Attack Coalition Vision and Intent

- Provide Initial Diagnostic Services
- Stabilization
- Emergent Care and Therapies in the ED
- Arrange appropriate transfer to PSC or CSC
- Patient returns to local facility and provider for outpatient care

# Elements of ASRH

## Table 1. Comparison of Elements in an Acute Stroke–Ready Hospital and Primary Stroke Center

<table>
<thead>
<tr>
<th>Element</th>
<th>ASRH</th>
<th>PSC</th>
<th>Comment*</th>
</tr>
</thead>
<tbody>
<tr>
<td>Acute stroke team</td>
<td>15-min response time</td>
<td>15-min response time</td>
<td>Minimum of 2 members</td>
</tr>
<tr>
<td>Stroke protocols</td>
<td>Revise annually</td>
<td>Revise annually</td>
<td>Applies to all types of strokes</td>
</tr>
<tr>
<td>Emergency medical services</td>
<td>Training in field assessment tools for stroke</td>
<td>Training in field assessment tools for stroke</td>
<td>At least 2 h of stroke-related education annually</td>
</tr>
<tr>
<td>Emergency department</td>
<td>Written protocols for treatment and stabilization; 4 annual h of stroke education</td>
<td>Written protocols for treatment and stabilization; 8 annual h of stroke education</td>
<td>Physician and nurse education for key staff</td>
</tr>
<tr>
<td>Laboratory testing, ECG/chest radiograph</td>
<td>Test results available within 45 min of ordering</td>
<td>Test results available within 45 min of ordering</td>
<td>Testing available 24/7</td>
</tr>
<tr>
<td>Brain imaging*</td>
<td>Test completed and read within 45 min (60 min for MRI)</td>
<td>Test completed and read within 45 min (60 min for MRI)</td>
<td>Head CT or MRI acceptable; service available 24/7</td>
</tr>
<tr>
<td>Stroke unit</td>
<td>Not required unless patients are admitted</td>
<td>Required for admitted patients; should include protocols and telemetry</td>
<td>Specific monitoring protocols even if not admitted</td>
</tr>
<tr>
<td>IV tPA†</td>
<td>Door-to-needle time of ≤60 min</td>
<td>Door-to-needle time of ≤60 min</td>
<td>IV tPA available 24/7</td>
</tr>
<tr>
<td>Neurosurgical services‡</td>
<td>Available within 3 h</td>
<td>Available within 2 h</td>
<td>Can be onsite or by transfer of patient</td>
</tr>
<tr>
<td>Initiation of telemedicine link</td>
<td>Within 20 min of when it is deemed medically necessary</td>
<td>Respond within 20 min of link request if serving as a hub</td>
<td>Type of link will vary by service vendor; same response times for receiving hub CSC</td>
</tr>
<tr>
<td>Telemedicine/teleradiology equipment</td>
<td>Onsite to transmit</td>
<td>Onsite and offsite to receive</td>
<td>Applies to a CSC if they will be a hub site</td>
</tr>
<tr>
<td>Transfer of patients to PSC or CSC</td>
<td>Patient leaves within 2 h of ED arrival (or once medically stable)§</td>
<td>Not applicable in most cases unless transferred to a CSC</td>
<td>Mode of transportation will vary</td>
</tr>
</tbody>
</table>

ASRH indicates Acute Stroke–Ready Hospital; CSC, Comprehensive Stroke Center; CT, computed tomography; ED, emergency department; IV tPA, intravenous tissue plasminogen activator; and PSC, Primary Stroke Center.

*Comments apply to the ASRH recommendations unless otherwise noted.
†See Performance Metrics section for further details.
‡Neurosurgical coverage might include having a neurosurgeon at the hospital or transfer of the patient to another facility where a neurosurgeon is available and can be onsite.
§Exceptions include factors beyond the control of the ASRH, such as weather delays, mechanical issues, etc.
## Stroke Certification Programs – Program Concept Comparison

<table>
<thead>
<tr>
<th>Program Concept</th>
<th>ASRH</th>
<th>PSC</th>
<th>CSC</th>
</tr>
</thead>
<tbody>
<tr>
<td>Program Medical Director</td>
<td>Sufficient knowledge of cerebrovascular disease</td>
<td>Sufficient knowledge of cerebrovascular disease</td>
<td>Has extensive expertise, available 24/7, 8 hours of stroke education annually</td>
</tr>
<tr>
<td>Acute Stroke Team</td>
<td>Available 24/7, at bedside within 15 minutes; at least 4 hours of stroke education annually</td>
<td>Available 24/7, at bedside within 15 minutes; at least 8 hours of stroke education annually</td>
<td>Available 24/7, at bedside within 15 minutes; at least 8 hours of stroke education annually</td>
</tr>
<tr>
<td>Emergency Medical Services</td>
<td>Access to protocols used by EMS</td>
<td>Access to protocols used by EMS</td>
<td>Access to protocols used by EMS, routing plans, records from transfer</td>
</tr>
<tr>
<td>Collaboration</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Stroke Unit</td>
<td>No designated beds for acute care of stroke patients</td>
<td>Stroke unit or designated beds for the acute care of stroke patients</td>
<td>Dedicated neuro-intensive care beds for complex stroke patients available 24/7</td>
</tr>
<tr>
<td>Initial Assessment of Patient</td>
<td>Emergency Department physician, nurse practitioner, or physician assistant</td>
<td>Emergency Department physician</td>
<td>Emergency Department physician</td>
</tr>
<tr>
<td>Diagnostic Testing Capability</td>
<td>CT, MRI, labs 24/7</td>
<td>CT, MRI, labs, CTA, MRA 24/7, and cardiac imaging when necessary</td>
<td>CT, MRI, labs, CTA, MRA, other cranial and carotid duplex ultrasound, TEE, TTE, catheter angiography 24/7 and cardiac imaging when necessary</td>
</tr>
<tr>
<td>Neurologist Accessibility</td>
<td>24/7 via in person or telemedicine</td>
<td>24/7 via in person or telemedicine</td>
<td>Meets concurrently emergent needs of multiple complex stroke patients, Written call schedule for attending physicians providing availability 24/7</td>
</tr>
<tr>
<td>Neurosurgical Services</td>
<td>Within 3 hours (provided through transferring the patient)</td>
<td>Within 2 hours; OR is available 24/7 in PSC, providing neurosurgical services</td>
<td>24/7 availability: Neurointerventionalist; Neuroradiologist; Neurologist; Neurosurgeon</td>
</tr>
<tr>
<td>Telemetry</td>
<td>Within 20 minutes of it being necessary</td>
<td>Available if necessary</td>
<td>Available if necessary</td>
</tr>
<tr>
<td>Treatment Capabilities</td>
<td>IV thrombolysis: Anticipate transfer of patients who have received IV thrombolysis</td>
<td>IV thrombolysis: May have the ability to perform the following: Neurovascular interventions for aneurysms, Stenting of carotid arteries, Carotid endarterectomy, and Endovascular therapy</td>
<td>IV thrombolysis: Neurovascular interventions for aneurysms, Neuroendovascular clipping of aneurysms, Stenting of extracranial carotid arteries, Carotid endarterectomy, Endovascular therapy</td>
</tr>
<tr>
<td>Transfer protocols</td>
<td>With one PSC or CSC</td>
<td>For neurological emergencies</td>
<td>Receiving transfers and circumstances for not accepting transferred patients</td>
</tr>
<tr>
<td>Staff Education Requirements</td>
<td>ED staff – a minimum of twice a year</td>
<td>ED staff – a minimum of twice a year</td>
<td>Nurses and other ED staff – 2 hours annually, Stroke nurses – 8 hours annually</td>
</tr>
<tr>
<td>Provision of Educational Opportunities</td>
<td>Provides educational opportunities to prehospital personnel</td>
<td>Provides educational opportunities to prehospital personnel</td>
<td>Sponsors at least 2 public educational opportunities annually, UFS and staff present 2 or more educational course annually for internal staff or individuals external to the comprehensive stroke center (e.g., referring hospitals)</td>
</tr>
<tr>
<td>Clinical Performance Measures</td>
<td>Non-Standardized Measures: Organization chooses 4 measures, at least 2 are clinical measures related to clinical practice guidelines</td>
<td>Standardized Measures: 8 core stroke measures</td>
<td>Standardized Measures: 8 core stroke measures and 8 comprehensive stroke measures for a total of 36</td>
</tr>
<tr>
<td>Research</td>
<td>N/A</td>
<td>N/A</td>
<td>Participants in patient-centered research that is approved by the IRB</td>
</tr>
<tr>
<td>Review</td>
<td>One Reviewer, One Day</td>
<td>One Reviewer, One Day</td>
<td>Two Reviewers, Two Days</td>
</tr>
</tbody>
</table>
## Stroke Levels of Care

### Table 1. Some Characteristics of Typical Acute Inpatient Stroke Care Facilities

<table>
<thead>
<tr>
<th>Characteristics</th>
<th>Non-Stroke Center</th>
<th>ASRH</th>
<th>PSC</th>
<th>CSC</th>
</tr>
</thead>
<tbody>
<tr>
<td>Typical bed count</td>
<td>20–50</td>
<td>30–100</td>
<td>100–400</td>
<td>400–1500</td>
</tr>
<tr>
<td>Annual stroke admissions</td>
<td>10–50</td>
<td>25–50</td>
<td>50–300</td>
<td>&gt;300</td>
</tr>
<tr>
<td>Rapid neuroimaging 24/7*</td>
<td>No</td>
<td>Performed and read within 45 min of order</td>
<td>Performed and read within 45 min of order</td>
<td>Performed and read within 45 min of order</td>
</tr>
<tr>
<td>IV tPA capability 24/7</td>
<td>No</td>
<td>60-min door-to-needle time</td>
<td>60-min door-to-needle time</td>
<td>60-min door-to-needle time</td>
</tr>
<tr>
<td>Acute stroke team available</td>
<td>No</td>
<td>At bedside within 15 min</td>
<td>At bedside within 15 min</td>
<td>At bedside within 15 min</td>
</tr>
<tr>
<td>Stroke unit</td>
<td>No</td>
<td>No†</td>
<td>Yes</td>
<td>Yes</td>
</tr>
<tr>
<td>Neurocritical care unit</td>
<td>No</td>
<td>No</td>
<td>No</td>
<td>Yes§</td>
</tr>
<tr>
<td>Access to neurosurgical services</td>
<td>No</td>
<td>Yes, within 3 h or by transfer‡</td>
<td>Yes, within 2 h, in-house or by transfer</td>
<td>Yes, 24/7 coverage and call schedule</td>
</tr>
</tbody>
</table>

ASRH indicates acute stroke–ready hospital; CSC, comprehensive stroke center; IV, intravenous; PSC, primary stroke center; tPA, tissue-type plasminogen activator; and 24/7, 24 hours per day, 7 days per week.

*24/7 Neurological expertise available through telemedicine, on site, or a combination.
†Some ASRHs may have the necessary resources on site or via telemedicine to support a stroke unit.
‡This may vary based on geographic and other considerations.
§Or a defined neurocritical care service operating within the context of a medical or surgical intensive care unit.
ED based Time Goals

- Door to Physician ≤ 10 minutes
- Door to Stroke Team ≤ 15 minutes
- Door to CT initiation ≤ 25 minutes
- Door to CT Interpretation ≤ 45 minutes
- Door to Drug (IV tPA) ≤ 60 minutes
- Door to Transfer to PSC or CSC ≤ 2 hours
- Door to Stroke Unit Admission ≤ 3 hours

Transferring Patient to a Higher Level of Care

Written Transfer Agreement with PSC or CSC

- Contact Personnel
- Phone numbers
- Hours of operation
- Transport options – covering ground and air ambulance
- Available transport/transfer 24/7
- Consistent with local rules and regulations

Packaging Stroke Patient for Transfer to PSC/CSC

- Date/Time of report
- Transferring Physicians name
- Date/Time Last Known Well
- Phone (preferably cell) number for NOK
- Brief History
- Past Medical History (vascular risk factors, surgeries)
- Vital Signs (full set on arrival and at departure)
- Blood Sugar
- Blood Pressure parameters
- Maintain NPO

- Initial NIHSS ---&--- NIHSS at departure
- Two peripheral IV 18 G in AC if possible
- Oxygen to maintain O2 sat > 94%
- HOB 15-30° unless contraindicated
- IVF’s – Normal Saline Only
- ED Summary of Treatment (BP management, medications given, any procedures
- MAR- blood pressure medications, antithrombotics – aspirin, Plavix, anticoagulation
- Send lab results and ECG
- Send CT report and images on disk if available (do not delay transport can fax later if not available)
Packaging Transfer of Stroke Patient

IV t-PA Administration

Additional Documentation Elements:

• Patient Weight
• Total Dose of t-PA with bolus and infusion amount
• Time IV t-PA administered: Bolus Time, Infusion Time, Completion Time
• Vital Signs and Neuro Checks documented every 15 minutes
• Call medical control for Blood pressure > 180/105
• Plan for blood pressure management en route (consider RN travel or ACLS ambulance)
• Stop IV t-PA infusion for: neurologic deterioration or airway edema
  Document time discontinued
• Notify receiving facility of patient departure
EMS Transport of Patient while IV t-PA still infusing

Items for Discussion between EMS, ASRH and PSC/CSC:

- Local hospital and EMS resources for transportation
- Utilization of EMS inter-facility transport protocols
- On Going Education
  - IV pump and what to do if the pump malfunctions
  - Signs and Symptoms of deterioration en route and what to do
  - What to do when the dose is completed
  - Blood Pressure Management
KBEMS Cardiac and Stroke Committee

Objectives:

Established 2013

- Identify and convene experts and partners to guide the statewide approach to definitive treatment of Cardiac and Stroke cases and recommend project interventions
- Implement and evaluate a comprehensive AMI and Stroke access assessment targeting 120 counties in the Commonwealth
- Collaborate with system engineers to analyze EMS system capabilities and the capabilities of regional healthcare facilities and specialty care centers
- Begin implementation of quality improvement initiatives prioritized by expert groups
- Identify policy initiatives based on the findings of the assessment and the expert group recommendations
- Promote and advocate for educational programs, protocol updates and regionalized EMS system of care
- Establish a minimum set for Cardiac and Stroke care that can be reported by EMS Systems and healthcare facilities for ongoing research
- Implement a reassessment to evaluate progress, remaining challenges, and clarify questions on the initial assessment
- Develop a gap analysis for ongoing evaluation of progress and strategy success with identification of future success
Summary

- Amend KRS 216B.0425 to define the terms "acute stroke ready hospital certification" and "comprehensive stroke center certification"; require the Cabinet for Health and Family Services to maintain a list of acute stroke ready hospitals, comprehensive stroke centers, and primary stroke centers, post the list on its Website, and provide the list to the Kentucky Board of Emergency Medical Services; require the board to provide the list to local emergency medical services providers; amend KRS 311A.180 to require emergency medical services directors to establish pre-hospital care protocols for the assessment, treatment, and transport of stroke patients; and amend other statutes to correct references to the Joint Commission.

SUSPECTED STROKE PROTOCOL

This protocol is for patients who have an acute episode of neurological deficit without any evidence of trauma. Signs consistent with acute Stroke:

- Sudden onset of weakness or numbness in the face, arm, or leg, especially on one side of the body
- Sudden onset of trouble seeing in one or both eyes
- Sudden onset of trouble walking, dizziness, loss of balance or coordination
- Sudden onset of confusion, trouble speaking or understanding
- Sudden onset of severe headache with no known cause
- Consider other causes of altered mental status, i.e., hypoxia, hypoperfusion, hypoglycemia, trauma, or overdose

Basic Standing Orders:
- Routine Patient Care.
- Obtain glucose reading via glucometer.
- Administer oxygen to keep sats > 94%, suction as necessary, and be prepared to assist ventilation.
- Perform Cincinnati Pre-hospital Stroke Scale.
- If positive, determine time of onset of symptoms. Time of onset of stroke is critical:
  - To patient: When was the last time you were normal?
  - To family or bystander: When was the last time you saw the patient normal?
- Obtain mobile phone contact of an informant, encourage transportation of family member.
- Maintain normal body temperature.
- Protect any paralyzed or partially paralyzed extremity.
- Early notification of the emergency department is critical.
- Closest hospital may not be the best destination hospital:
  - Consider a certified stroke center if onset of symptoms is within 8 hours
  - Consider air medical transport from the scene in lieu of closest hospital if the patient would otherwise not have access to definitive care at a certified stroke center within 8 hours
- Transport the patient to the closest appropriate hospital emergency department if:
  - The patient is in cardiac arrest, or
  - The patient has an unmanageable airway, or
  - The patient has another medical condition that warrants transport to the closest appropriate hospital emergency department as per protocol.
- Consider ALS intercept / air medical transport.

Advanced Standing Orders:
Do not delay transport for ALS procedures
- IV access with 0.9% Normal Saline 100 ml per hour, unless contraindicated.
  Avoid dextrose.

Paramedic Standing Orders:
Do not delay transport for ALS procedures
- Obtain 12-lead EKG during transport.
- Treat blood pressure elevation of > 220/120 with 1 single dose of IV medication if still elevated in 15 minutes. Contact medical control.
- Manage compromised airway.
- Continuously reassess.

REV. (2/15)
SU SPECTED STROKE PROTOCOL

Kentucky Certified Stroke Centers

- St. Elizabeth Edgewood
- St. Elizabeth Ft. Thomas
- St. Elizabeth Florence
- University of Louisville / Louisville Baptist Health, Louisville Jewish Hospital, Louisville Saints Mary and Elizabeth Hospital, Louisville Norton Hospital, Louisville Norton Audubon Hospital, Louisville Norton Brownsboro Hospital, Louisville Norton Suburban Hospital, Louisville
- University of Kentucky / Lexington Baptist Health, Lexington University of Kentucky Hospital, Lexington
- Baptist Health, LaGrange
- The Medical Center, Bowling Green Tristar Greenview Regional Hospital
- Hardin Memorial Health, Elizabethtown
- Owensboro Health, Owensboro
- Pikeville Medical Center, Pikeville
- King's Daughter Medical Center, Ashland
- Baptist Health, Paducah
- Lake Cumberland Regional Hospital
- Jackson Purchase Medical Center

OH - 47 PSC and 5 CSC's

IN - 22 PSC's

IL - 53 PSC's and 5 CSC's

MO - 26 PSC and 2 CSC's

TN - 18 PSC and 5 CSC's

VA - 31 PSC's

WV - 4 PSC's

Joint Commission and HFAP Certified Primary Stroke Centers in Kentucky (21) - TJC Comprehensive Stroke Centers (2)
Suspected Stroke Protocol

Inter-facility Transfer Protocol

Inter-facility Transfer Guideline for Stroke Patient Receiving IV tPA
All patients need to be sent by ALS Ambulance Service ONLY
Or if ALS Ambulance Service is unavailable - can transport with a critical care RN

Sending facility must be able to maintain systolic blood pressure below 180 mmHg and diastolic blood pressure below 105 mmHg prior to transport

Prior to transport sending facility to:
- Ensure peripheral IV access is patent
- Two large-bore IVs - one in right antecubital space in case endovascular procedure is required
- Prepare document for EMS and receiving facility
- Imaging - hard copy must be sent with EMS
- Copy of vital record for receiving facility and hard copy with EMS
- Core lab information, assessment including exam and NIH Stroke Scale: results, orders, test results, vital signs, etc.
- tPA information including exact dose, bolus start time and infusion end time if applicable
- If tPA will be infusing during transportation, ensure IV pump can go with the patient
- Document patient status, including vital signs and NIH Stroke Scale just prior to transport

tPA Considerations:
- When mixing IV tPA, waste excess where only the calculated dose remains in the bottle
- Standard dosing is as follows: 0.9 mg/kg, with 70% given as a one minute IV push bolus, and the remainder is infused over one hour. The maximum dose is 50 mg
- Load the bottle with the exact dose that the patient is to receive/what is in the bottle
- 50 ml of normal saline must be infused at the same rate as the tPA infusion, after the tPA ends, clear the IV tubing of remaining tPA. (Process assures complete infusion of calculated dose)

Hand-off Communication
Sending facility to provide the following to EMS and receiving facility:
- Family/caregiver contact information, including phone number
- Contact number of sending and receiving physicians
- Time patient last known normal
- Time patient arrived at sending facility for treatment
- Time the EMS was called for transport
- All information about tPA dose and administration times
- Last assessment results, including vital signs and NIH Stroke Scale

During Transport:
- Keep patient strictory NPO, including medications
- Provide continuous pulse oximetry monitoring, keeping Sats > 94%
- Provide continuous cardiac monitoring
- If patient condition deteriorates notify receiving facility MD of condition change immediately
- If blood pressure > 160/100 or hypotension develops notify receiving facility MD immediately
- Perform and document vital signs and neurological assessment every 15 minutes on EMS-inter-facility transfer flow sheet
- Contact receiving facility at least 10 minutes prior to arrival

Upon Arrival at Receiving Facility:
- Handoff all documentation provided by sending facility
- Handoff all transportation documentation including inter-facility transfer flow sheet
- Report any changes in condition status
- Report status of tPA infusion: amount of remaining infusion or completion time, amount of normal saline infusion after tPA if applicable
- Report all care provided during transport
EMS – INTER-FACILITY TRANSFER PROTOCOL:

Stroke Patient During or After IV t-PA

(Transport only by ALS, if ALS EMS not available may transport with critical care RN)

***Sending facility must be able to maintain systolic blood pressure below 180 mmHg and diastolic blood pressure below 105 mmHg prior to transport and if t-PA still infusing IV pump must go with the patient***

Transferring Hospital:
Family/Caregiver or Emergency contact number: ____________________________
Contact number for receiving physician: ____________________________

10% of IV t-PA dose is administered via a one minute IV push, then the rest drips in over one hour. This must be followed by 50 mg normal saline - infused at the same rate to clear the t-PA from the IV tubing and ensure maximum dose infused.

No other medications through t-PA infusion line.

***It is important to note the start and end time of IV t-PA***

1) Perform and document Vital Signs and Neurological Exam:
   (EMS Neurological Exam - Cincinnati Pre-Hospital Stroke Scale and Glasgow Coma Scale with pupil exam)
   - From start of IV t-PA: every 15 minutes x 2 hours, then every 30 minutes x 6 hours, or until arrival at destination hospital

<table>
<thead>
<tr>
<th>PRN for SBP &gt;180 or DBP &gt;105 mmHg:</th>
<th>PRN for SBP &lt;90 mmHg:</th>
<th>PRN for DBP &lt;90 mmHg:</th>
</tr>
</thead>
<tbody>
<tr>
<td>□ IV Labetalol 10 mg IV over 2 minutes</td>
<td>□ 1 Liter NS WOR</td>
<td>□ Discontinue antihypertensive medications</td>
</tr>
<tr>
<td>□ Recheck in 5 minutes, may repeat one time</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

2) Continuous cardiac monitoring
3) Continuous pulse oximetry monitoring
   - Apply oxygen by nasal cannula or mask to maintain SpO2 >94%
4) Monitor for acute worsening conditions and decline in neurologic status (new headache or nausea, vomiting, signs of bleeding, or angina/edema):
   - FIRST stop IV t-PA - then call receiving facility.
5) Strict NPO including medication and ice chips

Contact receiving facility with cardiac or blood pressure issues or acute worsening conditions or decline in neurological status.
Tell the operator you need the stroke physician on-call emergently.

6) Contact receiving facility with an update and ETA at least 10 minutes prior to arrival

Hand-Off Communication Upon Arrival Must Include:
- Documentation and Imaging from sending facility
- Completed Transfer Protocol Documentation Form or other form that includes required documentation components listed above
- Verbal report, including changes in condition and/or concerns, and care provided
- Status of IV t-PA infusion and normal saline infusion, including completion time if finished in route
# Inter-Facility Transfer Documentation Form

**Stroke Patient During or After IV t-PA**

**Vital Signs:** (Goal: SBP < 180 mmHg and DBP < 105 mmHg)

<table>
<thead>
<tr>
<th>Date/Time</th>
<th>Blood Pressure</th>
<th>Heart Rate</th>
<th>Respiratory Rate</th>
</tr>
</thead>
<tbody>
<tr>
<td>15 MIN</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>30 MIN</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>45 MIN</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>60 MIN</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>1 HR 15 MIN</td>
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<td></td>
<td></td>
</tr>
<tr>
<td>1 HR 30 MIN</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>1 HR 45 MIN</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>2 HR</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>2 HR 15 MIN</td>
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<tr>
<td>2 HR 30 MIN</td>
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<tr>
<td>2 HR 45 MIN</td>
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<tr>
<td>3 HR</td>
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**Neurological Exam:**

<table>
<thead>
<tr>
<th>Glasgow Coma Scale (GCS)</th>
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</thead>
<tbody>
<tr>
<td>Pre-Coma</td>
</tr>
<tr>
<td>Eye Opening</td>
</tr>
<tr>
<td>Verbal Response</td>
</tr>
<tr>
<td>Motor Response</td>
</tr>
<tr>
<td>Left</td>
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<td>Right</td>
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</tbody>
</table>

**DATE:**

<table>
<thead>
<tr>
<th>TIMING</th>
<th>Eye Opening</th>
<th>Verbal Response</th>
<th>Motor Response</th>
<th>Left</th>
<th>Right</th>
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</thead>
<tbody>
<tr>
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</tbody>
</table>

**Cincinnati Pre-Hospital Stroke Scale (CPSS):** 

- 1 positive finding is abnormal

***Notify receiving physician if changes in assessment identified***

EMS Signature: ___________________________ Date: ____________

EMS Signature: ___________________________ Date: ____________

EMS Signature: ___________________________ Date: ____________

*Can be entered electronically. Communicate to receiving facility and provide documentation.*
Stroke Encounter Quality Improvement Project

- Established in 2008
- Statewide quality improvement initiative developed by the HDSP, HDSP Task Force, and AHA/ASA
- First Kentucky Stroke Registry
- Goal: Implement evidence based integrated cardiovascular delivery systems and to support and advance the quality of care available to stroke patients in Kentucky.
- Designed to encourage collaboration hospitals and stakeholders in KY.
- Initially 16 hospitals in 2008, currently 23
- All certified stroke centers are represented
- Legislative report submitted annually since 2012 – KRS 211.575
  - Governor and Legislative Research Commission
SEQIP 2 Year Initiative

Stroke Encounter Quality Improvement Project
*Kentucky SEQIP Stroke Registry Data Summary*

- Dissemination and education on the KBEMS inter-facility stroke transfer protocol
- Data collection and additional quality metrics related to EMS transport protocols

*Kentucky Heart Disease & Stroke Prevention Program*

Prepared for:

Governor Steven L. Beshear  
Legislative Research Commission  
June 1, 2015
Door to Needle Times by State

Target: Stroke Phase II aims to achieve Door-to-Needle Times within 60 minutes in 75% or more of acute ischemic stroke patients treated with IV tPA.*

*Eligible Get With The Guidelines-Stroke/Target: Stroke acute ischemic stroke patients treated between January 2014 to December 2014

GOAL 75%

FEWER THAN 6 HOSPITALS PER STATE

Arkansas 42/714 (14%
Indiana 129/295 (22%
New Hampshire 16/47 (8%

25-49%

Arizona 398/530 (74%
Colorado 291/395 (74%
Tennessee 257/323 (79%

50-74%

Alabama 60/138 (45%
California 146/258 (57%
Connecticut 153/152 (100%
Delaware 49/106 (47%
Florida 765/175 (44%
Georgia 82/743 (11%
Hawaii 75/102 (74%
Illinois 298/158 (90%
Kansas 67/144 (46%
Kentucky 193/271 (71%
Louisiana 110/163 (68%
Maine 26/56 (47%
Maryland 608/441 (140%
Massachusetts 314/939 (34%
Michigan 271/456 (59%
Minnesota 107/168 (64%
Mississippi 107/174 (62%
Missouri 416/599 (69%
Nebraska 20/48 (42%
New Jersey 439/681 (65%
New York 1228/188 (65%
North Carolina 417/594 (70%
North Dakota 38/10 (95%
Ohio 375/619 (61%
Oregon 183/318 (58%
Pennsylvania 594/1083 (55%
Puerto Rico (FL-PHI Stroke Registering) 813/1327 (62%
Rhineland 65 (17%
South Carolina 257/397 (65%
Texas 905/1492 (60%
Utah 18/6 (95%
Virginia 129/224 (57%
Washington 319/694 (46%
West Virginia 57/167 (34%
Wisconsin 195/279 (70%
North Carolina 117/353 (34%

75-100%

Chiesi is proud to support the American Heart Association's Target: Stroke™ quality initiative.
Mississippi State Department of Health

Stroke System-of-Care Plan

Utah State Stroke System
Example Publications

Striking Rural–Urban Disparities Observed in Acute Stroke Care Capacity and Services in the Pacific Northwest
Implications and Recommendations

Wendy Shultis, PhD; Robert Graff, PhD; Chara Chamie, MPH; Cherish Hart, MA; Palina Louangketh, MHS; Mike McNamara, MS; Nick Okon, DO; David Tirschwell, MD, MSc

Statewide Efforts to Narrow the Rural–Urban Gap in Acute Stroke Care

Nicholas J. Okon, DO, Crystelle C. Fogle, MBA, MS, RD, Michael J. McNamara, MS, Carrie S. Oser, MPH, Dennis W. Dietrich, MD, Dorothy Gohdes, MD, Todd S. Harwell, MPH, Daniel V. Rodríguez, MD, Steven D. Helgerson, MD, MPH

Using tPA for acute stroke in a rural setting

Lorraine L. Edwards, MD
### Table 1. Problems With and Possible Solutions for the Prehospital Management of Acute Stroke in Rural Areas

<table>
<thead>
<tr>
<th>Problems</th>
<th>Possible Solutions</th>
</tr>
</thead>
<tbody>
<tr>
<td>Rapid recognition of symptoms and response by patients and their caregivers</td>
<td>Public education and education of caregivers and individuals at risk</td>
</tr>
<tr>
<td>Response by 911 rural dispatchers</td>
<td>Targeted education</td>
</tr>
<tr>
<td>Expertise and training of rural paramedics</td>
<td>Targeted continuing stroke education and increase in state resources to compensate and improve emergency medical services force</td>
</tr>
<tr>
<td>Dispersion of hospitals and increased transit time</td>
<td>Promote helicopter evacuation for those residents living far away from the local emergency department</td>
</tr>
</tbody>
</table>

**Table Title:**
Problems With and Possible Solutions for the Prehospital Management of Acute Stroke in Rural Areas
### Table 3. Problems With and Possible Solutions for Interhospital Transfer to a Tertiary Care Institution

<table>
<thead>
<tr>
<th>Problems</th>
<th>Possible Solutions</th>
</tr>
</thead>
<tbody>
<tr>
<td>Lack interventions during interhospital aerial transfer</td>
<td>Perform clinical trials during tertiary flight crews as coinvestigators</td>
</tr>
<tr>
<td>Coordination of arrival of patient</td>
<td>Adapt code stroke systems to coordinate reception of in-bound aerial crew</td>
</tr>
<tr>
<td>Communication gaps between local emergency department and tertiary care receiving hospital</td>
<td>Adapt code stroke systems to facilitate communication, use telemedicine for transfer of information, and use neuroradiology data links</td>
</tr>
</tbody>
</table>

**Table Title:**

Problems With and Possible Solutions for Interhospital Transfer to a Tertiary Care Institution
• 71 year old RHWM with h/o diabetes, hypertension, and CHF who had sudden onset of R side face, arm, and leg weakness at 0830.

• Triage OLH @ 1009

• NIHSS 5 on arrival, worsened to 10

• Inclusion/Exclusion criteria met for IV t-PA

• IV t-PA administered at 11:19

• Depart OLH unknown

• Arrive ULH 15:51
Case Documentation

✓ Last Known Normal
✓ Past Medical History
✓ History Present Illness
✓ Home Medications
✓ Vital signs arrival and departure
✓ NIHSS arrival
✓ IV t-PA bolus and infusion time
✓ Height & weight
✓ MAR OLH ED
✓ ED orders
✓ OLH ED physician & RN note
✓ ECG, CT Head, Lab Report

Missing Information

- EMS run sheet
- IV t-PA dose
- IV t-PA completion time
- Blood pressure parameters
- VS and neuro check Q 15 min
- NOK information
- Handoff between EMS/Nursing
• NIHSS on arrival to ULH 5
• Diagnosis:  Left subcortical lacunar stroke
• Etiology:  Small Vessel Disease
• Discharge NIHSS 1, mRS 1, Barthel Index 95
• Disposition: Home to follow up with PCP for continued risk factor modification and stroke clinic or neurologist at home
Our Mission: It’s Not Impossible!!!

Treat all eligible stroke patients with IV t-PA

We have the foundation: AHA/ASA, KHA, Genentech, SEQIP, HDSP

http://www.activase.com/iscstroke/golden-hour-acute-ischemic-stroke#
• ASRHs form the base of local and regional stroke systems of care
• ASRHs, PSCs, and CSCs should work together to improve stroke systems of care
• Collaboration with EMS and Community Education vital to success
• SEQIP and the Heart Disease and Stroke Prevention Taskforce along with their partners is Kentucky’s foundation for building a comprehensive stroke system of care
Thank You

- Kentucky Hospital Association
- American Heart/Stroke Association

If you would like more information on SEQIP:

Kari Moore: kdmoo02@louisville.edu
502-852-6317

Kristin Howard: howardmk@sjhlex.org
859-313-1748