8.i. GETAC Stroke Committee Update to Council

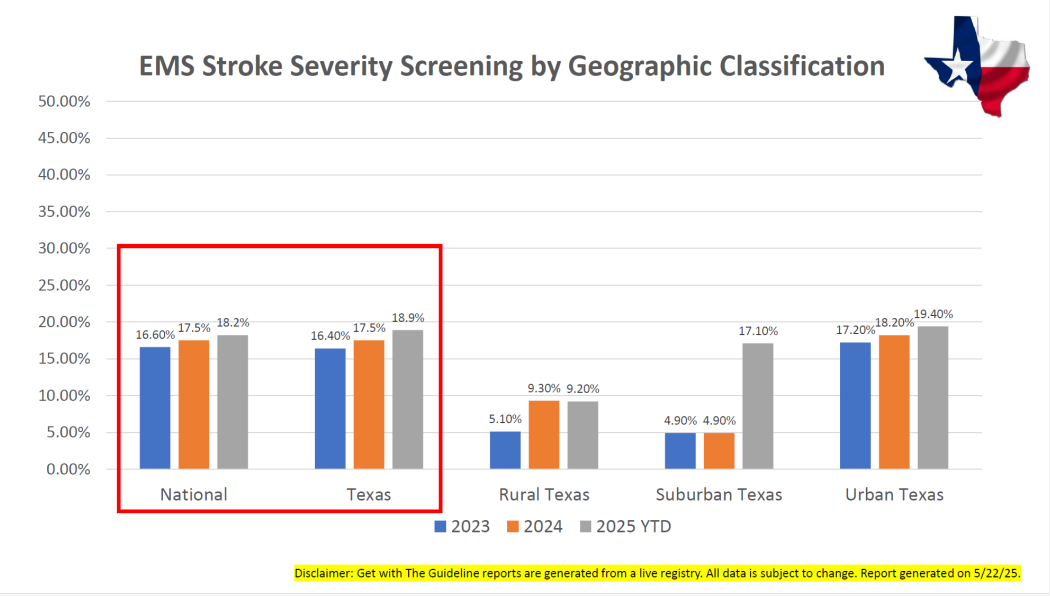
Stroke Committee

Priority Not Implemented
Priority Activities Recorded
Priorities Completed and being Monitored

Committee Priorities	Current Activities	Status
Texas Stroke Quality Performance Report	• Review and disseminate Texas Stroke Quality report. • Share with TCCVDS. • Use the quality report to identify barriers to stroke care and opportunities for improvement. • **Stroke Committee approved endorsing participation with GWTG prehospital and interfacility layers.**	
RDC report	• Update from RDC at Stroke Committee meeting. • **Discussion of more rural hospitals participating than higher levels I and II.** • **RDC will not be the ultimate source for the performance report. Need to continue with GWTG** • **Discussion on GWTG super user account**	
Patient safety and quality concern – Neuro IR coverage	• Letter citing patient safety concern regarding Neuro IR call coverage discussed. • Multiple TX providers gave first-hand experience supporting statements in the letter 11/2024. • Stroke Committee and GETAC Council approved as a quality and patient safety concern. • Barriers to finding objective measures to demonstrate delays, patients inappropriately denied MT and misuse of resources. • DSHS is working with DNV and TJC to review transfers out from hospitals • Disseminate Stroke Committee and SSOC WG recommendation for internal review for hospitals.	

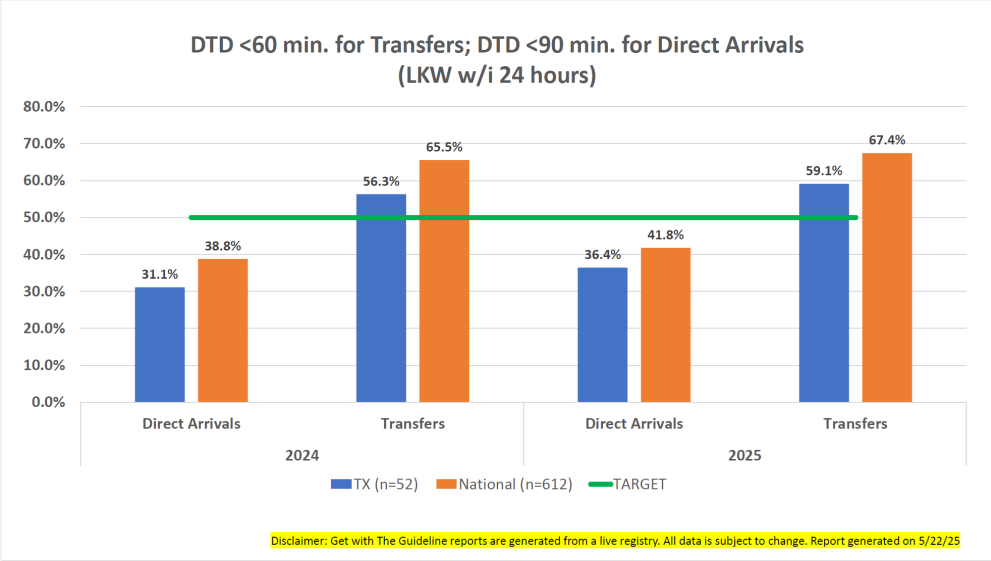
Highlights Texas Stroke Quality Report

- **Median DTN by RAC: Texas continues to hold below the national median at 39 minutes.**
- **Suburban hospital group is relatively small in comparison to rural and urban and can be easily skewed based on just a few sites' data. Please keep this in mind while reviewing, as their metrics in some areas are significantly better than the other 2 groups.**
- **Median DIDO for Acute Therapy Eligible Patients: Texas continues to lag in the national average, but is seeing a better start to 2025, with a median of 142 minutes.**
- **EMS Stroke Severity Screening: Texas is experiencing continued improvement in compliance with documentation of this element and is slightly ahead of the national compliance rate at 18.9%.**



Highlights Texas Stroke Quality Report

- **TPA vs TNK Usage slide: There appears to be full transition to TNK in 13 additional RACS.**
- **EMS on Scene Time: Percentages of cases where EMS is spending more than 15 minutes on scene before transfer is increasing.**
- **Stretch goal to 75% DTD in 90 minutes for transfer cases, since we are over the 50% goal set by GWTG in Texas.**
- **New GWTG Benchmark Groups:**
  - Allison has updated and created manually benchmark groups that can now be applied to the GWTG data for comparison.
  - 212 hospitals in Texas utilize GWTG. Of the 191 Texas-designated stroke hospitals, 168 utilize GWTG (87.9%).



Rural Stroke Facility Opportunity

American Heart Association.

Currently Participating

American Heart Association. Get With The Guidelines. Stroke

Texas Stroke GWTG Sample

- **212** TX Hospitals participating in GWTG
  - 49 participating hospitals classified as **"Rural,"** using the Rural Urban Commuting Area (RUCA) codes 4-10 and 99
  - 29 Rural sites joined as part of the **Rural Healthcare Outcomes Accelerator** program
  - 84 participating in RDC = 40% of TX GWTG Hospitals
    - PI Workgroup recommended goal = 60% (44 more hospitals)

American Heart Association.

RURAL HEALTH CARE OUTCOMES ACCELERATOR

Enrollment open until June 30, 2025

Project Mission

The Rural Health Care Outcomes Accelerator will work to ensure Americans living in rural areas have the best possible chance of survival and the highest quality of life attainable by promoting consistent, timely, and appropriate evidence-based care.

Rural Hospital Eligibility & Impact

Enrollment grants are available! Over 550 new participants have joined over the first 2.5 years of this program aiming to enroll 700 rural participants. While the Rural Accelerator is in it's 3rd and final enrollment year, most of the program benefits will be sustained except the no cost access to Get With The Guidelines®. The time to join this dynamic program is now! 150 new rural program participant grants remain available within Get With The Guidelines® quality programs for coronary artery disease, heart failure, and stroke. Participants will be invited to learning collaboratives, clinical education courses, and benefit from specialized quality improvement consultation. Target participants include Critical Access Hospitals, Rural Emergency Hospitals and/or hospitals in geographic areas outside of an urban setting located within census tracts associated with Rural Urban Commuting Area of small, large, or isolated Rural.

Benefits for Rural Hospitals

Rural Quality Program Support
New participants will receive Get With The Guidelines®- Stroke, CAD or HF at no cost for 3 years beginning with the year of their enrollment (2025, 2026, 2027) and support by a dedicated AHA Rural Quality Program Consultant.

Rural Education
AHA professional membership scholarships, continuing education courses, and clinical expert guided toolkits that can easily be consumed and assimilated by rural hospital teams will increase the translation of rural acute care opportunities into routine practice. These multimodal stroke, cardiac, and heart failure resources will align with AHA's Quality Improvement & Certification Programs, Scientific Community recommendations, and Outpatient Programs such as Target: PB, Check. Change. Cholesterol, target: Type 2 Diabetes.

Rural Community Network
An AHA virtual network that encourages peer to peer connection of health care professions within the inpatient and outpatient communities through an innovative, accessible, and interactive platform.

Model Sharing & Research
AHA convened quarterly cardiac and stroke rural learning collaboratives provide a forum for sharing model practice strategies and promote opportunities to present at regional and national rural conferences. AHA's Rural Quality Team will convene rural clinical experts and leaders and ultimately establish a writing committee to develop and publish rural quality and outcomes research.

Rural Recognition
Equitable Get With The Guidelines®- Stroke, CAD and HF Rural Recognition Awards are available for rural hospitals who provide excellent care to these unique evidence-based performance measures.

For more information, please email RuralGWTGSupport@heart.org
or apply at heart.org/ruralaccelerator

Stroke Committee

Priority Not Implemented
Priority Activities Recorded
Priorities Completed and being Monitored

Committee Priorities	Current Activities	Status
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NCTTRAC Proposed Recommendation

Comprehensive and Thrombectomy Capable Stroke Centers that perform mechanical thrombectomy should have adequate coverage to meet the emergent needs of multiple strokes. Each facility should have a written call schedule readily available within the hospital system, identifying the on-call and backup on-call interventional provider privileged to perform mechanical thrombectomy (neurointerventionalist) 24 hours a day, 7 days a week, 365 days a year. The neurointerventionalist taking calls should be available by phone within 20 minutes and available on-site within 30 minutes from notification. When concurrent facilities are covered by either the primary or backup on-call provider, the following should be in place:

* If one neurointerventionalist is primary on-call concurrently at 2 facilities there should be one dedicated backup on-call provider for each facility (e.g., two hospitals with shared coverage, one primary and 3 tier backup on-call coverage).
* The dedicated primary neurointerventionlist on-call at one facility may serve as backup call for no more than 1 hospital at any given time (e.g. primary call at one facility and backup at one additional facility).
* The facilities with cross coverage should be in close proximity, allowing the neurointerventionlist either serving as primary or backup on-call to be available on site within 30 minutes.

Comprehensive and Thrombectomy Capable Stroke Centers that utilize a system of care to deliver stroke care, treatment, and services may utilize the same interventionists provided the following requirements are met:

* Written call schedules are readily available within the hospital system to demonstrate how stroke care, treatment, and services are provided at all hospitals in the system 24 hours a day, 7 days a week, 365 days a year.
* If one physician is covering more than one facility or another service in the organization, there is a written plan for backup coverage.
* Protocols and processes are developed and implemented to detail the system and organizations' plans to meet the emergent needs of multiple complex stroke patients.
* Protocols and processes are developed in response to times organizations would not be able to provide mechanical thrombectomy services and subsequently transfer patients or notify Advisory -Capability with comment.

Comprehensive and Thrombectomy Capable Stroke Centers that perform mechanical thrombectomy and utilize an independent contracted provider or group for neurointerventional coverage to deliver stroke care, treatment, and services should have the following requirements met by the contracted provider or group:

*Written call schedules are readily available outlining all of the hospitals that the primary and backup on-call providers are covering for the shift.
*If one contracted physician is covering more than one facility, there is a written plan to meet the emergent needs of multiple stroke patients for each of the facilities.
*Protocols and processes are developed in response to times the primary and backup on-call providers would not be able to provide mechanical thrombectomy services and subsequently transfer patients or notify of Advisory-Capability with comment. *

Stroke Committee

Priority Not Implemented
Priority Activities Recorded
Priorities Completed and being Monitored

Committee Priorities	Current Activities	Status
Adult Prehospital Stroke Resource	• Final routing algorithm approved through GETAC Council 03/2025 • **Resource document for adult algorithm revisions approved by required committees 06/2025.** • **Approval items: Adult Resource Document**	
Pediatric Stroke Task Force	• **Algorithm put into final form and approved by required committees and pediatric stroke task force 06/2025.** • **Approval items: Pediatric Routing algorithm** • **The resource document needs final approval from the Pediatric Committee. Approved by the task force and required committees.** • **Pediatric Stroke Tip Sheet is still under review by the Pediatric Stroke Task Force.** • Next steps, minimum capability recommendations for pediatric hospitals to be destinations for pediatric stroke.	

Stroke Committee

Priority Not Implemented
Priority Activities Recorded
Priorities Completed and being Monitored

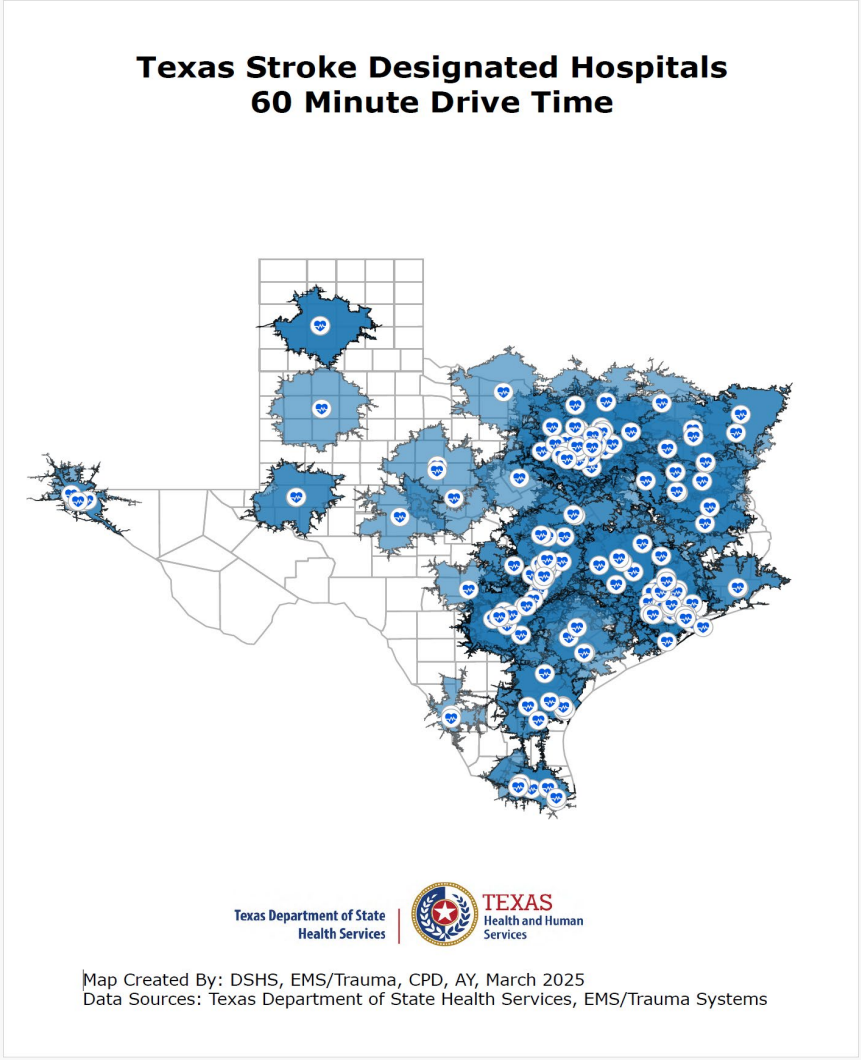
Committee Priorities	Current Activities	Status
Interfacility Stroke Terminology	• Worked with Drs. Fagan and Winckler from the last session presented revisions, which were approved by the Stroke, EMS, Air Medical, and EMS Medical Director Committees in 11/2024. • Presented to the GETAC Council but not approved 11/2024. • **Participating with the EMS Time Sensitive Deconfliction Task Force**	
DIDO performance recommendations	• Approved by Committees and the GETAC Council 11/2024. • **Working on disseminating to Stroke programs and RAC chairs.** • **Long-term goal, collect the data to outline barriers for interfacility transfers and opportunities to facilitate faster DIDO** • **Stroke Committee liaison with EMS Education Committee**	
TEAM EMS-Ed Study	• **Study endorsed by Stroke, EMS and EMS Medical Directors Committees 06/2025.** • **Will reach out the EMS Education Committee** • **Study submitted to LSSC for funding.** • **Update about LSSC, desire to partner with TX projects/studies.** • **Call for members for the educational content writing group** • **Request Council endorsement of study**	

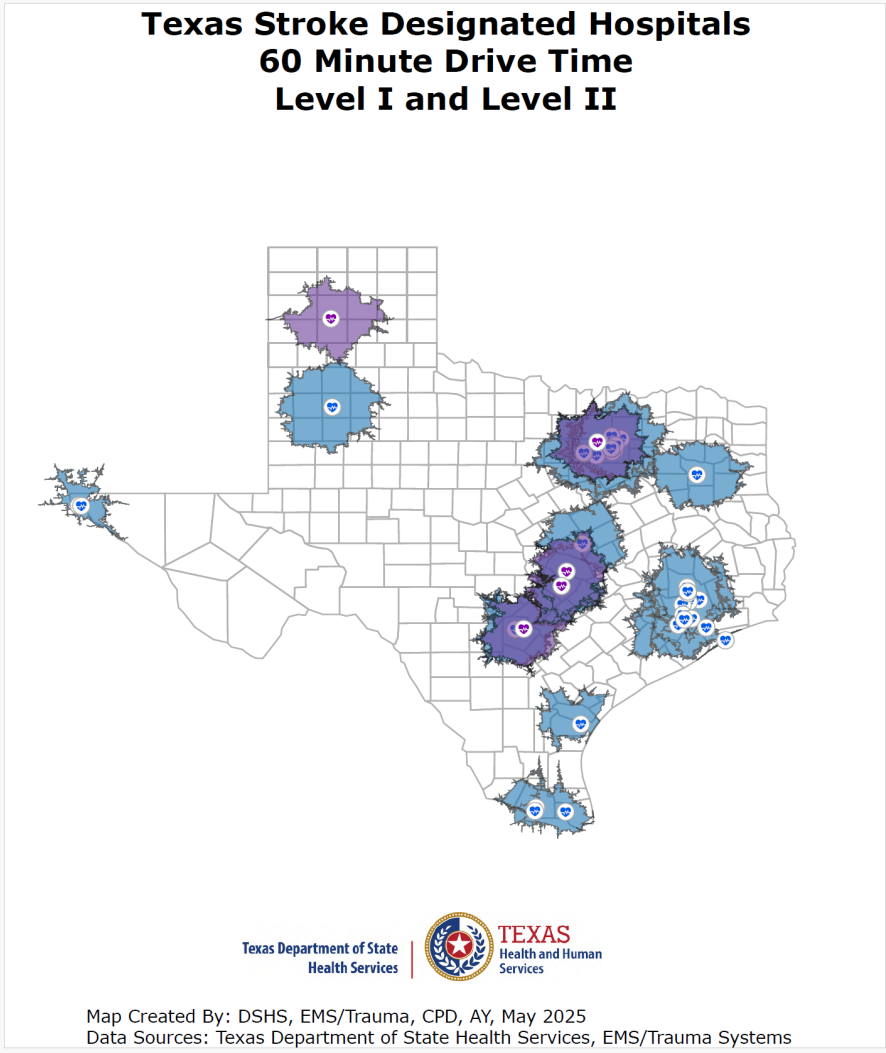
Stroke Committee

Priority Not Implemented
Priority Activities Recorded
Priorities Completed and being Monitored

Committee Priorities	Current Activities	Status
Post Acute Stroke Care Work Group	• Approved by Stroke Committee 11/2024 • Dr. Sean Savitz will lead the work group • **Call for members, planned first meeting 07/2025**	
Stroke Managers Mentorship Program and Texas Stroke Coordinators Collaborative Survey	• Education Work Group discussing the platform and feasibility of the mentorship program. • Working on the stroke managers' survey. • Will incorporate some questions from the prior survey.	
STRAC Stroke Program Manager Manual	• Collect and share resources related to stroke program management, stroke coordinator & manager roles, and process improvement. • Presented 11/2024, continue to look at opportunities for disseminating the resource.	
Rural Stroke Work Group	• **Met twice after the prior session, plan to meet monthly.** • **Working on defining rural and resource-challenged regions and hospitals to be included in the scope of work group.** • **Working on questions for the needs assessment survey.** • **Reviewed heat maps.**	

Texas Stroke Heat Maps





Rural Stroke Work Group Action Items:

- Martee Tebow, Sarah Hancock, Jennine Fox, Dr. Mandy Jagolino-Cole, and Janine Mazabob will work on a recommendation for public awareness and education on stroke to target rural areas (English and Spanish) – target early September for presentation.
- Looking at performance measures that can be followed for rural areas.
- Guideline statements, AHA/ASA and BAC recommendations specific to rural stroke are being reviewed.

Stroke Committee

Priority Not Implemented
Priority Activities Recorded
Priorities Completed and being Monitored

Committee Priorities	Current Activities	Status
Texas EMS Stroke Survey	• **Results will be shared.**	
The Stroke Committee endorsed stroke education and certification courses.	• Ongoing effort identifying stroke educational opportunities for providers	
Stroke Education Resources for stroke facilities	• **Working with DSHS for website access to stroke education**	
Work with DSHS to outline recommendations for stroke rules for ASRH	• Pending further direction	

Stroke Committee

- **Committee items needing council guidance**
  1. None at this time

- **Stakeholder items needing council guidance**
  1. None at this time

- **Items referred to GETAC for future action**
  1. None at this time

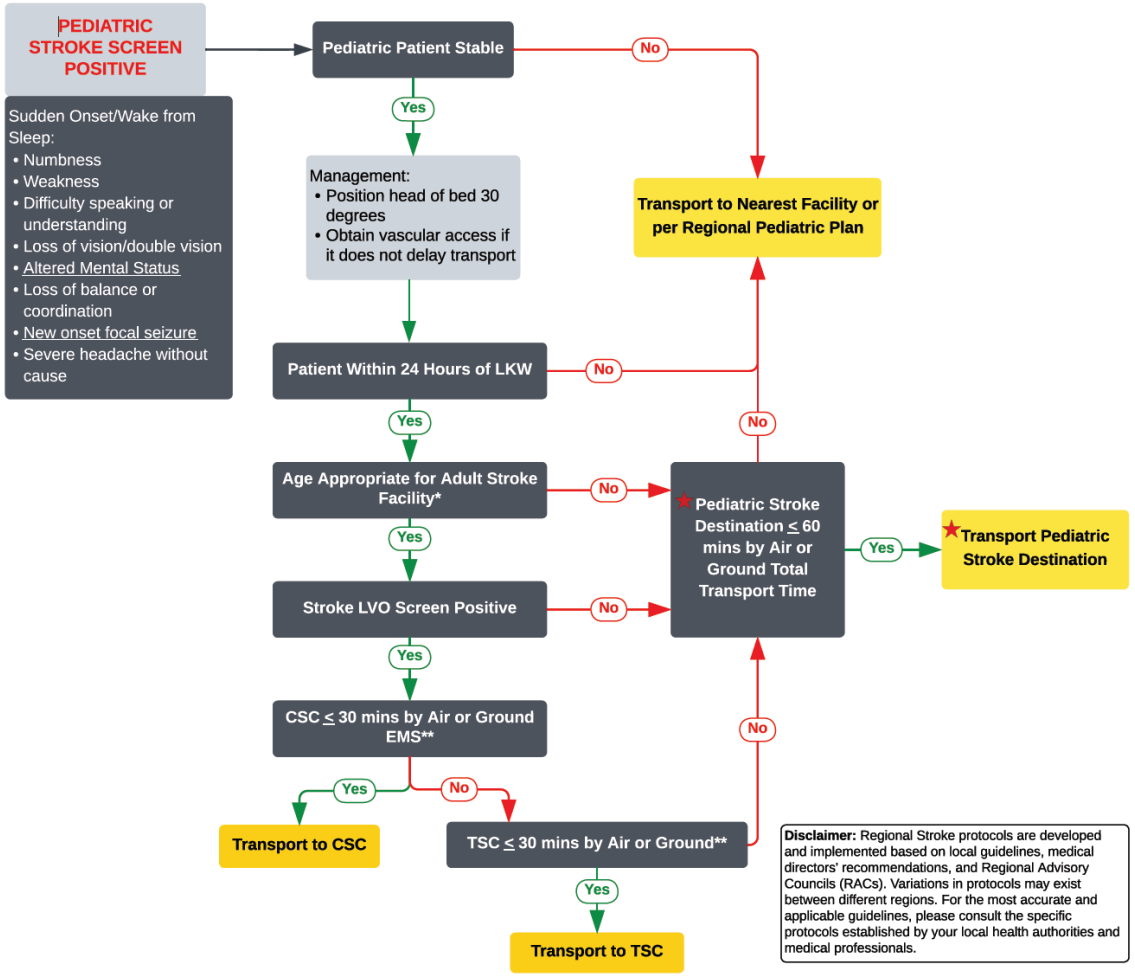
GETAC Stroke Committee

- **Committee items needing council approval:**
  1. Adult EMS stroke resource document
  2. Pediatric Stroke Routing Algorithm
  3. Endorsement TEAM EMS-Ed study
- **Action items for the next session:**
  1. Pediatric Stroke resource document.
  2. Pediatric stroke tip sheet and supplement
  3. Rural Stroke Needs Assessment Survey

8.i.A. Approve: Pediatric Stroke Triage Algorithm with Resource Documents

EMS Acute Pediatric Stroke Routing Resource Document

INSERT WATERMARK - Resource Document



Disclaimer: Regional Stroke protocols are developed and implemented based on local guidelines, medical directors' recommendations, and Regional Advisory Councils (RACs). Variations in protocols may exist between different regions. For the most accurate and applicable guidelines, please consult the specific protocols established by your local health authorities and medical professionals.

*Different adult stroke facilities will have different capabilities and willingness to evaluate and treat stroke patients under 18. RACs should outline the patients age appropriate for adult stroke facility admission based on regional facility resources and hospital policies; ** Within ≤ 30 minutes past the nearest Pediatric Stroke Destination and no more than 60 minutes total transport time by air or ground.

★There are **no** formal national or statewide guidelines, certifications, or recognition systems for 'Pediatric Stroke Destination'. EMS Medical Directors should determine which nearby facilities they will direct pediatric patients with suspected or confirmed stroke. **MOST** of these facilities will be tertiary care children's hospitals. CSC: Comprehensive Stroke Center; TSC: Thrombectomy Capable Stroke Center; LVO: large vessel occlusion; RAC: Regional Advisory Council

APPROVAL ITEM 08/2025: Resource Document for Pediatric Stroke

PREHOSPITAL PEDIATRIC STROKE TRIAGE AND MANAGEMENT

1. **Goals:**

   To increase EMS awareness and identification of strokes in the pediatric population (infants and children less than 18 years of age) and to facilitate rapid triage and transport to the nearest appropriate facility.

2. **Purpose:**

   Pediatric Stroke is a rare disease that is, nevertheless, included among the top ten causes of death in pediatrics.[1] However, rapid recognition and appropriate treatment of pediatric stroke can profoundly improve outcomes for these children, sparing them from decades of disability.[2,3] Thrombectomy has been shown to improve outcomes in pediatric large artery occlusion stroke.[4] This guidance document is designed to help EMS providers recognize and triage pediatric stroke patients quickly, facilitating improved outcomes throughout the state.

   The **GETAC Prehospital Pediatric Stroke Triage Algorithm** was developed in consultation with EMS, EMS leaders, and local, regional, and state medical authorities. The GETAC pediatric stroke algorithm was developed in consultation with the GETAC Stroke, EMS, Pediatric, EMS Medical Directors Committees, and the Council. Available guideline statements and guidance from the GETAC Pediatric Stroke Task Force (a consensus of expert opinion based on clinical experience in the fields of Vascular Neurologists, Neuroendovascular Surgeons, and pediatricians) were integral in the algorithm development.[5-13] The recommendations were developed to ensure that all pediatric patients with a known or suspected stroke are rapidly identified, assessed, and triaged as outlined below. Standardizing care to rapidly diagnose and provide appropriate treatment will improve outcomes.[9-12] The prehospital pediatric stroke triage and transport recommendations serve to direct the regional triage of pediatric patients with acute stroke to the most appropriate facility. See **Annex A: GETAC Pediatric Prehospital Stroke Triage Algorithm**.

There are no formal national or statewide guidelines, certifications, or recognition systems for Pediatric Stroke Destinations. EMS Medical Directors should determine which nearby facilities they will direct pediatric patients with suspected or confirmed stroke. A pediatric stroke destination should have personnel available to care for pediatric stroke patients and a pediatric intensive care unit. Pediatric stroke destinations should have a multidisciplinary team to care for pediatric stroke patients, the capability to administer antiplatelet drugs, anticoagulants, thrombectomy, and thrombolytic therapies, and the ability to treat complications. Pediatric stroke destinations should have the technical capabilities (including imaging capability, MRI if possible), policies, and procedures to facilitate optimal care of a pediatric stroke patient.[9-12] Pediatric hospitals that do not meet the above capabilities should be able to identify, stabilize, consult, and transfer patients to a center that can provide the appropriate care and rehabilitative resources.[9-12]

3. **Prehospital Triage of Stroke in Pediatric Patients**

   Pediatric stroke can present with focal neurologic signs, as well as nonspecific signs like seizure or altered mental status.[9,14-16]

   Sudden onset of any of the following suggests the possibility of acute stroke:

   - Numbness or weakness of the face, arm, and/or leg (especially on one side of the body)
   - Confusion
   - Trouble speaking or understanding language.
   - Double vision, trouble seeing in one or both eyes.
   - Altered Mental Status
   - Trouble walking
   - Dizziness
   - Loss of balance or coordination
   - Severe headache with no known cause (suggests hemorrhagic stroke), especially with altered mental status.

   ❖ For patients with any of the above neurological signs, especially with the listed conditions below, consider triaging as an acute stroke.

   Patients with any of the following are at higher risk for acute stroke:

   - Heart disease
   - History of blood vessel problems in the brain
   - History of stroke
   - Sickle cell disease
   - Cancer
   - History of blood clots

   Common pediatric stroke mimics:

   - Alcoholic intoxication
   - Cerebral infections

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APPROVAL ITEM 08/2025: Resource Document for Pediatric Stroke

- Drug overdose
- Hypoglycemia
- Hyperglycemia
- Genetic/metabolic disorders
- Atypical migraines
- Neuropathies (e.g., Bell's palsy)
- Seizure
- Post-ictal state
- Tumors

Basic Level

In suspected pediatric stroke cases, assess and treat ABCDEs per universal pediatric recommendations:

- **A (Airway):** Airway support and ventilation assistance are recommended for patients with acute stroke who have decreased consciousness or who have a compromised airway. Suctioning and oropharyngeal or nasopharyngeal airway as needed to ensure airway patency.
- **B (Breathing):** Supplemental oxygen should be provided to maintain oxygen saturation > 94% (continuous monitoring).
- **NOTE:** Some patients with congenital heart disease have a different goal saturation level (80-90% in some cases). If unsure, confirm the normal level with parents or caretakers.
- **C (Circulation):** Evaluate and treat signs/symptoms of shock according to the Shock Clinical Practice Guidelines
- **D (Disability)**: Assess and document GCS, pupillary size, and reactivity.
- **E (Exposure/Environmental):** Assess for evidence of traumatic injury, especially head injury.

Stabilization and Initial Management:

- If there is evidence of shock, treat according to the Shock clinical practice guidelines.
- If there is hypoglycemia (POC glucose < 70 mg/dL),[17] treat according to the diabetic emergencies clinical practice guidelines.
- If seizures occur, treat according to the seizure clinical practice guidelines.
- Place the patient in a supine position, head of the bed elevated 30 degrees.
- Cardiac monitoring during transport is recommended.

Cardiovascular Examination:

- Record blood pressure, rate, rhythm, respiratory rate, and oxygen saturation.
- Obtain an EKG if it will not delay transport.

Neurological Assessment for Pediatric Stroke:

- Weakness of the face, arm, and/or leg (especially on one side of the body)
- Numbness on one side of the face or body
- Confusion
- Trouble speaking or understanding language.

- Double vision, trouble seeing in one or both eyes.
- Altered Mental Status
- Trouble walking
- Dizziness
- Loss of balance or coordination
- Severe headache with no known cause (suggests hemorrhagic stroke), especially with altered mental status.
- Seizure with post-ictal focal deficit (like weakness) that does not resolve quickly (~15 minutes).

History:

Interview the patient, family members, and other witnesses to determine symptoms, the time of symptom discovery, and the last known well (LKW) or the last time the patient was without symptoms. Ask about seizure at onset, head trauma, history of recent surgeries, history of bleeding problems/diagnosed bleeding disorders, and signs of possible brain hemorrhage (severe headache of sudden onset, nausea/vomiting with headache or loss of consciousness). Obtain a mobile number for the next of kin and witnesses.

- ❖ **NOTE:** For "wake-up strokes," the last known well time is the last time the patient was witnessed to be at baseline, which may have been the night before. The time they are found is not the time of the last known well.

Additional History:

- Obtain past medical history and history of past and recent surgeries.
- Allergies (e.g., iodinated contrast)
- Pre-existing substantial disability (e.g., unable to walk independently)
- Device and implant history (e.g., left ventricular assist device, pacemaker, valve replacement, VP shunt)

Medications:

- Obtain a list of all medications including antiplatelet agents (e.g., aspirin, clopidogrel [Plavix]) and blood thinners (direct thrombin inhibitors [dabigatran/Pradaxa], factor Xa inhibitors [fondaparinux/Arixtra, rivaroxaban/Xarelto, apixaban/Eliquis, edoxaban/Savaysa]), low molecular weight heparin [enoxaparin/ Lovenox], unfractionated heparin, bivalirudin, argatroban, warfarin [Coumadin].
- If possible, record when the last dose was taken.

Management:

EMS personnel should address ABCDEs per universal pediatric guidelines. Additional initial management steps include:

- Prevent aspiration, HOB > 30. Ensure airway patency with suctioning and OPA or NPA as needed.
- Provide supplemental oxygen if needed to keep oxygen saturation > 94%.
  - (Adjust if the patient has known congenital heart disease with a different goal oxygen saturation)
- Treat hypotension per regional pediatric protocols.

APPROVAL ITEM 08/2025: Resource Document for Pediatric Stroke

- Maintain blood pressure below 20% above the 95th percentile for age.[12] Call online medical control if the systolic blood pressure is consistently above this percentile. The table below is an example of the upper limit of systolic blood pressure by age.

Age	Goal Systolic Blood Pressure
1-4 years	<130mmHg
5-10 years	<145mmHg
11-17 years	<160mmHg

- Hypoglycemia (blood glucose < 70 mg/dL) should be treated in patients suspected of acute ischemic stroke.[17] Evidence indicates that persistent in-hospital hyperglycemia during the first 24 hours after stroke is associated with worse outcomes and increased risk of hemorrhagic conversion in adults than normoglycemia. You should treat hyperglycemia with a blood glucose range of 140-180 being preferred.
- To facilitate expedited stroke workup in the ED, place two peripheral IVs, so long as it does not delay transport time.

System Triage:

- The goal on-scene time is 10-15 minutes or less. If the family is not transported with the patient, encourage them to go directly to the ED.
- See **Annex A: GETAC Pediatric *Prehospital Stroke Triage Algorithm*** forthe pediatric prehospital stroke triage algorithm.

Destination Decision-Making for Suspected Pediatric Stroke in Rural, Urban, and Suburban Areas

Age Criteria and Appropriateness for ADULT Stroke Facility: Please note that different adult stroke facilities will have different capabilities and willingness to evaluate and treat stroke patients under 18. EMS Medical Directors and stroke facility leadership should outline the age appropriateness for adult stroke facility admission based on regional facility resources and hospital policies.

Triage Recommendation:

1. Pediatric patient suspected of having a stroke who is medically stable and last known well **≤ 24 hours**; triage patient based on the following criteria:

   Age appropriateness for adult stroke facility:

   - Pediatric patient with suspected stroke, **age < appropriate:**
     - Transport suspected stroke patient to the nearest **Pediatric Stroke Destination***
       - **Pediatric Stroke Destination** – EMS Medical Director will recommend local pediatric stroke destinations. Typically, these are pediatric hospitals with the capability to care for pediatric patients with stroke. Please note, there are **NO** formal national or statewide guidelines, certifications, accreditations, or recognition systems for 'Pediatric Stroke Destinations'.
     - If no Pediatric Stroke Destination is within 60 minutes by air or ground total transport time, or the patient is unstable, transport to the nearest Pediatric Facility.
   - Suspected pediatric stroke, **age ≥ appropriate:**
     - Perform Validated Stroke Severity Screening Tool to assess for potential large vessel occlusion (LVO), such as RACE score.[18]
     - **If LVO Screening Tool Positive:**
       - Transport suspected stroke patients to the nearest adult Comprehensive Stroke Center (CSC/ Level 1) if within ≤ 30 minutes from the nearest Pediatric Stroke Destination and no more than 60 minutes total transport time by air or ground.
       - If no CSC is available within 30 minutes, transport to the nearest thrombectomy capable stroke center (TSC/ Level 2) if within < 30 minutes from the nearest Pediatric Stroke Destination and no more than 60 minutes total transport time by air or ground.
       - If neither a CSC nor TSC is available within ≤ 30 minutes, transport to the nearest Pediatric Stroke Destination.
       - If no Pediatric Stroke Destination is available within ≤ 60 minutes or the patient is unstable, transport to the nearest Pediatric Facility.
     - **If LVO Screening Tool Negative:**
       - Transport suspected stroke patients to the nearest Pediatric Stroke Destination.
       - If no Pediatric Stroke Destination is within 60 minutes by air or ground total transport time, or the patient is unstable, transport to the nearest Pediatric Facility or most appropriate facility.
2. Pediatric patient suspected of having a stroke and last known well **> 24 hours**, triage based on the following criteria:
   - Suspected pediatric stroke, **for all ages:**
     - Transport suspected stroke patients to the nearest Pediatric Stroke Destination.
     - If no Pediatric Stroke Destination is within a 60-minute total transport time or the patient is unstable, transport to the nearest Pediatric Facility.

❖ **For all ages:** consider air medical if transport time is prolonged > 60 minutes.

❖ **Stroke Prenotification**: alert the receiving facility that a suspected pediatric stroke patient is en route prior to arrival. A stroke alert prior to arrival will mobilize appropriate resources before patient arrival.
   - Prenotification should include: Age, last known well, time of symptom discovery, current vital signs, stroke screening tool score (if performed), and symptoms (weakness on one side, altered mental status, etc.).

❖ **Hand-off Goal**: 120 seconds for EMS to ED triage nurse hand-off.

(Note – Plan is adapted from the 2022 North Central Texas Trauma Regional Advisory Council Regional Stroke Plan)

Last Update – 06.03.2025

APPROVAL ITEM 08/2025: Resource Document for Pediatric Stroke

References:

1. CDC. 10 Leading Causes of Death, US. https://wisqars.cdc.gov/pdfs/leading-causes-of-death-by-age-group_2021_508.pdf. Accessed April 20, 2025.
2. Bhatia KD, Briest R, Goetti R, Webster R, Troedson C, Dale RC, Muthusami P, Miteff C, Miteff F, Worthington J, et al. Incidence and Natural History of Pediatric Large Vessel Occlusion Stroke: A Population Study. *JAMA Neurol*. 2022;79:488-497. doi: 10.1001/jamaneurol.2022.0323
3. Lauzier DC, Galardi MM, Guilliams KP, Goyal MS, Amlie-Lefond C, Hallam DK, Kansagra AP. Pediatric Thrombectomy: Design and Workflow Lessons From Two Experienced Centers. *Stroke*. 2021;52:1511-1519. doi: 10.1161/STROKEAHA.120.032268
4. Sporns PB, Bhatia K, Abruzzo T, Pabst L, Fraser S, Chung MG, Lo W, Othman A, Steinmetz S, Jensen-Kondering U, et al. Endovascular thrombectomy for childhood stroke (Save ChildS Pro): an international, multicentre, prospective registry study. *Lancet Child Adolesc Health*. 2024;8:882-890. doi: 10.1016/S2352-4642(24)00233-5
5. Adeoye O, Nystrom KV, Yavagal DR, Luciano J, Nogueira RG, Zorowitz RD, Khalessi AA, Bushnell C, Barsan WG, Panagos P, et al. Recommendations for the Establishment of Stroke Systems of Care: A 2019 Update. *Stroke*. 2019;50:e187-e210. doi: 10.1161/STR.0000000000000173
6. Powers WJ, Rabinstein AA, Ackerson T, Adeoye OM, Bambakidis NC, Becker K, Biller J, Brown M, Demaerschalk BM, Hoh B, et al. Guidelines for the Early Management of Patients With Acute Ischemic Stroke: 2019 Update to the 2018 Guidelines for the Early Management of Acute Ischemic Stroke: A Guideline for Healthcare Professionals From the American Heart Association/American Stroke Association. *Stroke*. 2019;50:e344-e418. doi: 10.1161/STR.0000000000000211
7. Jauch EC, Schwamm LH, Panagos PD, Barbazzeni J, Dickson R, Dunne R, Foley J, Fraser JF, Lassers G, Martin-Gill C, et al. Recommendations for Regional Stroke Destination Plans in Rural, Suburban, and Urban Communities From the Prehospital Stroke System of Care Consensus Conference: A Consensus Statement From the American Academy of Neurology, American Heart Association/American Stroke Association, American Society of Neuroradiology, National Association of EMS Physicians, National Association of State EMS Officials, Society of NeuroInterventional Surgery, and Society of Vascular and Interventional Neurology: Endorsed by the Neurocritical Care Society. *Stroke*. 2021;52:e133-e152. doi: 10.1161/STROKEAHA.120.033228
8. Association AH. American Heart Association Mission Lifeline: Stroke Severity-based Stroke Triage Algorithm for EMS [online]. Accessed April 18, 2025.
9. Harrar DB, Benedetti GM, Jayakar A, Carpenter JL, Mangum TK, Chung M, Appavu B, International Pediatric Stroke Study G, Pediatric Neurocritical Care Research G. Pediatric Acute Stroke Protocols in the United States and Canada. *J Pediatr*. 2022;242:220-227 e227. doi: 10.1016/j.jpeds.2021.10.048
10. Rafay MF. Moving Forward in Organizing Acute Pediatric Stroke Care. *Can J Neurol Sci*. 2021;48:750-751. doi: 10.1017/cjn.2021.47
11. Roach ES, Bernard T, deVeber G. Defining a Pediatric Stroke Center. *Pediatr Neurol*. 2020;112:11-13. doi: 10.1016/j.pediatrneurol.2020.08.008
12. Rivkin MJ, Bernard TJ, Dowling MM, Amlie-Lefond C. Guidelines for Urgent Management of Stroke in Children. *Pediatr Neurol*. 2016;56:8-17. doi: 10.1016/j.pediatrneurol.2016.01.016
13. Ferriero DM, Fullerton HJ, Bernard TJ, Billinghurst L, Daniels SR, DeBaun MR, deVeber G, Ichord RN, Jordan LC, Massicotte P, et al. Management of Stroke in Neonates and Children: A Scientific Statement From the American Heart Association/American Stroke Association. *Stroke*. 2019;50:e51-e96. doi: 10.1161/STR.0000000000000183
14. Elbers J, Wainwright MS, Amlie-Lefond C. The Pediatric Stroke Code: Early Management of the Child with Stroke. *J Pediatr*. 2015;167:19-24 e11-14. doi: 10.1016/j.jpeds.2015.03.051
15. Phelps K, Silos C, De La Torre S, Moreno A, Lapus R, Sanghani N, Koenig M, Savitz S, Green C, Fraser S. Establishing a pediatric acute stroke protocol: experience of a new pediatric stroke program and predictors of acute stroke. *Front Neurol*. 2023;14:1194990. doi: 10.3389/fneur.2023.1194990
16. Wharton JD, Barry MM, Lee CA, Massey K, Ladner TR, Jordan LC. Pediatric Acute Stroke Protocol Implementation and Utilization Over 7 Years. *J Pediatr*. 2020;220:214-220 e211. doi: 10.1016/j.jpeds.2020.01.067
17. GETAC. Pediatric Stroke Task Force Expert Opinion 2025. Accessed April 20, 2025.
18. Turon-Vinas E, Boronat S, Gich I, Gonzalez Alvarez V, Garcia-Puig M, Camos Carreras M, Rodriguez-Palmero A, Felipe-Rucian A, Aznar-Lain G, Jimenez-Fabrega X, et al. Design and Interrater Reliability of the Pediatric Version of the Race Scale: PedRACE. *Stroke*. 2024;55:2240-2246. doi: 10.1161/STROKEAHA.124.046846

Last Update – 06.03.2025

8.i.B. Approve: Adult prehospital stroke triage algorithm resource document

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PREHOSPITAL ADULT STROKE TRIAGE AND MANAGEMENT

1. **Goal**
   - The GETAC endorsed a triage recommendation to assist pre-hospital providers with the rapid identification, assessment, and triage of all suspected stroke patients in Texas. This recommendation aims to lower barriers to seeking emergency care for stroke and ensure that stroke patients receive care at appropriate facilities promptly.

2. **Purpose**
   - In consultation with emergency medical services (EMS) leaders, local, regional, and state agencies, as well as medical authorities, current national guideline statements, and local experts; the following recommendations seek to ensure that all patients with a known or suspected stroke are rapidly identified, assessed and triaged as outlined below.[1-15] 9-1-1 call centers and EMS dispatchers are encouraged to use standardized approaches to prehospital stroke assessment, triage, management, and interfacility documentation.
   - The prehospital acute stroke triage and transport recommendations serve to direct the triage of adult patients (greater than ≥ 18 years of age) to the most appropriate facility based on the duration and severity of symptoms. The **GETAC Adult Prehospital Stroke Triage Algorithm** is based on multi-society endorsed guideline statements and recommendations,[1-15] consensus of expert opinion (Vascular Neurologists, Neuroendovascular Surgeons, and Neurosurgeons) based on clinical experience and in consultation with the GETAC council, EMS, EMS Medical Directors, Air Medical, and Stroke Committees. *See **Annex A, B, and C: GETAC Adult** **Prehospital Stroke Triage Algorithm***
   - Regional stakeholders should collaborate to consider local prehospital and health care resources, individual stroke center performance, and geographic considerations to create an optimal stroke system of care (SSOC) and destination protocol to ensure effective and efficient stroke care.[1,4,10,13-15] Ideal destination plans should factor in all available data sources, including traffic patterns, site-specific performance data, and associated clinical outcomes.[1,4,14] EMS agencies should implement destination plans based on time and severity for patients with suspected large vessel occlusion (LVO) within 24 hours of the last known well. These plans should prioritize a nearby comprehensive stroke center (CSC) over other centers of lower capability when available within acceptable transport times.[4,14-16]
   - In response to the perceived need for greater access to thrombectomy, several of the accrediting agencies for stroke centers introduced a fourth level of certification for facilities that can effectively perform endovascular treatment (EVT) but do not meet all the criteria of a CSC, the Thrombectomy Capable Stroke Center (TSC). The American Stroke Association 2019 SSOC Recommendations and the American Heart Association (AHA) Mission: Lifeline Stroke outline that the TSC certification is intended for regions of the country that are not readily accessible to CSCs; a CSC is the preferred destination for patients with suspected LVO when they are within acceptable transport times.[1,4,15] If no CSC is available, a TSC should be the preferred destination for these patients from among all nearby primary stroke centers (PSCs).[1,2,4,15]
   - The AHA Lifeline Stroke Committee felt it was best to err on the side of caution and initially set the total transport time from the scene to CSC at 30 minutes for an urban area, 45 minutes in a suburban area, and 60 minutes in a rural area. However, patients eligible for IV thrombolysis (0-4.5 hours from last known well) should be routed to the nearest stroke facility if transport to the nearest CSC or TSC would make them ineligible for thrombolysis due to the additional transport time. In suburban and rural settings, prehospital destination plans and interfacility transport policies should prioritize transporting suspected LVO patients to a facility with well-defined evaluation and stabilization protocols to minimize Door-In-Door-Out (DIDO) times for patients requiring transfer to a higher level of care.[4,10,15] Additional transport time, including air medical transport, may be reasonable in rural communities or where large distances separate stroke centers.[1,4,13,15]

3. **SSOC Modification for Metropolitan, Non-Metropolitan, and Frontier Regions**
   - The following is adapted from the AHA Mission: Lifeline Stroke recommendation for Emergency Medical Services for acute stroke triage and routing.[1,2,4,13,15] These modifications to transport time thresholds are suggested to help EMS agencies adjust their regional stroke triage protocols in collaboration with local resources and key stakeholders.[4,13,15]
   - A Metropolitan SSOC modification is appropriate for a metro region (Urban/RUCA code 1)[4,17] These areas have a high population density (50,000+ inhabitants) and abundant healthcare resources, with EMS access to one or more TSC/CSC within 30 minutes of ground transport time.[4,15]
   - A Non-Metropolitan SSOC modification is appropriate for large residential communities adjacent to an urban core (Suburban/RUCA codes 2-3).[4,17] These areas generally have a population density closer to the urban threshold. They may have access to nearby community hospitals and suburban or urban advanced stroke centers within a 30–60-minute transport by EMS air or ground.[4,15] Patients with suspected LVO should be routed directly to a CSC if the maximum transport time from the scene to the CSC does not exceed 45 minutes. If no CSC is within 45 minutes, then EMS should go directly to a TSC if the maximum total transport time from the scene to the TSC does not exceed 45 minutes. If no TSC or CSC exists within 45 minutes of total travel time, EMS should go to the nearest acute stroke-ready hospital (ASRH) or PSC.[4,15]
   - A Frontier SSOC modification is appropriate for a small or non-metropolitan region (Rural/RUCA codes 4-10).[4,17] These areas generally have low population density (<50,000 inhabitants), limited local general healthcare resources, few nearby ASRH or PSC, and often no TSC/CSC within 60 minutes of transport time by EMS ground, although there may be one within 60 minutes by air.[4,15] Patients with suspected LVO should be routed directly to a CSC if the maximum total transport time from the scene to the CSC does not exceed 60 minutes.[4,15] If no CSC is within 60 minutes, then EMS should go directly to a TSC if the maximum total transport time from the scene to the TSC does not exceed 60 minutes.[4,15] Consider air medical transport if no certified stroke center is within 60 minutes by ground. If air transfer is unavailable,

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transfer the patient to the nearest hospital per the regional stroke plan.[4,15]

- The COVID-19 pandemic further emphasized the need for flexible prehospital triage and interfacility transport adaptation in response to local and regional factors. Preferential routing of suspected LVO patients to centers with thrombectomy capability may be of even greater importance when in-hospital and interfacility delays are amplified in conditions such as the COVID-19 pandemic.[18]

4. **Prehospital Triage of Stroke in Adult Patients**
   - **Basic Level**:
     - Assess and support ABCs according to UNIVERSAL CARE – ADULT:
       - **A (Airway)**: Airway support and ventilator assistance are recommended for patients with acute stroke who have decreased consciousness or a compromised airway. Suctioning and oropharyngeal or nasopharyngeal airway as needed to ensure airway patency.
       - **B (Breathing)**: Supplemental oxygen should be provided to maintain oxygen saturation >94% (continuous monitoring).[2]
       - **C (Circulation)**: Evaluate, document, and treat signs/symptoms of shock according to the Shock Clinical Practice Guidelines (CPG).
       - **D (Disability)**: Assess and document GCS, pupillary size, and reactivity.
       - **E (Exposure/Environmental)**: Assess for evidence of traumatic injury, especially head injury.
   - **Positioning and Stabilization**:
     - Place the patient in a supine position, with the head of the bed elevated at 30 degrees, if the patient can tolerate.[2,10] Keeping the patient at 30 degrees can improve blood flow to the brain[19,20] and is recommended if the patient can tolerate.[2,10] Avoid lying the patient flat unless an LVO is documented,[21] and the patient is not at risk for elevated intracranial pressure or herniation.[20]
     - Ensure airway patency with suctioning and oropharyngeal airway or nasopharyngeal airway as needed.
     - Cardiac monitoring during transport is recommended. Obtaining an EKG during workup is acceptable as long as it does not delay transport to the appropriate stroke facility.[2]
     - Treat hypotension. Evaluate, document, and treat signs/symptoms of shock according to the **Shock CPG**.
     - If hypoglycemia is present (POC glucose <60 mg/gL),[2] treat according to **Diabetic Emergencies CPG**. Hyperglycemia in acute ischemic stroke is associated with worse clinical outcomes,[22,23] including greater infarct growth[24,25] and hemorrhagic infarct conversion.[26,27]
     - If there is Seizure activity, treat according to the **Seizure CPG**.
   - **Management**:
     - EMS personnel should begin the initial management of stroke in the field as outlined in this document.
     - Provide supplemental oxygen if needed to keep oxygen saturation >94%.[2]
     - Treatment of hypertension is **NOT** recommended unless blood pressure is >220/120 mmHg.[2]
     - Avoid dextrose-containing fluids in non-hypoglycemic patients.[2]
     - Perform and document a POC Glucose analysis and treat according to the ASA 2019 Guidelines for Management of Acute Ischemic Stroke.[2]
       - Hypoglycemia (blood glucose <60 mg/dL) should be treated in patients suspected of acute ischemic stroke.[2]
     - To facilitate expedited stroke workup in the ED, place at least one 18 or 20-gauge IV in the antecubital fossa or forearm (right preferred).
     - To facilitate the fastest Door-to-Needle and stroke care, collect blood samples to provide the receiving facility, as long as it does not delay the transfer.
   - **Assessment**:
     - **History** - Interview patient, family members, and other witnesses to **determine symptoms**, **time of symptom discovery**, and **last known well** or last time patient without symptoms:
       - Obtain a mobile number for the next of kin and witnesses.
       - **NOTE**: For "wake-up strokes," the time documented is the time the patient was last known well, not the time the patient was found.
       - **NOTE**: Sudden onset of any of the following suggests the possibility of acute stroke:
         - Numbness or weakness of the face, arm, and/or leg (especially on one side of the body)
         - Confusion
         - Trouble speaking or understanding language
         - Double vision, trouble seeing in one or both eyes
         - Trouble walking
         - Dizziness
         - Loss of balance or coordination
         - Sudden onset of severe headache with no known cause (suggests hemorrhagic stroke)
         - Any asymmetry of the neurological exam
     - **Additional History**:
       - Obtain the patient's history, including co-morbid conditions, past medical history, recent surgeries, prior strokes, and allergies (iodinated contrast).
       - Items to report: seizure at onset of stroke symptoms, head trauma, history of recent surgeries, history of bleeding problems, history of recent stroke, signs of possible brain hemorrhage [severe headache of sudden onset, nausea/vomiting with headache or loss of consciousness (LOC)].
       - Obtain dates for **recent events**: surgery, stroke, bleed, or trauma.
       - Additional history: ask if symptoms are associated with a severe headache of sudden onset, loss of consciousness, nausea/vomiting, or the worst headache of their life.
       - Be alert to common stroke mimics*.
       - Determine if the patient has a substantial pre-existing disability (e.g., need for nursing home care or unable to walk independently).

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        - Obtain a list of all medications including: antiplatelet agents (e.g., aspirin, clopidogrel [Plavix]) and blood thinners (direct thrombin inhibitors [dabigatran/Pradaxa], factor Xa inhibitors [fondaparinux/Arixtra, rivaroxaban/Xarelto, apixaban/Eliquis, edoxaban/Savaysa], low molecular weight heparin [enoxaparin/ Lovenox], unfractionated heparin, bivalirudin, argatroban, or warfarin [Coumadin]).
            - If possible, record when the patient took the last dose.
        - Device/implant history (e.g., left ventricular assist device, pacemaker, valve replacement).
- **Examination**:
    - Assess and record blood pressure, rate, rhythm, respiratory rate, and oxygen saturation.
    - Apply a validated and standardized instrument for stroke screening, such as: FAST (Face, Arm, Speech, Test), Balance Eyes Face Arm Speech Time Tool (BEFAST), Los Angeles Prehospital Stroke Screen, Melbourne Ambulance Stroke Screen, or Cincinnati Prehospital Stroke Scale.[1,2,4,10,28-35]
    - In prehospital patients who screen positive for suspected stroke, apply a standard prehospital stroke severity assessment tool such as: Cincinnati Stroke Triage Assessment Tool (CSTAT), Field Assessment Stroke Triage for Emergency Destination (FAST-ED), Rapid Arterial Occlusion Evaluation Scale (RACE), Prehospital Acute Stroke Severity (PASS), Gaze-Face-Arm-Speech-Time (G-FAST), Conveniently-Grasped Field Assessment Stroke Triage (CG-FAST), Vision, Aphasia, Neglect (VAN) Assessment, Austrian Prehospital Stroke Scale, and Ventura Emergent LVO Score.[1,2,4,10,28,32,33,35-40]
- **System Triage**:
    - The goal for on-scene time is 10-15 minutes or less. If the family is not transported with the patient, encourage them to go directly to the ED.
    - See **Annex A, B, and C: Adult *Prehospital Stroke Triage Algorithm*** for the adult prehospital stroke triage algorithm.
    - **Call stroke alert** and pre-notify the receiving facility that a suspected stroke patient is en route so that the appropriate resources may be mobilized before the patient's arrival.[10,41]
    - **Pre-notification** should include the patient's name, age, LKW, time of symptom discovery, vitals, blood glucose, stroke screen and severity score, blood thinner history and last dose, sudden severe headache or loss of consciousness with symptom onset, and the phone number for the next of kin.[10]
    - Goal: 30 seconds for EMS to ED triage nurse hand-off.
    - **Bypass Exclusions**:
        - If severe or life-threatening trauma is suspected in addition to stroke, transfer to the appropriate level trauma center.
        - Patients under hospice care or with Medical Orders for Scope of Treatment (MOST) that outline no emergency measures should go to the nearest appropriate hospital.
    - Common ischemic **stroke mimics**: alcoholic intoxication, cerebral infections, drug overdose, hemorrhagic stroke, hypoglycemia, hyperglycemia, metabolic disorders, atypical migraines, neuropathies (e.g., Bell's palsy), seizure, post-ictal state, and tumors.

References:

1. Adeoye O, Nystrom KV, Yavagal DR, Luciano J, Nogueira RG, Zorowitz RD, Khalessi AA, Bushnell C, Barsan WG, Panagos P, et al. Recommendations for the Establishment of Stroke Systems of Care: A 2019 Update. *Stroke*. 2019;50:e187-e210. doi: 10.1161/STR.0000000000000173
2. Powers WJ, Rabinstein AA, Ackerson T, Adeoye OM, Bambakidis NC, Becker K, Biller J, Brown M, Demaerschalk BM, Hoh B, et al. Guidelines for the Early Management of Patients With Acute Ischemic Stroke: 2019 Update to the 2018 Guidelines for the Early Management of Acute Ischemic Stroke: A Guideline for Healthcare Professionals From the American Heart Association/American Stroke Association. *Stroke*. 2019;50:e344-e418. doi: 10.1161/STR.0000000000000211
3. Greenberg SM, Ziai WC, Cordonnier C, Dowlatshahi D, Francis B, Goldstein JN, Hemphill JC, 3rd, Johnson R, Keigher KM, Mack WJ, et al. 2022 Guideline for the Management of Patients With Spontaneous Intracerebral Hemorrhage: A Guideline From the American Heart Association/American Stroke Association. *Stroke*. 2022;53:e282-e361. doi: 10.1161/STR.0000000000000407
4. Jauch EC, Schwamm LH, Panagos PD, Barbazzeni J, Dickson R, Dunne R, Foley J, Fraser JF, Lassers G, Martin-Gill C, et al. Recommendations for Regional Stroke Destination Plans in Rural, Suburban, and Urban Communities From the Prehospital Stroke System of Care Consensus Conference: A Consensus Statement From the American Academy of Neurology, American Heart Association/American Stroke Association, American Society of Neuroradiology, National Association of EMS Physicians, National Association of State EMS Officials, Society of NeuroInterventional Surgery, and Society of Vascular and Interventional Neurology: Endorsed by the Neurocritical Care Society. *Stroke*. 2021;52:e133-e152. doi: 10.1161/STROKEAHA.120.033228
5. Lyng JW, Braithwaite S, Abraham H, Brent CM, Meurer DA, Torres A, Bui PV, Floccare DJ, Hogan AN, Fairless J, et al. Appropriate Air Medical Services Utilization and Recommendations for Integration of Air Medical Services Resources into the EMS System of Care: A Joint Position Statement and Resource Document of NAEMSP, ACEP, and AMPA. *Prehosp Emerg Care*. 2021;25:854-873. doi: 10.1080/10903127.2021.1967534
6. Ashcraft S, Wilson SE, Nystrom KV, Dusenbury W, Wira CR, Burrus TM, American Heart Association Council on C, Stroke N, the Stroke C. Care of the Patient With Acute Ischemic Stroke (Prehospital and Acute Phase of Care): Update to the 2009 Comprehensive Nursing Care Scientific Statement: A Scientific Statement From the American Heart Association. *Stroke*. 2021;52:e164-e178. doi: 10.1161/STR.0000000000000356
7. Dusenbury W, Mathiesen C, Whaley M, Adeoye O, Leslie-Mazwi T, Williams S, Velasco C, Shah SP, Gonzales NR, Alexandrov AW, et al. Ideal Foundational Requirements for Stroke Program Development and Growth: A Scientific Statement From the American Heart Association. *Stroke*. 2023;54:e175-e187. doi: 10.1161/STR.0000000000000424
8. Hoh BL, Ko NU, Amin-Hanjani S, Chou S-Y, Cruz-Flores S, Dangayach NS, Derdeyn CP, Du R, Hanggi D, Hetts SW, et al. 2023 Guideline for the Management of Patients With Aneurysmal Subarachnoid Hemorrhage: A Guideline From the American Heart Association/American Stroke Association. *Stroke*. 2023;54:e314-e370. doi: 10.1161/STR.0000000000000436
9. Pride GL, Fraser JF, Gupta R, Alberts MJ, Rutledge JN, Fowler R, Ansari SA, Abruzzo T, Albani B, Arthur A, et al. Prehospital care delivery and triage of stroke with emergent large vessel occlusion (ELVO): report of the Standards and Guidelines Committee of the

APPROVAL ITEM: Resource Document

Society of Neurointerventional Surgery. *J Neurointerv Surg*. 2017;9:802-812. doi: 10.1136/neurintsurg-2016-012699

10. Richards CT, Oostema JA, Chapman SN, Mamer LE, Brandler ES, Alexandrov AW, Czap AL, Martinez-Gutierrez JC, Martin-Gill C, Panchal AR, et al. Prehospital Stroke Care Part 2: On-Scene Evaluation and Management by Emergency Medical Services Practitioners. *Stroke*. 2023;54:1416-1425. doi: 10.1161/STROKEAHA.123.039792
11. Treggiari MM, Rabinstein AA, Busl KM, Caylor MM, Citerio G, Deem S, Diringer M, Fox E, Livesay S, Sheth KN, et al. Guidelines for the Neurocritical Care Management of Aneurysmal Subarachnoid Hemorrhage. *Neurocrit Care*. 2023;39:1-28. doi: 10.1007/s12028-023-01713-5
12. Warner JJ, Harrington RA, Sacco RL, Elkind MSV. Guidelines for the Early Management of Patients With Acute Ischemic Stroke: 2019 Update to the 2018 Guidelines for the Early Management of Acute Ischemic Stroke. *Stroke*. 2019;50:3331-3332. doi: 10.1161/STROKEAHA.119.027708
13. Zachrison KS, Asif KS, Chapman S, Joynt Maddox KE, Leira EC, Maynard S, Nobleza COS, Wira CR, American Heart Association Emergency Neurovascular C, Telestroke Committee of the Stroke C, et al. Identifying Best Practices for Improving the Evaluation and Management of Stroke in Rural Lower-Resourced Settings: A Scientific Statement From the American Heart Association. *Stroke*. 2025;56:e62-e74. doi: 10.1161/STR.0000000000000478
14. Zachrison KS, Nielsen VM, de la Ossa NP, Madsen TE, Cash RE, Crowe RP, Odom EC, Jauch EC, Adeoye OM, Richards CT. Prehospital Stroke Care Part 1: Emergency Medical Services and the Stroke Systems of Care. *Stroke*. 2023;54:1138-1147. doi: 10.1161/STROKEAHA.122.039586
15. Association AH. American Heart Association Mission Lifeline: Stroke Severity-based Stroke Triage Algorithm for EMS [online]. Accessed April 18, 2025.
16. Kuc A, Overberger R, Isenberg DL, Henry KA, Zhao H, Sigal A, Wojcik S, Herres J, Brandler E, Nomura JT. EMS Bypass to Endovascular Stroke Centers is Associated with shorter time to Thrombolysis and Thrombectomy for LVO Stroke. *Prehospital Emergency Care*. 2024:1-6.
17. USDA 2010 Rural-Urban Commuting Area (RUCA) codes. Accessed April 19, 2025.
18. Leadership AASC. Temporary Emergency Guidance to US Stroke Centers During the Coronavirus Disease 2019 (COVID-19) Pandemic: On Behalf of the American Heart Association/American Stroke Association Stroke Council Leadership. *Stroke*. 2020;51:1910-1912. doi: 10.1161/STROKEAHA.120.030023
19. Anderson CS, Olavarria VV. Head Positioning in Acute Stroke: Down but Not Out. *Stroke*. 2019;50:224-228. doi: 10.1161/STROKEAHA.118.020087
20. Schwarz S, Georgiadis D, Aschoff A, Schwab S. Effects of body position on intracranial pressure and cerebral perfusion in patients with large hemispheric stroke. *Stroke*. 2002;33:497-501. doi: 10.1161/hs0202.102376
21. Geraghty JR, Testai FD. Advances in neurovascular research: Scientific highlights from the 2024 international stroke conference. *J Stroke Cerebrovasc Dis*. 2024;33:107671. doi: 10.1016/j.jstrokecerebrovasdis.2024.107671
22. Capes SE, Hunt D, Malmberg K, Pathak P, Gerstein HC. Stress hyperglycemia and prognosis of stroke in nondiabetic and diabetic patients: a systematic overview. *Stroke*. 2001;32:2426-2432. doi: 10.1161/hs1001.096194
23. Desilles JP, Meseguer E, Labreuche J, Lapergue B, Sirimarco G, Gonzalez-Valcarcel J, Lavallee P, Cabrejo L, Guidoux C, Klein I, et al. Diabetes mellitus, admission glucose, and outcomes after stroke thrombolysis: a registry and systematic review. *Stroke*. 2013;44:1915-1923. doi: 10.1161/STROKEAHA.111.000813
24. Baird TA, Parsons MW, Phan T, Butcher KS, Desmond PM, Tress BM, Colman PG, Chambers BR, Davis SM. Persistent poststroke hyperglycemia is independently associated with infarct expansion and worse clinical outcome. *Stroke*. 2003;34:2208-2214. doi: 10.1161/01.STR.0000085087.41330.FF
25. Shimoyama T, Kimura K, Uemura J, Saji N, Shibazaki K. Elevated glucose level adversely affects infarct volume growth and neurological deterioration in non-diabetic stroke patients, but not diabetic stroke patients. *Eur J Neurol*. 2014;21:402-410. doi: 10.1111/ene.12280
26. Ahmed N, Davalos A, Eriksson N, Ford GA, Glahn J, Hennerici M, Mikulik R, Kaste M, Lees KR, Lindsberg PJ, et al. Association of admission blood glucose and outcome in patients treated with intravenous thrombolysis: results from the Safe Implementation of Treatments in Stroke International Stroke Thrombolysis Register (SITS-ISTR). *Arch Neurol*. 2010;67:1123-1130. doi: 10.1001/archneurol.2010.210
27. Masrur S, Cox M, Bhatt DL, Smith EE, Ellrodt G, Fonarow GC, Schwamm L. Association of Acute and Chronic Hyperglycemia With Acute Ischemic Stroke Outcomes Post-Thrombolysis: Findings From Get With The Guidelines-Stroke. *J Am Heart Assoc*. 2015;4:e002193. doi: 10.1161/JAHA.115.002193
28. Vidale S, Agostoni E. Prehospital stroke scales and large vessel occlusion: A systematic review. *Acta Neurol Scand*. 2018;138:24-31. doi: 10.1111/ane.12908
29. Chen X, Zhao X, Xu F, Guo M, Yang Y, Zhong L, Weng X, Liu X. A Systematic Review and Meta-Analysis Comparing FAST and BEFAST in Acute Stroke Patients. *Front Neurol*. 2021;12:765069. doi: 10.3389/fneur.2021.765069
30. Aroor S, Singh R, Goldstein LB. BE-FAST (Balance, Eyes, Face, Arm, Speech, Time): Reducing the Proportion of Strokes Missed Using the FAST Mnemonic. *Stroke*. 2017;48:479-481. doi: 10.1161/STROKEAHA.116.015169
31. Pickham D, Valdez A, Demeestere J, Lemmens R, Diaz L, Hopper S, de la Cuesta K, Rackover F, Miller K, Lansberg MG. Prognostic Value of BEFAST vs. FAST to Identify Stroke in a Prehospital Setting. *Prehosp Emerg Care*. 2019;23:195-200. doi: 10.1080/10903127.2018.1490837
32. Oostema JA, Nickles A, Allen J, Ibrahim G, Luo Z, Reeves MJ. Emergency Medical Services Compliance With Prehospital Stroke Quality Metrics Is Associated With Faster Stroke Evaluation and Treatment. *Stroke*. 2024;55:101-109. doi: 10.1161/STROKEAHA.123.043846
33. Oostema JA, Konen J, Chassee T, Nasiri M, Reeves MJ. Clinical predictors of accurate prehospital stroke recognition. *Stroke*. 2015;46:1513-1517.
34. Zhelev Z, Walker G, Henschke N, Fridhandler J, Yip S. Prehospital stroke scales as screening tools for early identification of stroke and transient ischemic attack. *Cochrane Database Syst Rev*. 2019;4:CD011427. doi: 10.1002/14651858.CD011427.pub2
35. Abboud ME, Band R, Jia J, Pajerowski W, David G, Guo M, Mechem CC, Messé SR, Carr BG, Mullen MT. Recognition of stroke by EMS is associated with improvement in emergency department quality measures. *Prehospital Emergency Care*. 2016;20:729-736.
36. Krebs W, Sharkey-Toppen TP, Cheek F, Cortez E, Larrimore A, Keseg D, Panchal AR. Prehospital Stroke Assessment for Large Vessel Occlusions: A Systematic Review. *Prehosp Emerg Care*. 2018;22:180-188. doi: 10.1080/10903127.2017.1371263
37. Nguyen TTM, van den Wijngaard IR, Bosch J, van Belle E, van Zwet EW, Dofferhoff-Vermeulen T, Duijndam D, Koster GT, de Schryver E, Kloos LMH, et al. Comparison of Prehospital Scales for Predicting Large Anterior Vessel Occlusion in the Ambulance Setting. *JAMA Neurol*. 2021;78:157-164. doi: 10.1001/jamaneurol.2020.4418
38. Duvekot MHC, Venema E, Rozeman AD, Moudrous W, Vermeij FH, Biekart M, Lingsma HF, Maasland L, Wijnhoud AD, Mulder L, et al. Comparison of eight prehospital stroke

APPROVAL ITEM: Resource Document

scales to detect intracranial large-vessel occlusion in suspected stroke (PRESTO): a prospective observational study. *Lancet Neurol*. 2021;20:213-221. doi: 10.1016/S1474-4422(20)30439-7

39. Crowe RP, Myers JB, Fernandez AR, Bourn S, McMullan JT. The Cincinnati Prehospital Stroke Scale Compared to Stroke Severity Tools for Large Vessel Occlusion Stroke Prediction. *Prehosp Emerg Care*. 2021;25:67-75. doi: 10.1080/10903127.2020.1725198
40. Smith EE, Kent DM, Bulsara KR, Leung LY, Lichtman JH, Reeves MJ, Towfighi A, Whiteley WN, Zahuranec DB. Accuracy of prediction instruments for diagnosing large vessel occlusion in individuals with suspected stroke: a systematic review for the 2018 guidelines for the early management of patients with acute ischemic stroke. *Stroke*. 2018;49:e111-e122.
41. Nielsen VM, Song G, DeJoie-Stanton C, Zachrison KS. Emergency medical services Prenotification is associated with reduced odds of in-hospital mortality in stroke patients. *Prehospital Emergency Care*. 2023;27:639-645.

8.i.C. Approve: Pediatric Stroke Task Force Tip Sheet

Deferred to Q3

8.i.D. Approve: TEAM Stroke-Ed Study

TExAs Emergency Medical Services Standardized STROKE Education (TEAM STROKE-ED) Study

Hypothesis: EMS stroke knowledge would improve if standardized stroke education was provided.

- Perform an **+intervention with** standardized stroke education and another that uses current practices (**-intervention**).

Outcomes:

- **Primary Outcome**:
  - Stroke Knowledge:
    - Pre- and post-intervention skill and knowledge assessment
    - Retention assessment testing at 3- and 6-months post-intervention.
      - Assess EMS providers' understanding of stroke symptoms, appropriate interventions, and time-critical actions.
- **Secondary Outcomes**:
  - Regional Performance in Key Stroke Performance Measures:
    - Evaluate EMS providers' ability to recognize stroke symptoms accurately and initiate appropriate care by reviewing GWTG or NEMSIS performance regionally for:
      - Stroke screening tool utilization and documentation
      - Stroke severity tool utilization and documentation
      - Prenotification of suspect stroke patient arrival
      - Percentage of on-scene time $\leq$ 15 minutes.
  - Regional Time to Treatment:
    - Track regional performance measures for:
      - Door to Needle (thrombolysis intervention)
      - Door to Provider
  - Regional Patient Outcomes:
    - Track regional patient outcomes from GWTG, such as mortality, disability, and functional recovery, to assess the downstream impact of improved EMS performance.

TEAM Stroke-Ed Study

Title: TExAs Emergency Medical Services Standardized STROKE Education (**TEAM STROKE-ED**) Study

Research Question/Background:

Within a system of stroke care, access to prehospital stroke care requires early recognition of stroke and its severity, with the integration of clinical findings into a complex triage paradigm that factors in regional geography, last known well (LKW), stroke facility capability, and availability. Emergency medical responders are often the first medical professionals with direct patient contact and yet receive less training on stroke recognition and management than other clinicians involved in acute stroke care. Their initial assessment, treatment, and decisions regarding diversion and routing will significantly impact a patient's subsequent care and affect patient outcomes. The current state of emergency medical services (EMS) knowledge regarding stroke varies widely depending on the region, available resources, and training protocols in place. In one US survey, EMS providers reported inadequate stroke severity training and demonstrated gaps in knowledge of stroke types, stroke severity scales, and stroke center levels (Asif et al.). These findings highlight the need for systematic efforts to enhance and standardize the educational content and delivery of stroke education. We aim to investigate the impact of standardized stroke education on stroke knowledge and performance among EMS personnel in suburban, urban, and rural areas. The Texas EMS Standardized Stroke Education (**TEAM STROKE-ED**) study is a two-phase study. In the phase 1 feasibility portion of the study, a multi-modality acute stroke care curriculum for EMS providers will be implemented at a regional level. The curriculum will focus on core topics in the hyperacute, acute management, and triage of suspected stroke in adult and pediatric patients in the prehospital setting, providing case-based learning vignettes. Based on the feedback from the feasibility phase of the study and the needs assessment survey, a standardized, multi-modality learning module will be implemented for the statewide Phase 2 of the study, with a focus on urban, suburban, and under-resourced areas.

The **TEAM STROKE-ED** study has three aims:

1. Assess the suitability of implementing the standardized curriculum for EMS providers, as demonstrated by the uptake of stroke screening tools in the prehospital setting, educator and learner perspective surveys, and performance on assessment tools. Specifically, we will assess the impact of a standardized curriculum on the knowledge of EMS providers regarding stroke care and the triage of pediatric and adult patients in the prehospital setting and during interfacility transfers.

2. Assess the impact of the standardized curriculum on acute stroke clinical outcomes in the prehospital, emergency room, hospital setting, and during interfacility transfers for thrombectomy-eligible patients.

3. Assess for similar versus differential uptake of the curriculum in areas with a paucity of resources (including rural areas).

Trial Design:

1. **Study Type: Prospective, Randomized Cluster, Open-label, Blinded-Analysis Design**

   - This design helps establish causality by comparing outcomes between an intervention group (receiving standardized stroke education) and a control group (receiving usual training or no intervention) within defined regions in Texas.
   - **Hypothesis:** A state-wide standardized multi-modality acute stroke curriculum for EMS providers will improve the learner experience, stroke knowledge, management, and triage of adult and pediatric patients suspected of having a stroke in the prehospital setting and during interfacility transfers of thrombectomy-eligible patients.

2. **Study Population and Research Settings:**

   - EMS providers: EMTs, AEMTs, paramedics, and other relevant personnel at any level of training or experience practicing in urban, suburban, and rural areas across Texas.
   - Both experienced and novice EMS providers across rural, urban, and suburban regions will be enrolled to assess the impact across different skill levels and geographic stroke resources.

3. Intervention and comparators:

- Standardized Stroke Education Curriculum:
  - Develop a comprehensive education program for adult and pediatric patients covering:
    - Anatomy and pathophysiology of stroke
    - Recognition of stroke symptoms and types
    - Recognition of stroke severity
    - Recognition of stroke mimics
    - Importance of time-sensitive intervention
    - Proper assessment and initial management of stroke patients
    - Acute stroke system triage for rapid transfer to stroke centers
    - Stroke facility levels and distinctions
    - Importance of prenotification and hand-off best practices
    - Proper documentation and management of stroke patients during interfacility transfers
    - Introduction to extra ventricular drain basics
  - Ensure the education program is evidence-based, up-to-date, and aligned with established guidelines.
  - Offer training sessions, educational materials, and interactive exercises with case vignettes.

TEAM Stroke-Ed Study

4. Control:

- Usual Training:
  - EMS providers in the control group receive their regular training, which may vary across different EMS agencies but typically includes basic stroke education.

5. Outcomes:

- **Primary Outcome**:
  - Stroke Knowledge:
    - Pre- and post-intervention skill and knowledge assessment
    - Retention assessment testing at 3- and 6-months post-intervention.
      - Assess EMS providers' understanding of stroke symptoms, appropriate interventions, and time-critical actions.
- **Secondary Outcomes**:
  - Regional Performance in Key Stroke Performance Measures:
    - Evaluate EMS providers' ability to recognize stroke symptoms accurately and initiate appropriate care by reviewing GWTG or NEMSIS performance regionally for:
      - Stroke screening tool utilization and documentation
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  - Regional Time to Treatment:
    - Track regional performance measures for:
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  - Regional Patient Outcomes:
    - Track regional patient outcomes from GWTG, such as mortality, disability, and functional recovery, to assess the downstream impact of improved EMS performance.

6. Sample Size Calculation:

- Determine the required sample size based on the expected effect size, desired power, and significance level.

7. Randomization:

- Randomly assign EMS providers in a region to either the intervention or control group to minimize selection bias.

8. Blinding:

- Given the nature of the intervention, participants will be unblinded. However, outcome assessors will be blinded to group assignments to reduce bias.

9. Data Collection:

Track regional patient outcomes from GWTG, such as mortality, disability, and functional recovery, to assess the downstream impact of improved EMS performance.

10. Statistical Analysis:

- Compare outcomes between the intervention and control groups using appropriate statistical tests (e.g., t-tests, chi-square tests).
- Adjust for potential confounders such as EMS providers' baseline knowledge or experience level.

11. Ethical Considerations:

- Obtain approval from relevant ethics committees or Institutional Review Boards (IRBs).
- Ensure informed consent from participants.

12. Timeline:

- The duration of the trial, including recruitment, intervention delivery, and follow-up assessments will be 2 years.

13. Budget:

- resources for education program development, training sessions, data collection, analysis, and dissemination of findings.

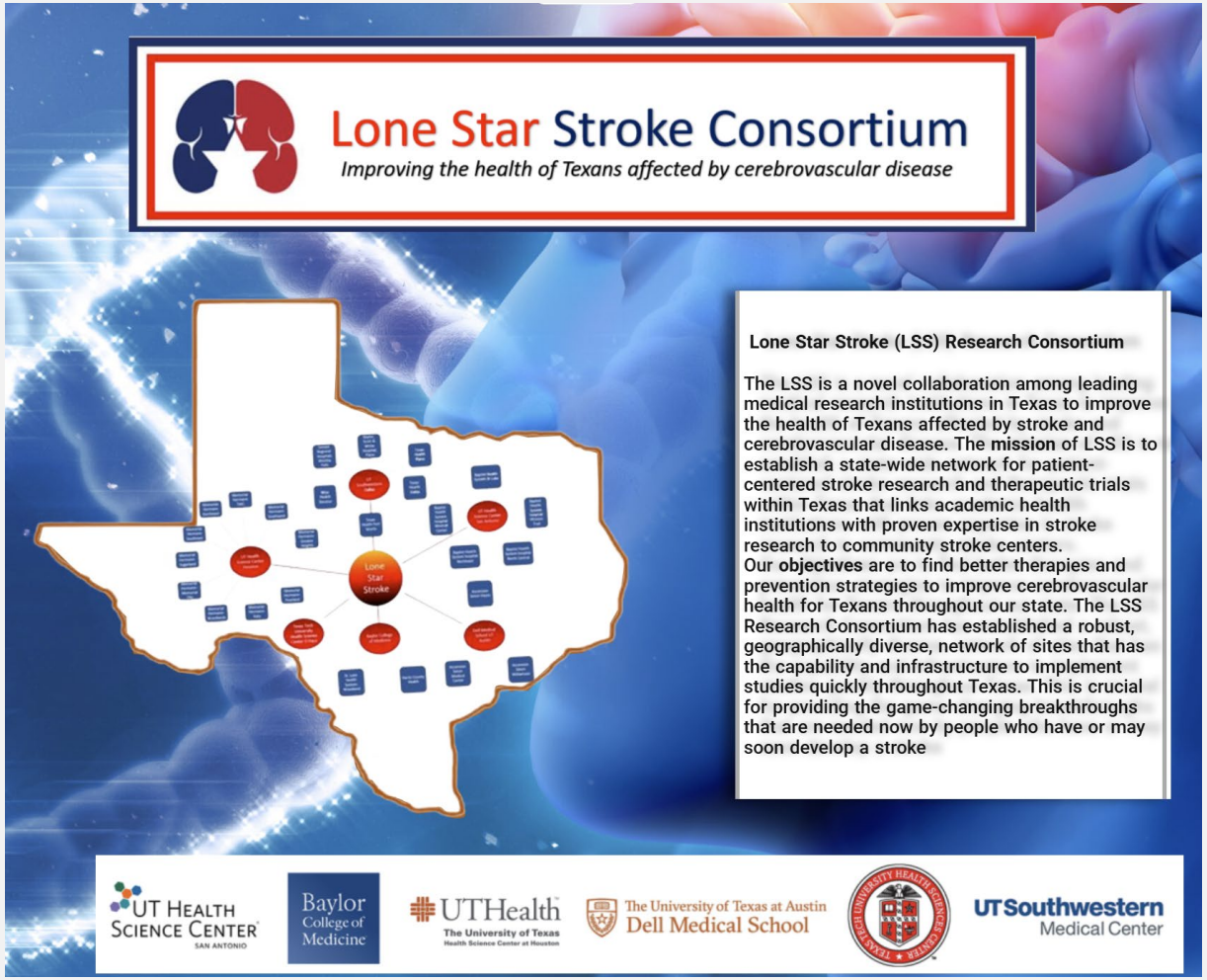
14. Dissemination of Results:

Publish findings in peer-reviewed journals and present them at relevant Regional Advisory Council and State levels to inform EMS practice and policy.

Conclusion:

By rigorously evaluating the effectiveness of such education programs, we can improve stroke care and outcomes in the prehospital settings and during interfacility transfers in adult and pediatric patients across Texas.

LSSC


Lone Star Stroke Consortium
Improving the health of Texans affected by cerebrovascular disease
Lone Star Stroke (LSS) Research Consortium
The LSS is a novel collaboration among leading medical research institutions in Texas to improve the health of Texans affected by stroke and cerebrovascular disease. The mission of LSS is to establish a state-wide network for patient-centered stroke research and therapeutic trials within Texas that links academic health institutions with proven expertise in stroke research to community stroke centers.
Our objectives are to find better therapies and prevention strategies to improve cerebrovascular health for Texans throughout our state. The LSS Research Consortium has established a robust, geographically diverse, network of sites that has the capability and infrastructure to implement studies quickly throughout Texas. This is crucial for providing the game-changing breakthroughs that are needed now by people who have or may soon develop a stroke
Lone Star Stroke
UT Health Science Center San Antonio
Baylor College of Medicine
UTHealth The University of Texas Health Science Center at Houston
The University of Texas at Austin Dell Medical School
UT Southwestern Medical Center