

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, either by 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,

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 ABCEs 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,^{21,22} 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 <60mg/gL),² treat according to **Diabetic Emergencies CPG**. Hyperglycemia in acute ischemic stroke is associated with worse clinical outcomes,^{23,24} including greater infarct growth^{25,26} and hemorrhagic infarct conversion.^{27,28}
- 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).

- 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.^{1,2,4,10,29-36}
 - 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.^{1,2,4,10,29,33,34,36-41}
- **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.^{10,42}
 - **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.

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