9.i. GETAC Stroke Committee

Chair: Robin Novakavic-White, MD

Vice-Chair: Sean Savitz, MD

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Stroke Committee

Priority Not Implemented
Priority Activities Recorded
Priorities Completed and being Monitored

Committee Priorities	Current Activities	Status
Report and share quarterly 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.** • **Encourage stroke facility participate with GWTG prehospital and interfacility layers and the RDC.** • **Present DTN performance report**	
RDC report	• **Update from RDC at Stroke Committee meeting.** • **36% TX stroke facilities participating with RDC**	
Patient safety and quality concern	• Letter citing patient safety concern regarding Neuro IR call coverage discussed. • Multiple providers in the state of Texas gave first-hand experience supporting statements in the letter 11/2024. • Stroke Committee and GETAC Council approved as a quality and patient safety concern. • **Seek Guidance**: Request to identify objective measures of impact. • Stroke committee and SSOC WG made recommendations for internal review for hospitals.	

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Patient Safety and Quality Concern

- Neuro IR coverage of multiple facilities without adequate backup is a patient safety and quality concern.
  - Concerns:
    - Leads to delays in care
    - Patients inappropriately denied care
    - Inappropriate use of resources (when patient is transferred from one capable CSC to another CSC to accommodate neuro IR)
- Request for **objective measures to demonstrate the delays, patients denied and misuse of resources.**

SSOC Work Group Discussion

- **SSOC work group recommendations:**
  - **Internal quality review:**
    - Encourage hospitals to perform internal multispecialty review of denied thrombectomy and provide feedback on patients deemed inappropriately denied treatment.
  - **Monitor required and internal performance measures:**
    - Neuro IR notification (page) to response
    - Neuro IR notification to angio team activation
    - Neuro IR notification to hospital arrival
    - Neuro IR notification to patient arrival to angio door
    - Angio door to groin puncture
    - Groin puncture to device deployed

- **Seek Guidance** – How best to demonstrate interfacility stroke transfers from CSC to CSC for thrombectomy/higher level of care.
  - May come from GWTG but would not capture all patients

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

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Committee Priorities	Current Activities	Status
Prehospital Stroke algorithm – Recommendation	• **Approved through GETAC Council 11/2024.** • **Request for clean versions and resource document.** • **Algorithm approved by Stroke, Air Medical, EMS and EMS MD Committees.** • **Resource document for adult algorithm approved by these committees except EMS MD Committee.** • **Pending final approval will present to GETAC Council for approval, RAC Chair meeting and EMS Education Committee.** • **Approval items: Algorithm final version**	
Pediatric Task Force	• Worked with Drs. Fagan and Winckler prior to last session. • Ms. Jorie Klein and DSHS approved terminology for pediatric facility. • 03/2025 session - algorithm and resource document approved by Pediatric, Stroke, Air Medical and EMS MD Committees. • 03/2025 revisions requested by EMS Committee and wished to seek input from EMS MD Committee before voting. • Prior to next session will submit minor revisions to the Pediatric Stroke Task Force for final approval. • Pediatric Stroke Tip Sheet and Supplement Resource approved by Stroke Committee. I have asked Dr. Stuart Fraser to submit the documents to the Pediatric Stroke Task Force for approval. • Next steps, minimum capability recommendations for pediatric hospital to be destinations for pediatric stroke.	

Resource Document

PREHOSPITAL 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 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.[1-9] Standardized approaches to prehospital stroke assessment, triage, management, and interfacility documentation are encouraged for 9-1-1 call centers and EMS dispatchers.
   - The prehospital acute stroke triage and transport recommendations 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. Multi-society endorsed guideline statements and recommendations,[1-9] as well as the consensus of expert opinion (Pediatric Neurologist, Vascular Neurologists, Neuroendovascular Surgeons, and Neurosurgeons) based on clinical experience and in conferment with GETAC council, EMS, EMS Medical Directors, Air Medical and Stroke Committees, are outlined in these recommendations. See Annex A: *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 SSOC and destination protocol to ensure effective and efficient stroke care.[1, 4, 8, 9] Ideal destination plans should factor in all available data sources, including traffic patterns, site-specific performance data, and associated clinical outcomes.[1, 4, 8] EMS agencies should implement destination plans based upon both time and severity for patients with suspected LVO within 24 hours of last known well that prioritize a nearby CSC over other centers of lower capability when available within acceptable transport times.[4, 7, 8]
   - 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 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 Mission: Lifeline Stroke outline that the TSC certification is intended for regions of the country that are not readily accessible to CSCs; CSCs are the preferred destination for patients with suspected LVO when they are within acceptable transport times.[1, 4, 7] If no CSC is available, a TSC should be the preferred destination for these patients from among all nearby PSCs.[1, 2, 4, 7]
   - 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 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, 7] In rural communities or where large distances separate stroke centers, additional transport time, including air medical transport, may be reasonable.[1, 4, 7]
3. **Stroke System of Care Modification for Metropolitan, Non-Metropolitan and Frontier Communities**
   - The following is adapted from the American Heart Association (AHA) Mission: Lifeline Stroke recommendation for Emergency Medical Services for acute stroke triage and routing.[1, 2, 4, 7] These modifications to transport time thresholds are suggested to help EMS agencies adjust their regional stroke triage protocols according to local resources in collaboration with key stakeholders.[4, 7]
   - A Metropolitan SSOC modification is appropriate for a metro region (Urban/RUCA code 1)[4, 10] 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, 11]
   - A Non-Metropolitan SSOC modification is appropriate for large residential communities adjacent to an urban core (Suburban/RUCA codes 2-3).[4, 10] 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, 11] 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 ASRH or PSC.[4, 11]
   - A Frontier SSOC modification is appropriate for a small or non-metropolitan region (Rural/RUCA codes 4-10).[4, 10] 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, 11] 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, 11] 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, 11] Consider air medical transport if no certified

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stroke center is within 60 minutes by ground. If air transfer is unavailable, transfer the patient to the nearest hospital per the regional stroke plan.[4, 11]

- The COVID-19 pandemic further emphasizes 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.[12]

4. **Prehospital Triage of Stroke 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 who have compromised airway. Ensure airway patency with suctioning and OPA or NPA, as needed.
       - 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/stabilization:
     - Place the patient in a supine position, with the head of the bed elevated at 30 degrees, if the patient can tolerate.[2, 9] Keeping the patient at 30 degrees can improve blood flow to the brain[13, 14] and is recommended if patient can tolerate.[2, 9] Avoid lying the patient flat unless an LVO is documented[15], and the patient is not at risk for elevated intracranial pressure and herniation.[14]
     - Cardiac monitoring during transport is recommended. If there is evidence of shock, treat 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,[16, 17] including greater infarct growth[18, 19] and hemorrhagic infarct conversion.[20, 21]
     - If there is Seizure activity, treat according to the Seizure CPG.
   - 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 of next of kin and witnesses.
       - NOTE: For "wake-up strokes," the time documented is the time 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 face, arm, and/or leg (especially on one side of the body)
         - Confusion
         - Trouble speaking or understanding language
         - Trouble seeing in one or both eyes or double vision
         - 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 patient history, including co-morbid conditions.
       - Items to Report: seizure at onset, head trauma, history of recent surgeries, history of bleeding problems, signs of possible brain hemorrhage [severe headache of sudden onset, nausea/vomiting with headache or loss of consciousness (LOC)].
       - Additional history: Past medical history, allergies (iodinated contrast).
       - 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).
       - Medications – obtain a list of all medications, including blood thinners such as direct thrombin inhibitors, factor Xa inhibitors, low molecular weight heparin, and unfractionated heparin [e.g., warfarin (Coumadin), rivaroxaban (Xarelto), dabigatran (Pradaxa), apixaban (Eliquis), edoxaban (Savaysa), enoxaparin (Lovenox)]. (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), BEFAST. Los Angeles Prehospital Stroke Screen, Melbourne Ambulance Stroke Screen, or Cincinnati Prehospital Stroke Scale.[1, 2, 4, 9, 22-25]
     - In prehospital patients who screen positive for suspected stroke, apply a standard prehospital stroke severity assessment tool, Cincinnati Stroke Triage Assessment Tool (CSTAT), Field Assessment Stroke Triage for Emergency Destination (FAST-ED), Rapid Arterial Occlusion Evaluation Scale (RACE) or Vision, Aphasia, Neglect (VAN) Assessment.[1, 2, 4, 9, 22-24]
   - Management:
     - EMS personnel should begin the initial management of stroke in the field as outlined in this document.
     - Prevent aspiration, HOB at 30 degrees.[2] Ensure airway patency with suctioning and OPA or NPA, as needed.
     - Provide supplemental oxygen if needed to keep oxygen saturation >94%.[2]
     - Treatment of hypertension is NOT recommended unless blood pressure

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>220/120 mmHg.[2]
  - Treat hypotension. Evaluate, document, and treat signs/symptoms of shock according to the Shock CPG. Obtain EKG during workup, as long as it does not delay transport to the appropriate stroke facility.[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 preferable).
  - 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.
- System Triage:
  - Goal for on-scene time, 10-15 minutes or less. Encourage the family to go directly to the ED if not transported with the patient.
  - See Annex A: *Prehospital Stroke Triage Algorithm* for the Acute 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.
  - Pre-notification should include the patient's name, LKW, vitals, blood glucose, stroke severity score, and the phone number for next of kin.
  - 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.

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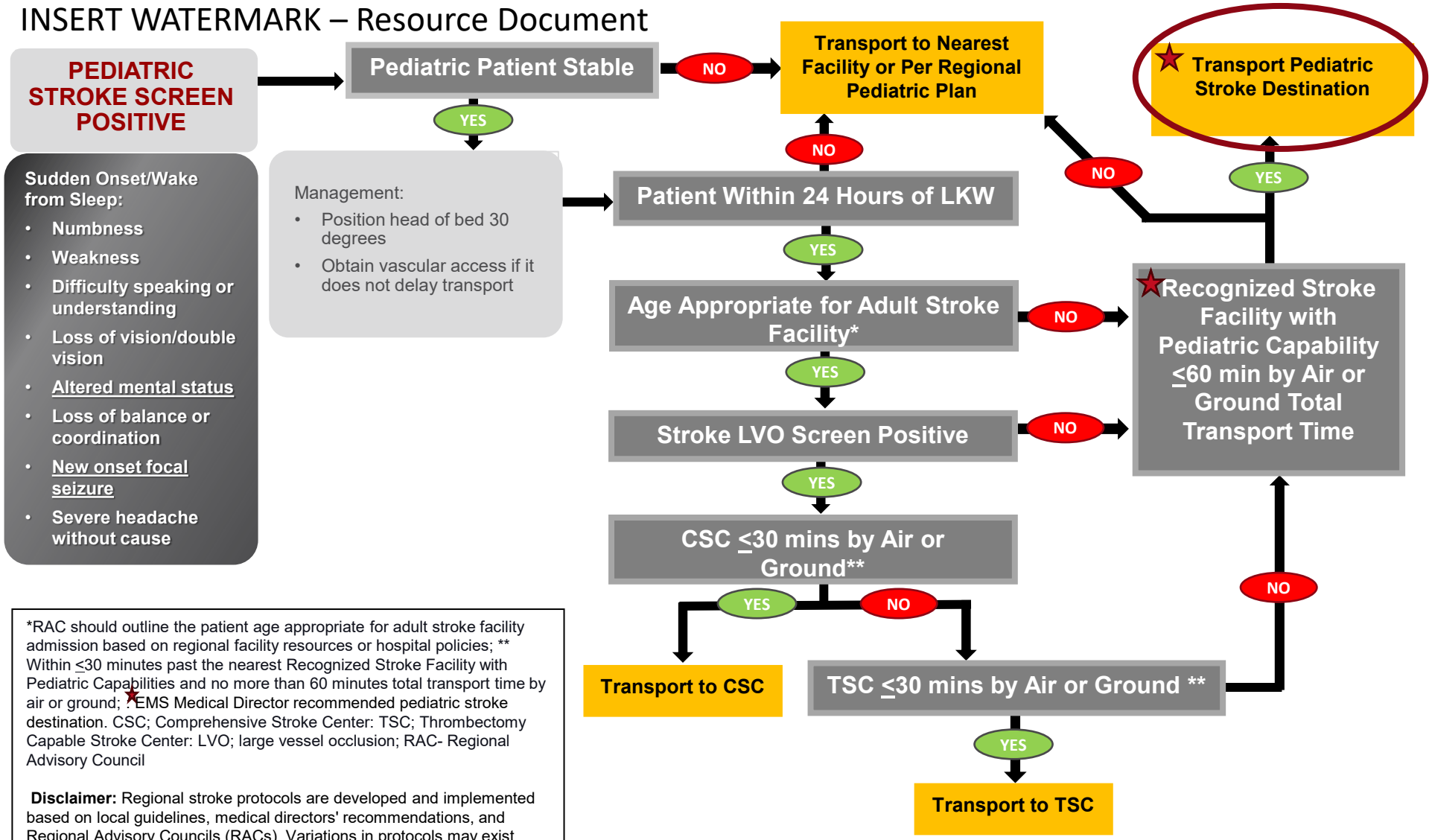
Prehospital Stroke algorithm – Recommendation	• Approved through GETAC Council 11/2024. • Request for clean versions and resource document. • Algorithm approved by Stroke, Air Medical, EMS and EMS MD Committees. • Resource document for adult algorithm approved by these committees except EMS MD Committee. • Pending final approval will present to GETAC Council for approval, RAC Chair meeting and EMS Education Committee. • Approval items: Algorithm final version	
Pediatric Task Force	• Worked with Drs. Fagan and Winckler prior to last session. • Ms. Jorie Klein and DSHS approved terminology for pediatric facility. • **03/2025 session - algorithm and resource document approved by Pediatric, Stroke, Air Medical and EMS MD Committees.** • **03/2025 revisions requested by EMS Committee and wished to seek input from EMS MD Committee before voting.** • **Prior to next session will resubmit minor revisions to the Pediatric Stroke Task Force for final approval.** • **Pediatric Stroke Tip Sheet and Supplement Resource approved by Stroke Committee. I have asked Dr. Stuart Fraser to submit the documents to the Pediatric Stroke Task Force and other Texas pediatric stroke experts for approval.** • **Next steps, minimum capability recommendations for pediatric hospital to be destinations for pediatric stroke.**	

EMS ACUTE PEDIATRIC STROKE RESOURCE DOCUMENT

INSERT WATERMARK – Resource Document



*RAC should outline the patient age appropriate for adult stroke facility admission based on regional facility resources or hospital policies; ** Within ≤30 minutes past the nearest Recognized Stroke Facility with Pediatric Capabilities and no more than 60 minutes total transport time by air or ground; ★ EMS Medical Director recommended pediatric stroke destination. CSC; Comprehensive Stroke Center: TSC; Thrombectomy Capable Stroke Center: LVO; large vessel occlusion; RAC- Regional Advisory Council

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. LKW – last known well; LVO – large vessel occlusion

EMS Pediatric Stroke Triage Recommendations

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 to facilitate improved outcomes throughout the state.

Goal:
To enhance EMS identification of strokes in the pediatric population (infants and children less than 18 years of age), as well as to increase rapid triage and transport to the nearest appropriate facility.

Purpose:
In consultation with EMS, ER, stroke, pediatric neurology, and pediatric leaders from around the state and current American Heart Association recommendations, we have developed the below EMS guidelines for pediatric patients with a known or suspected stroke.[5,6]

General Information on Pediatric Stroke

Pediatric stroke can present with focal neurologic signs, as well as non-specific signs like seizure or altered mental status.[7–11]

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

- Numbness or weakness of face, arm and/or leg (especially on one side of the body)
- Confusion
- Trouble speaking or understanding language
- Trouble seeing in one or both eyes or double vision
- 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
- Drug overdose
- Hypoglycemia
- Hyperglycemia
- Genetic/metabolic disorders
- Atypical migraines
- Neuropathies (e.g. Bell's palsy)
- Seizure
- Post-ictal state
- Tumors

Prehospital Triage of Stroke Patients

Basic Level – in suspected stroke cases, as with all other pediatric patients, 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 compromised airway. Ensure airway patency with suctioning and OPA or NPA, as needed.
- **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). Confirm normal level with parents/caretakers if unsure.
- **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)[12], treat according to diabetic emergencies clinical practice guidelines.
- If there are seizures, 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.

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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 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
- Trouble seeing in one or both eyes or double vision
- 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 patient, family members and other witnesses to determine symptoms, time of symptom discovery and last known well (LKW), or last time patient was without symptoms. Ask about seizure at onset, head trauma, history of recent surgeries, history of bleeding problems, and signs of possible brain hemorrhage (severe headache of sudden onset, nausea/vomiting with headache or loss of consciousness). Obtain mobile number of next of kin and witnesses.

❖ **NOTE:** For "wake up strokes" the last known well time is the last time that they were witnessed to be at their baseline, which may be the night before. The time they are found is not the last known well time.

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, factor Xa inhibitors, low molecular weight heparin [enoxaparin/ Lovenox], unfractionated heparin, warfarin [Coumadin], rivaroxaban [Xarelto], dabigatran [Pradaxa], apixaban [Eliquis], edoxaban [Savaysa]).
- If possible, record when the last dose was taken.

Management:

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

1. Prevent aspiration, HOB > 30. Ensure airway patency with suctioning and OPA or NPA as needed.
2. Provide supplemental oxygen if needed to keep oxygen saturation > 94%.
    a. (Adjust if the patient has known congenital heart disease with a different goal oxygen saturation)
3. Treat hypotension per regional pediatric protocols.
4. Maintain blood pressure below 20% above 95th%ile for age.[13] Call online medical control if systolic blood pressure consistently above this percentile. The below table is an example of an 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

5. Hypoglycemia (blood glucose < 70 mg/dL)[12] should be treated in patients suspected of acute ischemic stroke.* 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.
6. To facilitate expedited stroke workup in the ED, place two peripheral IVs so long as it does not delay transport time.

System Triage:

Goal on-scene time is 10-15 minutes or less. Encourage the family to go directly to the ED if not transported with the patient.

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

AGE CRITERIA and AGE APPROPRIATENESS FOR ADULT STROKE FACILITIES: Please note that different adult stroke facilities will have different capabilities and willingness to evaluate and treat stroke patients under 18. EMS Medical Directors should outline the patients that are age appropriate for adult stroke facility admission based on regional facility resources and hospital policies.

Recommended triage:

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

Age appropriateness for adult stroke facility:

- Pediatric suspected stroke, **age < appropriate:**
  - Transport suspected stroke patients to the nearest **Pediatric Stroke Destination***
    - **Pediatric Stroke Destination – EMS Medical Director will recommend local pediatric stroke destinations.** These are typically pediatric hospitals with capability to care for pediatric patients with stroke. Please note that there are **NO** formal national or statewide guidelines, certifications, or recognition systems for 'Pediatric Stroke Destinations'. We outline a list of suggested features for these centers in a separate document.
  - If no **Pediatric Stroke Destination** is within **60-minute** by air or ground **total transport time** or the patient is unstable, transport to the nearest **Pediatric Facility**.
- Pediatric suspected stroke, **age ≥ appropriate:**
  - **Perform Validated Stroke Severity Screening Tool** to access for potential large vessel occlusion (LVO), such as RACE score.[14]
  - **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-minute total transport time** by air or ground**.**
    - If no **CSC is available within 30 minutes**, transport to nearest **thrombectomy capable stroke center (TSC/ Level 2)** if within **≤ 30 minutes** from the nearest **Pediatric Stroke Destination** and no more than **60-minute 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-minute** by air or ground **total transport time** or the patient is unstable, transport to the nearest **Pediatric Facility**.

2. Pediatric patient suspected of stroke and last known well **> 24 hours**, triage based on following criteria:
   - Pediatric suspected 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 prolonged transport time > 60 minutes.
- **Stroke Prenotification**, alert receiving facility that a suspected pediatric stroke patient is in route prior to arrival. A stroke alert prior to arrival will mobilize appropriate resources before patient arrival.
  - Prenotification should include: Age, last known well, 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 2022 Pediatric Stroke North Central Texas Regional Stroke Plan)

Last Update – 03.06.2025

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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 last session, revisions were presented and approved by the Stroke, EMS, Air Medical and EMS Medical Director Committees 11/2024. • Present to the GETAC Council but not approved. • **Requested to be a part of the Task Force looking at interfacility transfer terminology.**	
DIDO performance recommendations	• Worked with Drs. Fagan and Winckler from last session, revisions were presented and approved by the Stroke, EMS, Air Medical, EMS Medical Director Committees and the GETAC Council 11/2024. • **Next steps disseminate to Stroke programs and RAC chairs.** • **Long-term goal, collect the data to outline barriers for interfacility transfers and opportunities to facilitate faster DIDO** • **Seek Guidance: Stroke Committee liaison with EMS Education Committee**	
TEAM EMS-Ed Study	• **Have informed committees of intent, no major objections voiced at preliminary idea.** • **Dr. Sean Savitz discussed IRB options at past meeting** • **Proposal drafted, working to submit for funding from LSSC.**	

TEAM EMS-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.

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 membership**	
Stroke Managers Mentorship Program and Texas Stroke Coordinators Collaborative Survey	• **Education Work Group discussing platform and feasibility of implementation of mentorship program.** • **Will propose Stroke managers survey at next session.** • **I can present idea at DSHS stroke meetings to gauge interest.** • **Will incorporate some questions from prior survey to assess current state.**	
STRAC Stroke Program Manager Manual	• Collect and share resources related to stroke program management, stroke coordinator & manager roles and process improvement. • Presented last session, will discuss further about dissemination at the next session.	
Rural Stroke Work Group	• **Had first meeting** • **Approval Item: conduct needs assessment survey in rural and resource challenged regions, EMSTR data, creating map to identify stroke care deserts in TX**	

RURAL Stroke Work Group

- First meeting 02/20/2025
  - 27 members
- Tasks:
  - Define rural and resource challenged areas
    - Accepted definition as outlined but with flexibility on population volume.
    - Classify regions by counties and RACs
  - DSHS Shared the state recognized rural regions.
  - Work with GWTG to look at which hospitals defined as rural.

RURAL Stroke Work Group

- Once regions/hospitals defined as rural/resource challenged:
  - Request for PI work group look at LKW to hospital arrival, mode of arrival and discharge disposition at rural hospitals from GWTG.
  - Promote RDC, prehospital and DIDO layers in registries.
  - Request EMSTR rural data for median run times, call to arrival (hospital or home), call type, interfacility times.
  - Map to identify stroke care deserts in TX
- GOAL: outline a recommendation for patient access to acute care in remote areas (example call 911/meet EMS).
- **Approval item:** Conduct needs assessment survey in rural/resource challenged regions.

Stroke Care Mapping

Contents lists available at ScienceDirect

Journal of Stroke and Cerebrovascular Diseases

journal homepage: www.elsevier.com/locate/jstroke

Navigating stroke care: Geospatial assessment of regional stroke center accessibility

Stephen Halada, BS [a,*], Kirsten MM Beyer, PhD, MPH [b], Yuhong Zhou, PhD [b], Benjamin W Weston, MD, MPH [c]

[a] Medical Student, Medical College of Wisconsin, Milwaukee, WI, 53226, USA
[b] Institute for Health & Equity, Medical College Wisconsin, 8701 W Watertown Plank Rd, Milwaukee, WI, 53226, USA
[c] Department of Emergency Medicine, Medical College Wisconsin, 8701 W Watertown Plank Rd, Milwaukee, WI, 53226, USA

ARTICLE INFO

Keywords:
Geospatial analysis
Public health
Accessibility
Cardiovascular/stroke

ABSTRACT

Introduction: Reducing time between stroke onset and hospital intervention is crucial for positive outcomes in stroke patients. While EMS utilization decreases time to intervention, many US regions are not within timely proximity to an advanced-care-capable stroke center (ASC), defined as a comprehensive or thrombectomy-capable center. This study aims to utilize geographic methodology to identify regions in Wisconsin with both high stroke mortality and low physical accessibility to certified stroke centers (SCs), particularly ASCs.

Methods: Geocoded mortality records for stroke death between 2015 and 2020 were accessed from the Wisconsin Department of Health Services. Indirectly age-standardized mortality ratios (SMRs) were estimated continuously across Wisconsin using adaptive spatial filtering and mortality records at the census block group level; the surface was then averaged by census tract for tract level SMRs. Addresses for SC locations within Wisconsin and bordering states were collected, and drive times from Wisconsin census tract centroids to the nearest SC subtypes were estimated. Drive times and mortality ratios were evaluated at the tract level alongside Rural-Urban Commuting Area (RUCA) codes. Spatial error regression modeling was used to determine RUCA classifications with the highest stroke risk independent of accessibility to stroke centers.

Results: Approximately 50%, 68%, and 78% of Wisconsin residents resided within 30, 45, and 60 minutes of an ASC, respectively. Median drive time from census tract centroids to the nearest ASC were highest for rural tracts (M=90 minutes, IQR=68-115) compared to small-town (M=82 minutes, IQR=49-113), micropolitan (M=53 minutes, IQR=43-77), and metropolitan tracts (M=19 minutes, IQR=11-35; $p<0.001$). Clusters of high stroke SMRs were found in urban centers as well as rural areas irrespective of county declinations. Spatial regression modeling suggested small-town census tracts had the highest SMR irrespective of physical accessibility to care and spatial correlation. In small-town census tracts >45 minutes from the nearest ASC, the median stroke SMR was 1.12 (IQR=0.94-1.40) with 226,000 residents and 150 stroke deaths per year.

Conclusion: Small-town areas are associated with both long drive distance to ASC locations and high stroke mortality. Geographical analyses reveal apparent stroke care deserts and may inform strategic allocation of emergency medicine resources and coverage.

Introduction

Cerebrovascular accidents, also known as strokes, are significant contributors to the overall cardiovascular disease burden and require timely and, often, specialized interventions[1]. Various medical interventions are available for acute stroke management including thrombolytic therapy, mechanical thrombectomy, and neuro-endovascular procedures. Minimizing the time between stroke symptoms and definitive medical interventions is crucial for optimizing neurocognitive ability and achieving overall positive outcomes. Thus,

Abbreviations: SC, Certified Stroke Center; ASC, Advanced-Care-Capable Stroke Center; ASRH, Acute Stroke Ready Hospital; PSC, Primary Stroke Center; TSC, Thrombectomy-Capable Stroke Center; CSC, Comprehensive Stroke Center; RUCA, Rural-Urban Commuting Area; CMR, Crude Mortality Rate; SMR, Standardized Mortality Ratio; ASF, Adaptive Spatial Filtering.

* Corresponding author.

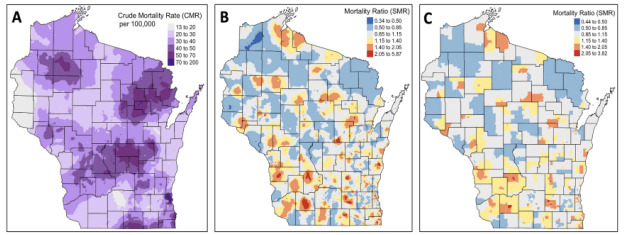

Fig. 2. Continuous crude stroke morality rate in Wisconsin **(A)**; indirect age-sex standardized stroke mortality ratio (SMR) maps in Wisconsin with **(B)** continuous distribution and **(C)** distribution averaged by surface area per census tract. SMR over 1 indicates regional ratios higher than the expected rate.

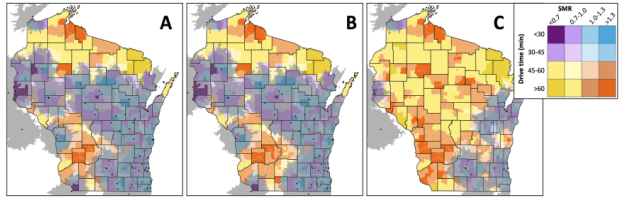

Fig. 3. Heat maps by Wisconsin census tract of categorized indirect age-sex standardized stroke mortality ratios alongside <30, 30-45, 45-60, and >60 minute drive times to the nearest **(A)** certified stroke center, **(B)** basic center, and **(C)** advanced-care-capable center with respective 45-minute drive catchment zone overlay.

performed the study in accordance with this protocol. Collection, recording, and reporting of data was accurate and ensured the privacy, health, and welfare of research subjected during and after the study.

Declaration of Generative AI in Scientific Writing

The authors did not use a generative artificial intelligence (AI) tool or service to assist with preparation or editing of this work. The authors take full responsibility for the content of this publication.

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administration, Funding acquisition, Conceptualization.

Declaration of competing interest

Research was conducted in the absence of commercial or financial conflicts. There are no disclosures.

Data availability

The data that support the findings of this study are available on request from the corresponding author, SH. The data are not publicly available due to presence of identifiers (i.e. geocoded addresses, etc).

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Stroke Committee

Priority Not Implemented
Priority Activities Recorded
Priorities Completed and being Monitored

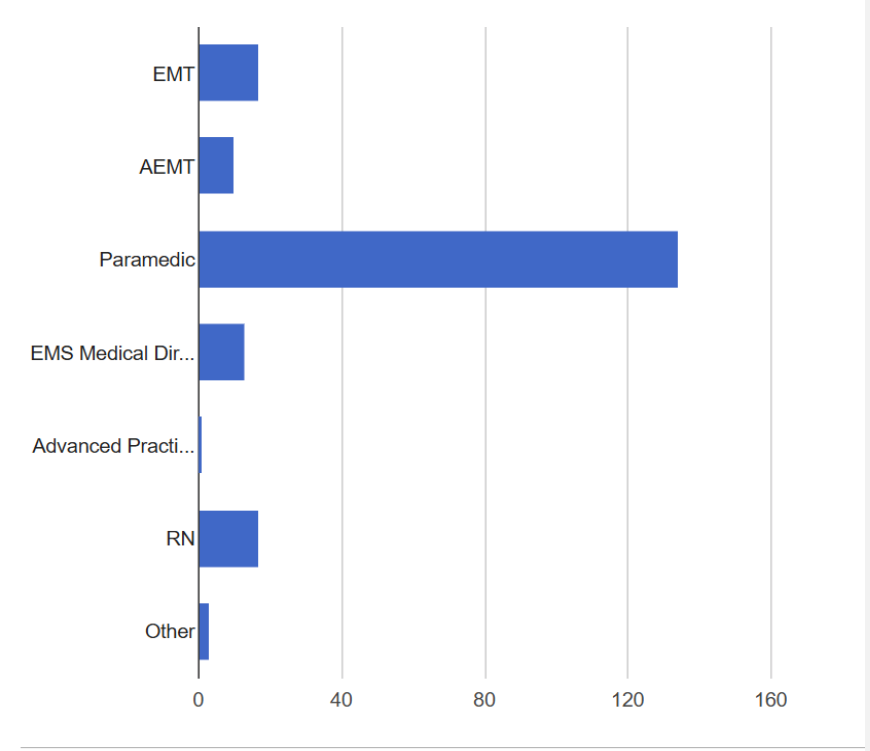
Committee Priorities	Current Activities	Status
Texas EMS Stroke Survey	• **Approved** • **Joseph assisting with disseminating survey** • **Extend Deadline**	
Stroke Committee endorsed stroke education and certification courses	• Ongoing effort identifying stroke educational opportunities for providers	
Stroke Education Resource for stroke facilities	• Working with DSHS for website access to stroke education • Elizabeth to report back to the Stroke Committee next session	
Work with DSHS to outline recommendations for stroke rules for ASRH	• Pending further direction	
Presentation on Wake-Up Stroke Study	• **UT Health system study with LSSC** • **PI's Drs. Sidarth Prasad and Daiwai Olson** • **Approved by Stroke Committee** • **Approval item: present to the DSHS stroke meetings in effort to encourage participation**	

EMS Survey Results

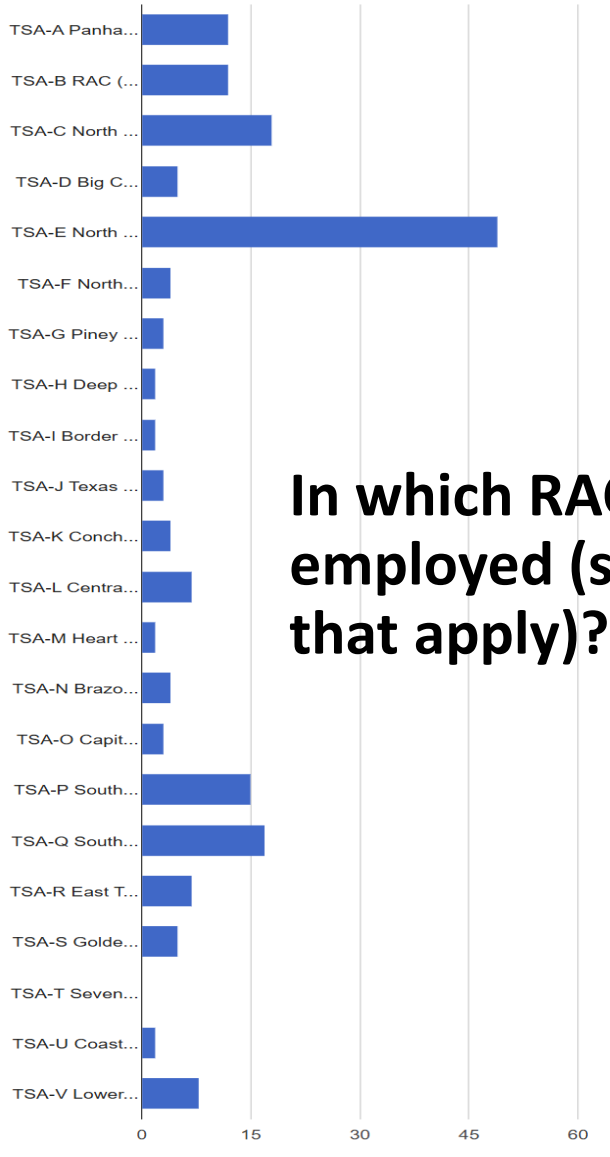
What is your level of emergency medical provider?

Total Count (N)	Missing*	Unique
183	6 (3.2%)	7

Counts/frequency: EMT (17, 9.3%), AEMT (10, 5.5%), Paramedic (134, 73.2%), EMS Medical Director (13, 7.1%), Advanced Practice Provider (1, 0.5%), RN (17, 9.3%), Other (3, 1.6%)



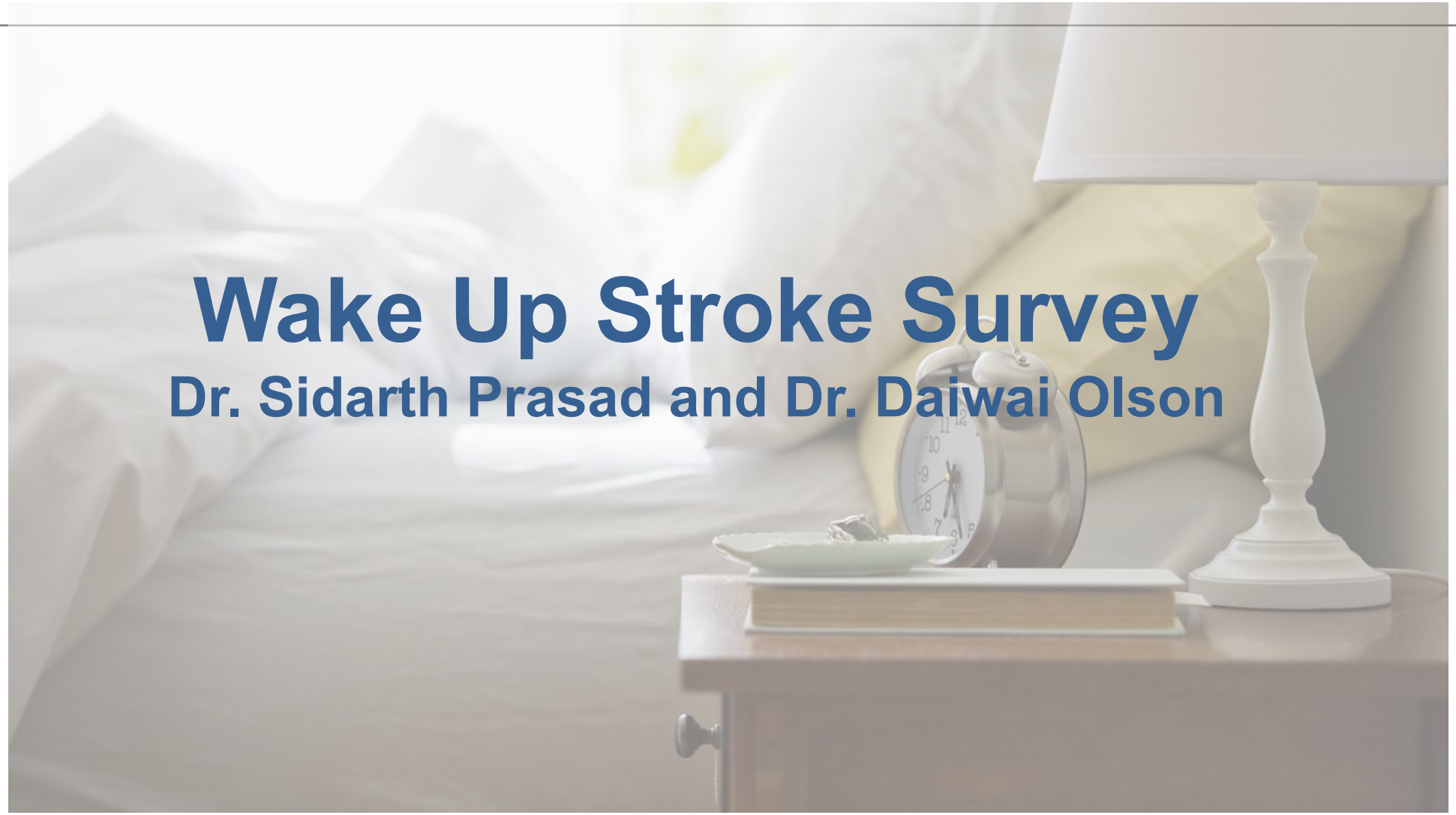
Counts/frequency: TSA-A Panhandle RAC (12, 7.0%), TSA-B RAC (BRAC) (12, 7.0%), TSA-C North Texas RAC (18, 10.5%), TSA-D Big Country RAC (5, 2.9%), TSA-E North Central Texas Trauma RAC (49, 28.5%), TSA-F Northeast Texas RAC (4, 2.3%), TSA-G Piney Woods RAC (3, 1.7%), TSA-H Deep East Texas RAC (2, 1.2%), TSA-I Border RAC (2, 1.2%), TSA-J Texas "J" RAC (3, 1.7%), TSA-K Concho Valley RAC (4, 2.3%), TSA-L Central Texas RAC (7, 4.1%), TSA-M Heart of Texas RAC (2, 1.2%), TSA-N Brazos Valley RAC (4, 2.3%), TSA-O Capital Area Trauma RAC (3, 1.7%), TSA-P Southwest Texas RAC (15, 8.7%), TSA-Q Southeast Texas RAC (17, 9.9%), TSA-R East Texas Gulf Coast RAC (7, 4.1%), TSA-S Golden Crescent RAC c/o Citizens Medical Center (5, 2.9%), TSA-T Seven Flags RAC (0, 0.0%), TSA-U Coastal Bend RAC (2, 1.2%), TSA-V Lower Rio Grande Valley RAC (8, 4.7%)



In which RAC are you employed (select all that apply)?

Total Count (N)	Missing*	Unique
172	17 (9.0%)	21

UT Southwestern
Medical Center



Wake Up Stroke Survey

Dr. Sidarth Prasad and Dr. Daiwai Olson

Survey Overview

UT Southwestern Medical Center

Mission statement: This survey aims to evaluate wake-up stroke protocols implemented in hospitals across Texas. Findings will support a grant application to NINDS and contribute to an implementation science toolkit. The goal is to develop a standardized, evidence-based protocol for wake-up stroke management, promoting best practices across Texas hospitals.

Benefit to State of Texas: The implementation toolkit will help improve and standardize wake-up stroke protocols, ensuring consistent and optimized patient care for those presenting as a code stroke in the ED.

Inclusion Criterion: All Texas hospitals involved in stroke care, regardless of whether they currently follow a wake-up stroke protocol. Survey can be completed preferably by the stroke coordinators.

Data Analysis: All collected information will be de-identified during analysis and presentation to ensure privacy and confidentiality.

Survey Duration: The survey will take less than 5 minutes to complete.

SCAN ME

Stroke Committee

- **Committee items needing council guidance**
  1. Patient safety and quality concern
  2.Stroke member liaison with EMS Education Committee

- **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 triage algorithm
  2. Rural stroke needs assessment survey
  3. EMSTR rural data request
  4. Wake-up Stroke Study
  5. Map to outline stroke access deserts in TX
- **Action items for the next session:**
  1. Pediatric Stroke triage algorithm and resource document.
  2. Adult Stroke triage resource document.
  3. TEAM EMS-Ed study
  4. Pediatric stroke tip sheet and supplement

9.i.A. Approval: Pediatric Stroke Triage Algorithm

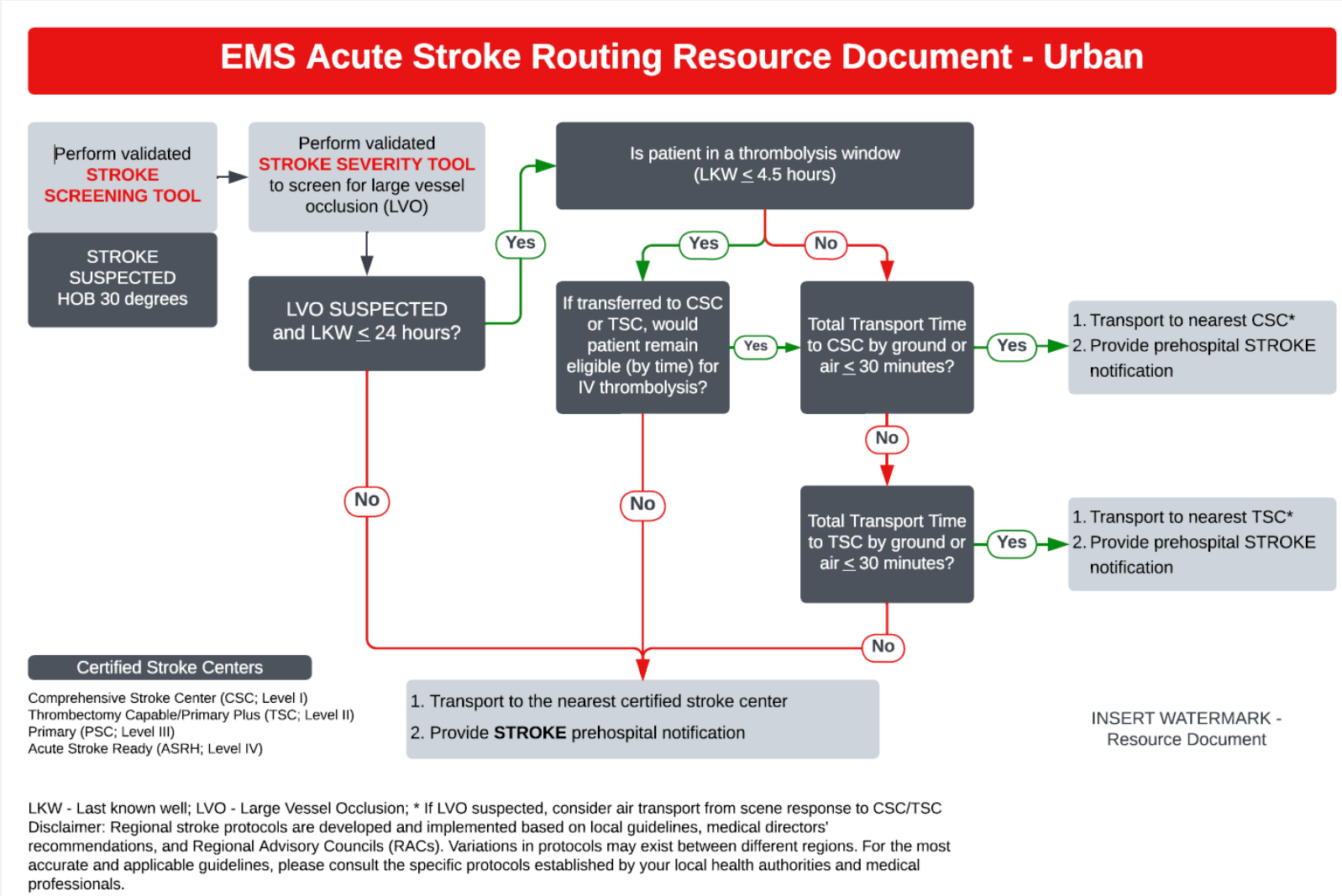
Deferred until Q2

9.i.B. Approval: Adult stroke triage algorithm resource document

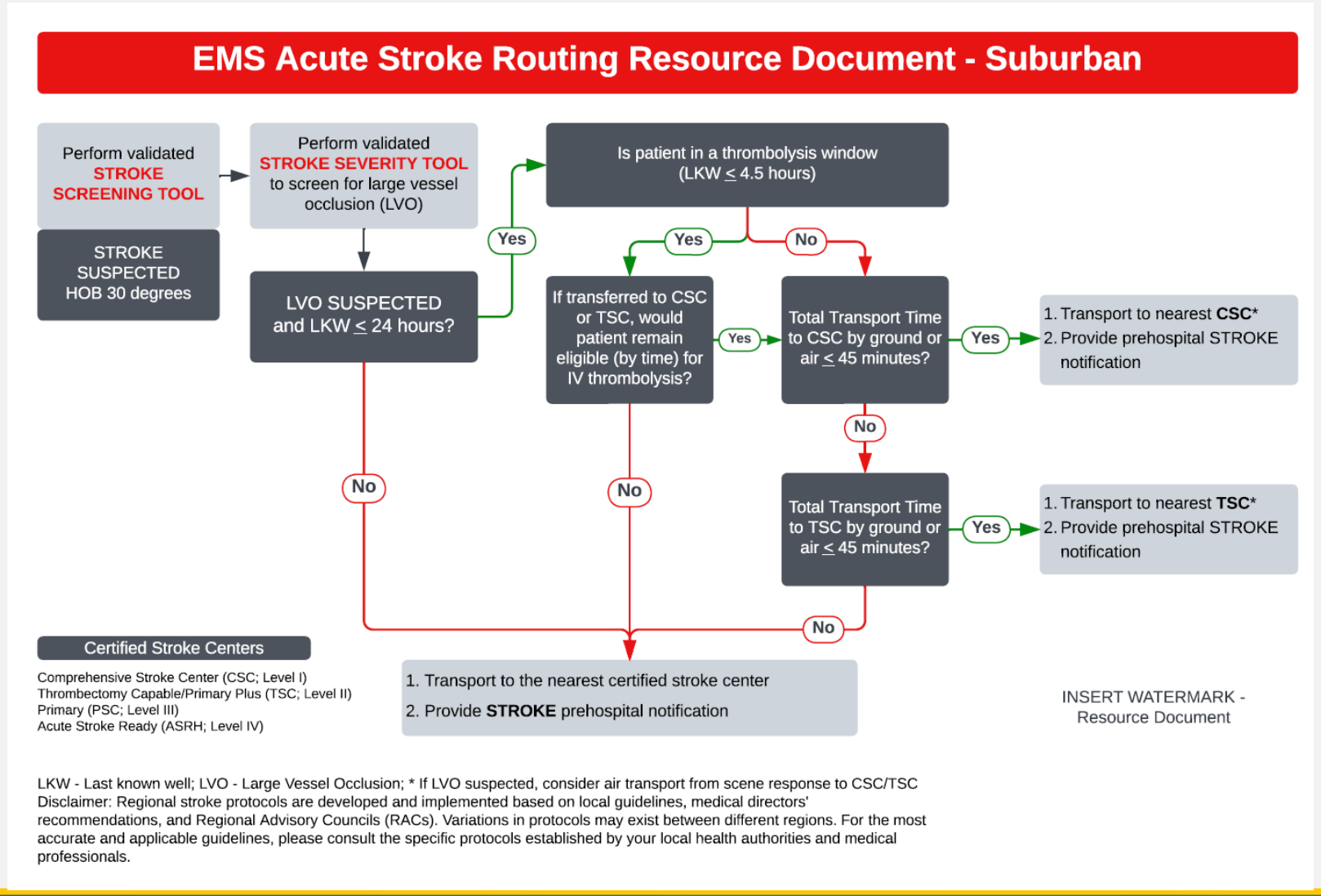
Deferred until Q2

9.i.C. Approval: Formalized Adult Stroke Algorithm

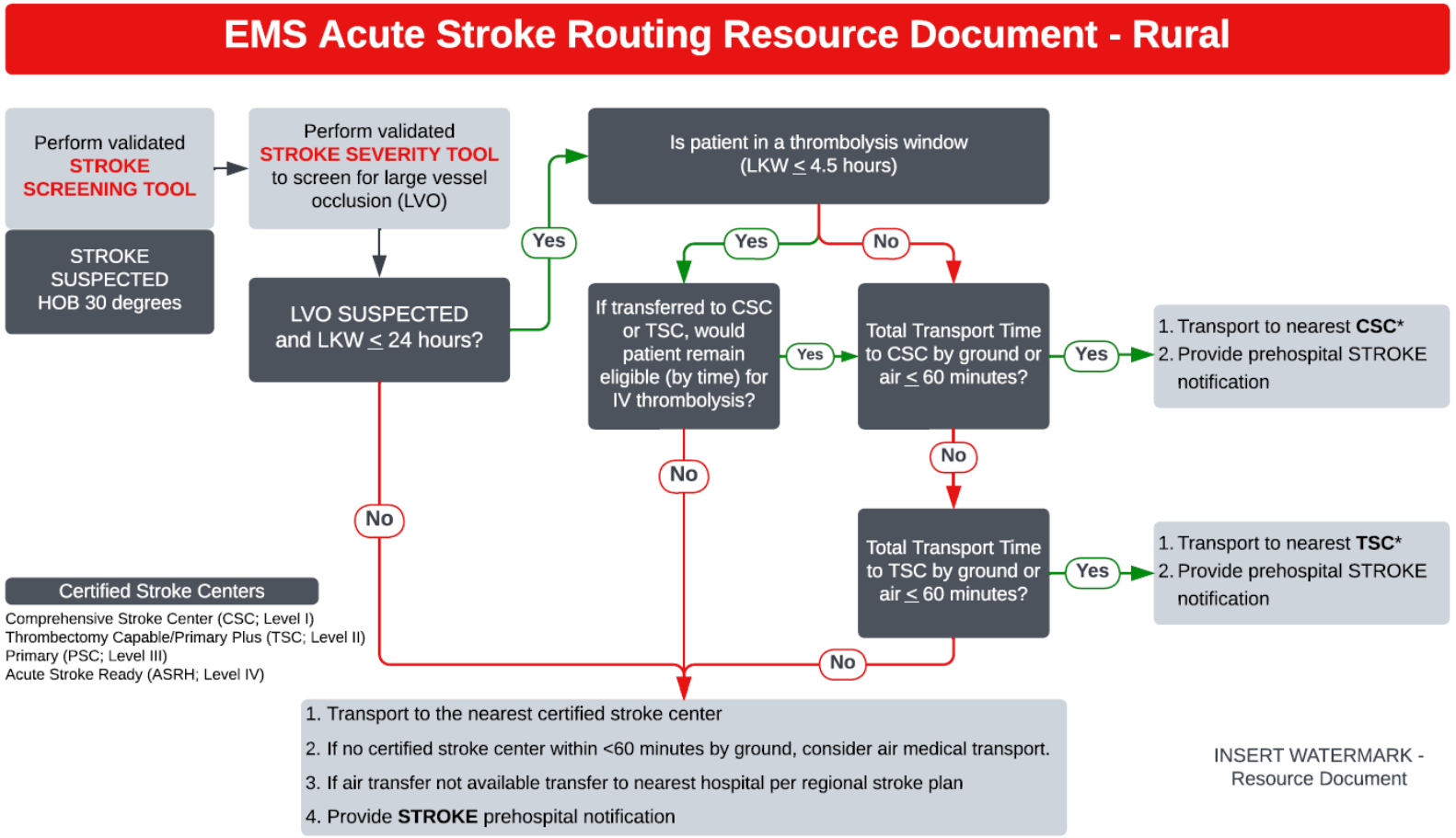
APPROVAL ITEM: Adult Algorithm



APPROVAL ITEM: Adult Algorithm



APPROVAL ITEM: Adult Algorithm



9.i.D. Approval: Pediatric Stroke Task Force Tip Sheet

Deferred until Q2