NORTH CENTRAL TEXAS
TRAUMA REGIONAL ADVISORY COUNCIL

Regional Stroke System Plan

Approved by NCTTRAC Board of Directors:
(Administrative Review and Update Only)
March 12, 2024

Approved by NCTTRAC General Membership:
December 13, 2022

Supersedes Regional Stroke System Plan:
August 11, 2021

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NCTTRAC serves the counties of Collin, Cooke, Dallas, Denton, Ellis, Erath, Fannin Grayson, Hood, Hunt, Johnson, Kaufman, Navarro, Palo Pinto, Parker, Rockwall, Somervell, Tarrant, and Wise

Any questions and/or suggested changes to this document should be sent to:

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APPROVAL AND IMPLEMENTATION

This plan applies to all counties within Trauma Service Area (TSA) E. TSA-E includes Collin, Cooke, Dallas, Denton, Ellis, Erath, Fannin, Grayson, Hood, Hunt, Johnson, Kaufman, Navarro, Palo Pinto, Parker, Rockwall, Somervell, Tarrant, and Wise counties.

This plan is hereby approved for implementation and supersedes all previous editions.

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Secretary Date

RECORD OF CHANGES

The North Central Texas Trauma Regional Advisory Council ensures that necessary changes and revisions to The Regional Stroke System Plan are prepared, coordinated, published, and distributed.

The plan will undergo updates and revisions:

- On an annual basis to incorporate significant changes that may have occurred
- When there is a critical change in the definition of assets, systems, networks, or functions that provide to reflect the implications of those changes
- When new methodologies and/or tools are developed; and
- To incorporate new initiatives.

The Regional Stroke System Plan revised copies will be dated and marked to show where changes have been made.

“Record of Changes” form is found on the following page.

RECORD OF CHANGES

This section describes changes made to this document. Use this table to record:

- Location within document (e.g., page #, section #, etc.)
- Change Number, in sequence, beginning with 1
- Date the change was made to the document
- Description of the change and rationale if applicable
- Name of the person who recorded the change

Article/Section	Date of Changes	Summary of Changes	Change Made by (Print Name)
All	7/7/2021	Changed dates to reflect FY22 approval	Corrine Cooper
Section IX	7/7/2021	Reformatted sentence structure	Corrine Cooper
Section IX	7/7/2021	Updated metropolitan and non-metropolitan terminology used by DSHS, as it relates to population	Corrine Cooper
Section XII	7/7/2021	Updated EMResource verbiage regarding ED operations status	Corrine Cooper
All	7/26/2021	Changing designations numbers to roman numerals for each level	Christina Gomez
All	7/26/2021	Changed Regional Stroke Plan to Regional Stroke System Plan throughout section where mentioned	Christina Gomez
Section V, IX, and X	7/26/2021	Replaced verbiage: Paradigms and protocols replaced with guidelines	Christina Gomez
Section VII	7/26/2021	Changed verbiage for Medical Direction of Prehospital Care Providers to solidify timeframe of	Christina Gomez
Section XI	7/26/2021	Changed verbiage of Decision Criteria to better align with Air	Christina Gomez
Section XIII	7/26/2021	Reformatted sentence structure for clarification of interfacility transfer	Christina Gomez
Section IX	7/26/2021	Added vitals and blood glucose to system triage section	Christina Gomez
Title	10/5/2022	Year removed from title	Christina Gomez
Section III	10/5/2022	Information added regarding new stroke designation level approved	Christina Gomez

Section III	10/5/2022	Stroke Committee Data Registry recommendation information added; description of new committee-approved award program included with the	Christina Gomez
Section VIII	10/5/2022	Stroke facility responsibilities elaborated on the reflect DSHS	Christina Gomez
Section X	10/5/2022	Pediatric facility information regarding stroke patients updated to reflect article updates and	Christina Gomez
Section XII	10/5/2022	EMResource updates regarding Diversion and Bypass protocols	Christina Gomez
Section XIII	10/5/2022	Information updated Inter Facility recommendations and telestroke practices	Christina Gomez
Section XIV	10/5/2022	Update to new DIDO, Door-to-Needle, and Door-to-Device times; updates from the approved SOP	Christina Gomez
References	10/5/2022	Update to articles and new peer reviewed journals	Christina Gomez

Final revisions should be submitted to the NCTTRAC Emergency Healthcare Systems Department at EHS@NCTTRAC.org, telephone 817.608.0390.

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1. SCOPE

1.1 Mission

1.1.1 The mission of the North Central Texas Trauma Regional Advisory Council (NCTTRAC) Stroke Committee is to develop a cohesive and aligned patient-centered regional stroke system of care (SSOC) that identifies and engages all potential key stakeholders with the purpose of improving the knowledge of the public, encourage primordial and primary prevention, advance and facilitate stroke therapy, improve secondary prevention and recovery from stroke; as well as reduce disparities in stroke care within the region. Such efforts will provide the infrastructure to facilitate achieving the primary goal of the Regional Stroke System Plan, to mitigate the effects of stroke within the region.

1.2 Vision

1.2.1 NCTTRAC Stroke Committee will provide leadership in stroke treatment by creating a broad stakeholder coalition with the responsibility and resources to develop, operate, evaluate, and integrate a regional SSOC based on relevant guideline recommendations.[1-6] Stakeholders should draw from key constituents, including healthcare providers, patients, caregivers, hospitals, home health companies, regulatory agencies, and payers.

1.3 Organization

1.3.1 One of the NCTTRAC Stroke Committee's goals is to provide the infrastructure and leadership necessary to sustain an exemplary and concerted regional SSOC within the designated nineteen-county region known as Trauma Service Area E (TSA-E), which strives to improve the level of care provided to persons living or traveling through this region. NCTTRAC standing committees and member organizations (hospitals, first responder organizations, emergency medical services (EMS) providers, air medical providers, emergency management, and public health) work collaboratively to provide quality care to stroke patients throughout the continuum of stroke care. The continuum of the eight domains of a SSOC includes community education, primordial prevention, primary prevention, EMS response, acute stroke treatment, secondary prevention, stroke rehabilitation, and continuous quality improvement (QI).[1]

1.4 Regional Plan

1.4.1 The Regional Stroke System Plan has been developed in accordance with generally accepted stroke guidelines and procedures for implementation of a comprehensive EMS and regional SSOC. This plan does not establish a legal standard of care but rather is intended to aid decision-making in the care of stroke patients. The Regional Stroke System Plan is not intended to supersede the physician's prerogative to order treatment.

2. STROKE SYSTEMS OF CARE GOALS

2.1 The purpose of the Stroke Committee shall be to facilitate the collaboration

and advancement of a regional SSOC based on accepted standards of care and guideline statements. The NCTTRAC Stroke Committee will solicit participation from key stakeholders comprised of: broadly healthcare providers, patients, caregivers, hospitals, home health companies, regulatory agencies, professional societies involved in health care, and payers. NCTTRAC Stroke Committee will encourage regional participation in providing and outlining quality stroke care that is patient-focused, complies with state and national guidelines, and seeks to improve public health in the 8 domains of a SSOC: community education, primordial prevention, primary prevention, EMS response, acute stroke treatment, secondary prevention, stroke rehabilitation, and continuous QI.[1] Policies that standardize the organization of stroke care throughout the continuum shall be enacted and indorsed. Such policies should aim to lower barriers to seeking emergency care for stroke, ensure that stroke patients receive care at appropriate facilities in a timely manner, and facilitate access to secondary prevention, rehabilitation, and recovery resources after stroke.[1] Adopted from current guidelines, NCTTRAC Stroke Committee shall develop a plan for a regional SSOC that addresses these key domains.[1]

3. RECOGNITION AND RESPONSIBILITIES OF STROKE FACILITIES

3.1 Goals

3.1.1 The NCTTRAC Stroke Committee and Regional Stroke System Plan aims to ensure that patients seeking emergency care for stroke receive care at the appropriate facilities in a timely manner and to facilitate access to secondary prevention, rehabilitation, and recovery resources after stroke. The NCTTRAC Stroke Committee promotes collaboration and commitment among the stroke facilities to develop uniform stroke systems standards that address stroke patient needs throughout the continuum of care; addressing the eight domains of a SSOC: community education, primordial prevention, primary prevention, EMS response, acute stroke treatment, secondary prevention, stroke rehabilitation and continuous QI.[1]

3.2 The NCTTRAC Stroke Committee encourages and promotes stroke centers within the region to work in an integrated fashion, providing and sharing best practices. Additionally, the collaboration seeks to establish recommendations for system coordination and interfacility transfers, assuring that high acuity stroke patients receive appropriate consideration for thrombectomy, thrombolysis, neurosurgical and neurocritical care.

3.3 Currently, there is no certification for pediatric stroke facilities. However, Cook Children's Medical Center and Children's Health Dallas are regional pediatric hospitals with a stroke program that meets subspecialty and imaging capability to manage strokes in patients under 18 years-old.

3.4 Committees Charged

3.4.1 Responsibilities charged to the NCTTRAC Stroke, Medical

Directors, and EMS Committees.

3.5 Objectives

3.5.1 The NCTTRAC Stroke Committee will utilize the Texas Department of State Health Services (DSHS) recognized designation for stroke facilities that provide the framework for stroke care within the region; Comprehensive Stroke Centers (CSC/Level I), Advanced or non- Comprehensive Thrombectomy Stroke Centers (Level II/TSC), Primary Stroke Centers (PSC/Level III) and Acute Stroke-Ready (Level IV/ASRH). The stroke facility names will change to reflect the new designation as outlined in the Texas Administrative Code Rule §157.133 Requirements for Stroke Facility Designation (Texas Administrative Code (state.tx.us)). The new names will be: Comprehensive Stroke Centers (CSC/Level I), Advanced or non- Comprehensive Thrombectomy Stroke Centers (Level II/TSC), Primary Stroke Centers (PSC/Level III) and Acute Stroke-Ready (Level IV/ASRH).

3.5.2 Stroke Center accreditation remains the cornerstone to ensure healthcare facilities remain committed to meeting overall high patient-safety standards. The DSHS shall determine the designation level for each facility by physical location, based on, but not limited to, national stroke standards, the facility's resources, and level of care capabilities; as well as compliance with the requirements outlined by the Texas Administrative Code, Rule §157.133 Requirements for Stroke Facility Designation. Designated stroke facilities in the NCTTRAC SSOC, including children's facilities capable of caring for pediatric strokes, must comply with department-approved national stroke standard requirements outlined by the DSHS (Stroke Systems - Texas Department of State Health Services, EMS & Trauma Systems). Hospitals must have compliance with the requirements validated by a department-approved survey organization. Each hospital shall demonstrate the capability to provide stabilization and transfer or treatment for acute stroke patients, written stroke standards of care, and a written stroke Quality Assessment and Performance Improvement (QAPI) plan as outlined by the Texas Administrative Code, Rule §157.133 Requirements for Stroke Facility Designation. Additionally, stroke facilities shall actively participate in the RAC Stroke Committee and transport plan; and submit data to the DSHS department as requested. Stroke facilities are required to receive and maintain stroke facility designation as outlined by the Texas Administrative Code, Rule §157.133 Requirements for Stroke Facility Designation. Additional goals, considerations, and responsibilities for NCTTRAC stroke facilities as outlined by guideline statements[1-6] and Texas Administrative Code, Rule §157.133 Requirements for Stroke Facility

Designation:

3.5.2.1 The Joint Commission and other certification programs offer four advanced levels of stroke certification for accredited facilities. All levels of certification utilize a standard method of delivering care centered on evidence-based guidelines for stroke care. Each level builds on the capabilities of the previous certification.

3.5.2.2 The TCS is a new level of care recently identified to address the need for greater access to thrombectomy in the community. TSC certification is intended for regions of the country that do not have ready access to CSCs; a CSC is the preferred destination for patients with suspected large vessel occlusion (LVO) when they are within acceptable transport times. If no CSC is available, a TSC should be the preferred destination for these patients from among all nearby PSCs.[1, 4, 7]

3.5.2.3 The CSC, TSC, PSC, and ASRH framework provides an appropriate platform for the data-driven development of hospital-based processes of care and outcome metrics.

3.5.2.4 As part of the QAPI plan, stroke facility treatment processes, technical outcomes (reperfusion rates), complications, and patient clinical outcomes should be tracked. All certified stroke facilities should meet or exceed the standards outlined by the DSHS-approved stroke facility certifying agency.

3.5.2.5 To facilitate quality improvement within the NCTTRAC and at the stroke facility, stroke registry participation, such as the RAC Data Collaborative, is strongly recommended.

3.5.2.6 All levels of stroke centers should work within the region in an integrated fashion, providing and sharing best practices.

3.5.2.7 Stroke centers should adopt approaches to secondary prevention that address all major modifiable risk factors and are consistent with the national guidelines for all patients with a history or a suspected history of stroke or TIA.[1]

3.5.2.8 Stroke centers should provide education and training for patients and family members. Clear, comprehensive, and timely communication across the inpatient and outpatient post-stroke continuum of care is essential to ensure appropriate medical and rehabilitation care.[1]

3.5.2.9 To standardize the post-acute care after stroke discharge, stroke centers should comprehensively screen for post-acute complications, provide individualized care plans for patients during the transition of care, provide referrals to community services, and reinforce secondary prevention

and self-management of stroke risk factors and lifestyle changes to decrease the risk of recurrent stroke. Trained stroke nurses, nurse practitioners, social workers, community health workers, and others should play a pivotal role.[1, 6]

3.5.2.10 Stroke care centers should ensure that all stroke survivors receive a standardized screening evaluation during the initial hospitalization to determine whether rehabilitation services are needed and the type, timing, location, and duration of such therapy.[1]

3.5.2.11 Long-term follow-up with primary care and specialists (physiatrist or neurology) should be arranged to identify patients with residual impairments and ensure appropriate continued rehabilitation.

3.5.2.12 Efforts should be made to advance the use of technology and patient-reported outcomes and to facilitate improved care transitions in stroke care. These interventions should be refined based on continuous QI measurement and methods. Such efforts will bolster overall stroke prevention, treatment, and recovery, as well as may reduce the persistent disparities observed in stroke care. Before implementation, new policies should be evaluated for potential adverse impact on access to care and disparities in care.[1]

3.5.2.13 A hospital shall not use or authorize the use of any public communication or advertising containing false, misleading, or deceptive claims regarding its stroke designation status. Public communication or advertising shall be deemed false, misleading, or deceptive if the facility uses these terms:

3.5.2.13.1 (1) "stroke facility," "stroke hospital," "stroke center," or similar terminology and the facility is not currently designated as a stroke facility in accordance with this section; or

3.5.2.13.2 (2) "comprehensive Level I stroke center," "advanced Level II stroke center," "primary Level III stroke center," "acute stroke ready Level IV center," or similar terminology in its signs, advertisements or printed materials the facility provides to the public, unless the hospital is currently designated at that defined level of stroke facility in accordance with the Texas Administrative Code, Rule §157.133 Requirements for Stroke Facility Designation.

3.5.2.14 EMResource is the official means of notification of these capabilities and their availability. A facility relinquishing stroke designation shall provide 30 days advance notice

to the DSHS Department, NCTTRAC, EMS providers and healthcare facilities which customarily transfer–out and/or transfer–in stroke patients, NCTTRAC and the DSHS Department.

3.5.2.14.1 The facility is responsible to continue providing stroke care services and ensure that stroke care continuity for the region remains in place for the 30 days following the notice of relinquishing its stroke designation.

3.5.3 NCTTRAC will not designate stroke facilities at any level, but may set minimum standards for what is considered active participation for the purposes of a Letter of Participation:

3.5.3.1 Stroke facility needs to maintain a valid DSHS designation as a Stroke Center.

3.5.3.2 NCTTRAC minimum participation requirements as defined in the NCTTRAC Bylaws (See Annex A: *NCTTRAC Bylaws*) or Standard Operating Procedures.

3.5.3.3 **Gold Star Stroke Facility** status is awarded to stroke facilities sharing performance measures with the Regional Data Collaborative, as part of the NCTTRAC quality initiative to improve regional stroke care in the NCTTRAC SSOC.

3.5.3.4 **Gold Star Stroke Facility Plus** status is awarded to stroke facilities providing transparent performance measures with the Regional Data Collaborative, as part of the NCTTRAC quality initiative to improve regional stroke care in the NCTTRAC SSOC.

4. COMMUNITY EDUCATION AND STROKE PREVENTION

4.1 Goals

4.1.1 Through a collaboration between NCTTRAC keystroke stakeholders, the SSOC will seek to address risk factors and behavior modifications aimed at community education, primordial prevention, primary prevention, and secondary prevention of stroke. An additional goal is to increase public, physician, hospital, and EMS personnel awareness of the signs and symptoms of stroke, stroke treatment options, and best practices as outlined by the NCTTRAC Stroke Committee and current guidelines. Public education programs should be sustainable over time and designed to reach racially/ethnically, age and gender diverse populations

4.2 Committee Charged

4.2.1 Responsibilities charged to the NCTTRAC Stroke Committee.

4.3 Objectives

4.3.1 The NCTTRAC stroke system key stakeholders will partner to achieve

the following objectives either in collaboration or independently as a pillar in the stroke care system[1]:

4.3.1.1 Support local and regional educational initiatives to increase stroke awareness (including stroke warning signs, risk factors, primary and secondary prevention, and recovery), aimed at the general and pediatric population with enriched targeting of populations at increased risk for stroke and poor outcomes after stroke.[1]

4.3.1.2 Adopt innovative behavioral interventions and encourage research in tools that support sustainable improvements addressing barriers to healthy behaviors, prevention adherence, and behavioral responses to warning symptoms.[1]

4.3.1.3 Public health leaders and medical professionals shall plan and implement public education programs focused on stroke systems and the need to seek emergency care (by calling 9-1-1) in a rapid manner. These programs shall be designed to reach diverse populations. Such educational programs should aim to increase the use of the 9-1-1 EMS system, reduce stroke onset to ED arrival times, increase EMS prehospital notification and increase the timely use of stroke treatments.[1]

4.3.1.4 Adopt approaches to secondary prevention that address all major modifiable risk factors and that are consistent with the national guidelines for all patients with a history or a suspected history of stroke or TIA.[1]

4.3.1.5 Support education and training for patients and family members. Clear, comprehensive, and timely communication across the inpatient and outpatient post-stroke continuum of care is essential to ensure appropriate medical and rehabilitation care.[1]

5. SYSTEM ACCESS

5.1 Goals

5.1.1 The goal for system access within TSA-E is two-fold: 1) access to emergency stroke care within the region must be rapidly available; 2) EMS must be available to provide quality health care to patients in TSA-E. In portions of this region, First Responder Organizations (FRO) may provide initial treatment pending EMS arrival.

5.2 Committees Charged

5.2.1 Responsibilities charged to the NCTTRAC EMS and Stroke Committees.

5.3 Objectives

5.3.1 In consultation with EMS leaders, local, regional, and state agencies, as well as medical authorities and local experts, NCTTRAC will develop triage guidelines that ensure that all patients with a known or suspected stroke are rapidly identified, assessed, and triaged as

outlined in this document. Standardized approaches to prehospital stroke assessment, triage, management, and interfacility documentation as outlined by the NCTTRAC Regional Stroke Plan are encouraged for 9-1-1 call centers and EMS dispatchers.

5.3.2 One of the primary elements of an EMS/Stroke system is to provide access to EMS and subsequent mobilization of a medical response to the scene. Every call for emergency services should universally and automatically be accompanied by location identifying information. A regional system providing dedicated lines that allow direct routing of emergency calls is ideal. Routing is based on telephone exchange areas, not municipal boundaries. Automatic Number Identification (ANI) and Automatic Location Identification (ALI) should be available. Alternative routing allows 9-1-1 calls to be routed to a designated alternative location. Most areas route their calls to the county 9-1-1 in case of overload orfailure.

5.3.3 When calls come into a 9-1-1 center, the communication system ensures that the call taker has the appropriate written protocols as well as proper training. The caller should not have to talk to more than two telecommunications personnel. The call transfer equipment used in transferring these calls should take no longer than ten seconds, and the equipment must have a history of being 95% reliable.

5.3.4 The 9-1-1 center should utilize specific screening protocols for potential stroke patients and prioritize EMS dispatch at the appropriate level for patients screening positive for acute stroke.[4,8-10] The 9-1-1 centers should utilize QI processes to review screening and dispatch for patients transported by EMS who are suspected of having a stroke and, whenever possible, review the actual final clinical hospital diagnoses. Call takers should have annual stroke education training requirements to maintain knowledge and proficiency.

6. EMS AND COMMUNICATIONS

6.1 Goals

6.1.1 EMS communications systems must provide the means by which emergency resources can be accessed, mobilized, managed, and coordinated. An emergency assistance request and the coordination of the response require communication linkages for 1) access to EMS from the scene of the incident, 2) dispatch and coordination of EMS resources, 3) coordination with medical facilities, and 4) coordination with other public safety and emergency personnel. It is imperative that EMS personnel provide prehospital notification to the receiving stroke facility that a suspected stroke patient is in route; this allows the receiving stroke facility to mobilize the appropriate resources prior to patient arrival and expedite care.

6.1.2 Currently, there is no certification for pediatric stroke facilities. Cook Children's Medical Center and Children's Health Dallas are regional pediatric hospitals with a stroke program that meets subspecialty and imaging capability to manage strokes in patients under 18 years old.

6.2 Committee Charged

6.2.1 Responsibilities charged to the NCTTRAC EMS and Stroke Committees

6.3 Objectives

6.3.1 The communication system is an integral part of a regional plan for the care of stroke patients. Networks should be geographically integrated and based on the functional need to enable routine and special large-scale operations for communications among EMS and other public safety agencies. Utilization of system status management technology should be considered for both areas with a high demand for mobile resources and for those areas where resources may not be readily available on a routine basis but would benefit from shifting resources from one geographic area to another.

6.3.2 EMS communication center(s) should be staffed with fully trained telecommunicators. The ideal telecommunication should have completed an Emergency Dispatch course, such as the Emergency Medical Dispatch: National Standard Curriculum as offered from the National Highway Traffic Safety Administration and the U.S. Department of Transportation.

6.3.3 NCTTRAC encourages 100% participation from all EMS agencies within the nineteen counties that comprise TSA-E. By enhancing participation, NCTTRAC can identify quality issues related to response times. NCTTRAC can then move toward resolving these issues through assessment, education, intervention, and evaluation through system process improvement (SPI) procedures.

6.3.4 EMS agencies should ensure that stroke management education is provided at least yearly and is integrated as a "core care competency" for EMS providers. It is recommended that a total of 4 hours of continuing credit be obtained from the 144 hours that are required during the 4-year recertification cycle with DSHS. This education should be developed and delivered in conjunction with regional stroke facilities and local/regional EMS partners. Stroke management education should include:

6.3.4.1 Adopt and train EMS providers on a single stroke screening tool and severity scale for identifying suspected acute stroke due to LVO.[1, 4, 11-12]

6.3.4.2 Adopt and train EMS providers to a destination plan based on stroke facility locations and capability, anticipated transport times, and patient acuity.[4, 13] The local algorithm should include consideration of air medical transport for

longer transport distances.[5]

6.3.4.3 Regional interfacility transport agencies should be trained to safely and rapidly transport stroke patients, including patients who received thrombolytic therapy or require consideration for EVT.[1, 4]

6.3.4.4 EMS agencies should develop and train providers on prehospital stroke notification protocols with receiving stroke facilities. Pre-arrival notification enables pre-arrival activation of stroke teams, which facilitates direct transport of the patient to the CT scanner on ED arrival and rapid evaluation of the patient by the ED physician and stroke team.[1, 4]

6.3.5 All participating prehospital agencies should engage in QI programs coordinated with the SSOC, emphasizing dispatch, response, field triage, and care transitions. Agencies should assess adherence to recommended targets for prehospital performance in acute stroke care.[2]

7. MEDICAL OVERSIGHT

7.1 Goals

7.1.1 The development of a regional SSOC requires the active participation of qualified physician providers. Physicians should be clinically qualified in their area of practice and have expertise and competence in treating stroke patients.[1, 14-17] The regional SSOC will be developed under the direction of representatives of NCTTRAC medical staff throughout the region.

7.2 Committee Charged

7.2.1 Responsibilities are charged to the NCTTRAC Medical Directors Committee.

7.3 Objective

7.3.1 Provide consistent medical oversight to ensure regional guidelines align with national standards.

8. REGIONAL PREHOSPITAL MEDICAL CONTROL

8.1 Goals

8.1.1 The Regional Stroke System Plan will assist with identifying and educating on regional medical control resources and standardized guidelines and analyze the accessibility of medical control resources. Additionally, it will identify and educate NCTTRAC EMS Providers and serve as a source for medical direction.

8.2 Committees Charged

8.2.1 Responsibilities are charged to the NCTTRAC EMS, Medical Directors and Stroke Committees.

8.3 Objectives

8.3.1 All EMS Providers have a Medical Director for their service. The Medical Directors have signed a form verifying that they are following the NCTTRAC guidelines for the treatment of patients within their area. These forms are updated and maintained by the NCTTRAC administrative office.

8.3.2 NCTTRAC encourages coordinated medical control in our region and, to that end, has organized a Medical Directors Committee, which meets periodically to review the protocols and guidelines for EMS Providers within TSA-E. Several medical directors have multiple EMS Providers working with them to help consolidate and control the prehospital care of stroke patients, but this is not a mandatory requirement at this time. Through the efforts of the Medical Directors Committee, NCTTRAC will continue to work towards developing consistency and standardization of the guidelines used within our region.

8.3.3 Physician Involvement in Regional Plan Development – The Medical Directors Committee meets quarterly to conduct its usual business and review and approve regional planning components, policies, and guidelines related to medical care. Each EMS Medical Director and at least one physician from each NCTTRAC hospital has the opportunity for representation in this standing working group. All physicians within TSA-E are invited to attend these meetings.

8.3.4 Medical Direction of Prehospital Care Providers – In accordance with DSHS guidelines, all NCTTRAC prehospital care providers function under medical control through a delegated physician practice. Regional EMS guidelines are available online to all EMS Providers for incorporation into local protocols. Annual reviews and updates are completed and distributed upon approval. EMS Medical Directors may adopt these guidelines with their emergency healthcare systems.

8.3.5 Regional Quality Improvement – The Medical Directors Committee meets quarterly to conduct business and conduct regional QI activities. (Please see the System PI section for more details).

8.3.6 EMResource – EMResource is the official means by which hospitals can update EMS Providers on their DSHS stroke designation level. It is the responsibility of the DSHS stroke facilities to maintain an accurate status reflecting the level of designation by law. Additionally, it is the responsibility of the EMS Providers to use EMResource to verify a hospital's DSHS designation and monitor if the facility is experiencing any issues that could affect the hospital's ability to provide appropriate stroke care.

8.3.6.1 A facility relinquishing stroke designation shall provide

30 days advance notice to the DSHS Department, NCTTRAC, EMS providers, and healthcare facilities which customarily transfer–out and/or transfer–in stroke patients.

8.3.6.1.1 The facility is responsible to continue providing stroke care services and ensure that stroke care continuity for the region remains in place for the 30 days following the notice of relinquishing its stroke designation.

8.3.6.2 A designated facility must provide written notification of a temporary event or decision impacting the ability of a stroke facility to comply with designation requirements to maintain the current designation status or to increase the stroke facility's capabilities that affect the region. The notice shall be provided as soon as possible within 24 hours to the EMS providers, healthcare facilities to which it customarily transfers–out and/or transfers–in stroke patients, NCTTRAC, and the DSHS Department.

8.3.7 Currently, there is no certification for pediatric stroke facilities. Cook Children's Medical Center and Children's Health Dallas are regional pediatric hospitals with a stroke program that meets subspecialty and imaging capability to manage strokes in patients under 18 years old.

9. PREHOSPITAL STROKE TRIAGE AND MANAGEMENT

9.1 Goals

9.1.1 The NCTTRAC SSOC provides triage guidelines to assist pre-hospital providers with the rapid identification, assessment, and triage of all suspected stroke patients, which aims to lower barriers to seeking emergency care for stroke and ensure that stroke patients receive care at appropriate facilities in a timely manner. Pediatric Stroke patients (0<18 yo) will be transported to the nearest Pediatric Stroke Center: Children's Health or Cook Children's Medical Center.

9.2 Committees Charged

9.2.1 Responsibilities are charged to the NCTTRAC EMS, Stroke, Medical Directors, and Emergency Department Operations Committees.

9.3 Purpose

9.3.1 In consultation with EMS leaders, local, regional, and state agencies, as well as medical authorities, current national guideline statements, and local experts; NCTTRAC will develop triage guidelines that ensure that all patients with a known or suspected stroke are rapidly identified, assessed and triaged as outlined below.[1-6] Standardized approaches to prehospital stroke assessment, triage, management,

and interfacility documentation, as outlined by the NCTTRAC Regional Stroke Plan, is encouraged for 9-1-1 call centers and EMS dispatchers.

9.3.2 The prehospital acute stroke triage and transport recommendations serve to direct the triage of adult patients (greater than or equal to 18 years of age) to the most appropriate facility, based on duration and severity of symptoms. If EMS encounters an acute stroke patient under 18 years old, contact the closest pediatric facility or Medical Control for guidance. Multi-society endorsed guideline statements and recommendations,[1-6] as well as the consensus of expert opinion (Pediatric Neurologist, Vascular Neurologists, Neuroendovascular Surgeons, and Neurosurgeons) based on clinical experience and in conferment with NCTTRAC Medical Directors and Stroke Committee members are outlined in these recommendations. See Annex B: *NCTTRAC Acute Stroke Triage Algorithm*, from the American Heart Association Mission: Lifeline Stroke Algorithm.[7]

9.3.3 Regional stakeholders must 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] Ideal destination plans must factor in all available data sources, including traffic patterns, site-specific performance data, and associated clinical outcomes.[1, 4] 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 (Annex B: *NCTTRAC Acute Stroke Triage Algorithm*).[4]

9.3.4 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; CSC are the preferred destination for patients with suspected LVO when they are within acceptable transport times.[1] If no CSC is available, a TSC should be the preferred destination for these patients from among all nearby PSCs.[1-2, 4, 7]

9.3.5 In the absence of new data, it is reasonable to adopt the Mission: Lifeline algorithm to the community needs.[1-2, 4, 7]When several stroke center options exist within similar travel times, EMS should seek care at the facility capable of offering the highest level of stroke care.[1-2, 4, 7] No randomized trial data exist to support a definitive recommendation on the acceptable additional time when considering triaging a patient

with suspected LVO to a CSC. Therefore, the Mission: Lifeline Stroke Committee felt it was best to err on the side of caution and initially set the total transport time from scene to CSC at 30 minutes. However, patients eligible for IV thrombolysis (0-3 hours from last known well) should be routed to the nearest ASRN or PSC if transport to the nearest CSC or TSC would make them ineligible on arrival due to additional transport time. In suburban and rural setting, prehospital destination plans and interfacility transport policies should prioritize transport of 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, of up to 30 additional minutes may be reasonable.[1, 4, 7]

9.4 Stroke System of Care Modification for Metropolitan, Non-Metropolitan and Frontier Communities

9.4.1 The following is adapted from the American Heart Association 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]

9.4.1.1 A Metropolitan SSOC modification is appropriate for a metro region (RUCA code 1)[18] These areas have high population density (50,000+ inhabitants) and abundant healthcare resources, with access to one or more TSC/CSC within 30 min transport time by EMS ground.

9.4.1.2 A Non-Metropolitan SSOC modification is appropriate for large residential communities adjacent to an urban core (RUCA codes 2-3). These areas generally have a population density closer to the urban threshold and may have access to nearby community hospitals and suburban or urban advanced stroke centers within a 30–60-minute transport time by EMS air or ground. Patients with suspected LVO should be routed directly to a CSC if the additional transport time passed the nearest TSC does not exceed 30 minutes, and the maximum transport time from scene to CSC does not exceed 45 minutes. If no CSC is within 45 minutes, then EMS should go directly to a TSC if the additional transport time passed the nearest PSC or ASRH does not exceed 30 minutes, and the maximum total transport time from scene to 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.

9.4.1.3 A Frontier SSOC modification is appropriate for a very small or non-metropolitan region (RUCA codes 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 transport time by EMS ground, although there may be one within 60 minutes by air. Patients with suspected LVO should be routed directly to a CSC if the additional transport time passed the nearest TSC does not exceed 30 minutes, and the maximum total transport time from scene to CSC does not exceed 60 minutes. If no CSC is within 60 minutes, then EMS should go directly to a TSC if the additional transport time passed the nearest PSC or ASRH does not exceed 30 minutes, and the maximum total transport time from scene to TSC does not exceed 60 minutes.

9.4.2 The COVID-19 pandemic further emphasizes the need for flexible adaptation of prehospital triage and interfacility transport 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.[19]

9.5 Prehospital Triage of Stroke Patients

9.5.1 Basic Level

9.5.1.1 Assess and support ABCs according to UNIVERSAL CARE – ADULT:

9.5.1.1.1 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.

9.5.1.1.2 B (Breathing): Supplemental oxygen should be provided to maintain oxygen saturation >94% (continuous monitoring).

9.5.1.1.3 C (Circulation): Evaluate, document, and treat signs/symptoms of shock according to the Shock Clinical Practice Guidelines (CPG).

9.5.1.1.4 D (Disability): Assess and document GCS, pupillary size, and reactivity.

9.5.1.1.5 E (Exposure/Environmental): Assess for evidence of traumatic injury, especially head injury.

9.5.1.2 Positioning/stabilization:

9.5.1.2.1 Place the patient in a supine position, head of the bed elevated 30 degrees.

9.5.1.2.2 Cardiac monitoring during transport is recommended. If there is evidence of shock, treat according to the Shock CPG.

9.5.1.2.3 If hypoglycemia is present (POC glucose <60 mg/gL), treat according to Diabetic Emergencies CPG.

9.5.1.2.4 If there is Seizure activity, treat according to the Seizure CPG.

9.5.1.3 Assessment

9.5.1.3.1 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:

9.5.1.3.1.1 Obtain a mobile number of next of kin and witnesses. 9.4.3.2.1.2

9.5.1.3.1.2 NOTE: For “wake-up strokes,” the time documented is the time last known well, not the time the patient was found.

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

9.5.1.3.1.4 Numbness or weakness of face, arm, and/or leg (especially on one side of the body)

9.5.1.3.1.5 Confusion

9.5.1.3.1.6 Trouble speaking or understanding language

9.5.1.3.1.7 Trouble seeing in one or both eyes or double vision

9.5.1.3.1.8 Trouble walking

9.5.1.3.1.9 Dizziness

9.5.1.3.1.10 Loss of balance or coordination 9.4.3.2.1.3.8 Sudden onset of severe headache with no known cause (suggests hemorrhagic stroke)

9.5.1.3.1.11 Any asymmetry of the neurological exam

9.5.1.3.2 Additional History:

9.5.1.3.2.1 Obtain patient history, including co-morbid conditions.

9.5.1.3.2.2 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)].

9.5.1.3.2.3 Additional history: Past medical history, allergies (iodinated contrast).

9.5.1.3.2.4 Be alert to common stroke mimics*.

9.5.1.3.2.5 Determine if the patient has a substantial pre-existing disability (e.g., need for nursing home care or unable to walk independently).

9.5.1.3.2.6 Medications – obtain a list of all mediations, 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 last dose.)

9.5.1.3.2.7 Device/implant history (e.g., left ventricular assist device, pacemaker, valve replacement)

9.5.1.3.3 Examination

9.5.1.3.3.1 Assess and record blood pressure, rate, rhythm, respiratory rate, and oxygen saturation.

9.5.1.3.3.2 Apply a validated and standardized instrument for stroke screening such as FAST (Face, Arm, Speech, Time), Los Angeles Prehospital Stroke Screen, or Cincinnati Prehospital Stroke Scale

9.5.1.3.3.3 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.

9.5.1.4 Management

9.5.1.4.1 EMS personnel should begin the initial management of stroke in the field as outlined in this document.

9.5.1.4.2 Prevent aspiration, HOB >30. Ensure airway patency with suctioning and OPA or NPA, as needed.

9.5.1.4.3 Provide supplemental oxygen if needed to keep oxygen saturation >94%

9.5.1.4.4 Treatment of hypertension is NOT recommended unless blood pressure >220/120 mmHg.

9.5.1.4.5 Treat hypotension. Evaluate, document, and treat signs/symptoms of shock according to the Shock CPG. If possible, obtain EKG during workup, as long as it does not delay transport to the appropriate stroke facility.

9.5.1.4.6 Avoid dextrose-containing fluids in non-hypoglycemic patients.

9.5.1.4.7 Perform and document a POC Glucose analysis and treat according to the ASA 2019 Guidelines for Management of Acute Ischemic Stroke.[2]

9.5.1.4.7.1 Hypoglycemia (blood glucose <60 mg/dL) should be treated in patients suspected of

acute ischemic stroke.

9.5.1.4.8 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).

9.5.1.4.9 To facilitate the fastest Door-to-Needle and stroke care, when possible, collect blood sample to provide the receiving facility, however, as long as it does not delay the transfer.

9.5.1.5 System Triage

9.5.1.5.1 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.

9.5.1.5.2 See Annex B: *NCTTRAC Acute Stroke Triage Algorithm* for the Acute Stroke Triage Algorithm.

9.5.1.5.3 Call stroke alert, and pre-notify the receiving facility that a suspected stroke patient is in route so that the appropriate resources may be mobilized before patient arrival.

9.5.1.5.3.1 Pre-notification should include patient's name, LKW, vitals, blood glucose, stroke severity score, and the phone number for next of kin.

9.5.1.5.4 Goal: 30 seconds for EMS to ED triage nurse hand-off.

9.5.1.5.5 Bypass Exclusions:

9.5.1.5.5.1 If severe or life-threatening trauma is suspected in addition to stroke, transfer to the appropriate level trauma center.

9.5.1.5.5.2 Patients under hospice care or with Medical Orders for Scope of Treatment (MOST) that outlines no emergency measures should go to the nearest appropriate hospital.

9.5.1.5.5.3 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.

10. PEDIATRIC STROKE TRIAGE AND MANAGEMENT

10.1 Goals

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

10.2 Committee Charged

10.2.1 Responsibilities are charged to the NCTTRAC EMS, Stroke, Pediatric, Medical Directors and Emergency Department Operations Committees.

10.3 Purpose

10.3.1 In consultation with EMS leaders, local, regional, and state agencies, as well as medical authorities, current national guideline statements, and local pediatric neurology experts; NCTTRAC will develop triage guidelines that ensure that all pediatric patients with a known or suspected stroke are rapidly identified, assessed and triaged as outlined below.[1-2, 4, 7, 14-17] Standardizing care to rapidly diagnose and provide appropriate treatment will improve outcomes.[14-17] The prehospital acute stroke triage and transport recommendations serve to direct the regional triage of pediatric patients with acute stroke to the most appropriate facility.

10.3.2 Pediatric stroke facilities should have the availability of personnel to care for pediatric stroke patients with a pediatric intensive care unit. Pediatric stroke facilities shall have a multidisciplinary team to care for pediatric stroke patients, have the capability to administer antiplatelet drugs, anticoagulants and thrombolytic therapies, as well as have the ability to treat complications. Pediatric stroke facilities should have the technical capabilities (including imaging capability, MRI if possible), policies and procedures to facilitate optimal care of the pediatric stroke patient.[14-17] Cook Children's Medical Center and Children's Health Dallas have a stroke program that meets subspecialty and imaging capability to manage strokes in patients under 18 years old. If EMS encounters an acute stroke in a pediatric patient (0 to <18 years), contact Cook Children's Medical Center or Children's Health Dallas for guidance. Pediatric hospitals that do not meet the above capabilities shall be able to identify, stabilize, consult and transfer patients to a center that can provide the appropriate care and rehabilitative resources.[14-17]

10.4 Prehospital Triage of Stroke Patients

10.4.1 Basic Level

10.4.1.1 Assess and support ABCs according to UNIVERSAL – PEDIATRIC:

10.4.1.1.1 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.

10.4.1.1.2 B (Breathing): Supplemental oxygen should be provided to maintain oxygen saturation >94% (continuous monitoring).

10.4.1.1.3 C (Circulation): Evaluate, document, and treat signs/symptoms of shock according to the Shock Clinical

Practice Guidelines (CPG).
10.4.1.1.4 D (Disability): Assess and document GCS, pupillary size, and reactivity.
10.4.1.1.5 E (Exposure/Environmental): Assess for evidence of traumatic injury, especially head injury.

10.4.1.2 Positioning/Stabilization:
10.4.1.2.1 Place the patient in a supine position, head of the bed elevated 30 degrees.
10.4.1.2.2 Cardiac monitoring during transport is recommended.
10.4.1.2.3 If there is evidence of shock, treat according to the Shock CPG.
10.4.1.2.4 If hypoglycemia is present (POC glucose <60 mg/gL), treat according to Diabetic Emergencies CPG.
10.4.1.2.5 If there is seizure activity, treat according to the Seizure CPG

10.4.2 Assessment
10.4.2.1 History
10.4.2.1.1 Consider stroke in any pediatric patient with new-onset headache and/or sudden new-onset focal neurological symptoms.
10.4.2.1.2 Causes include:
10.4.2.1.2.1 Congenital heart conditions/surgery
10.4.2.1.2.2 Sickle Cell Disease and other hematologic conditions, such as those causing abnormal blood clotting.
10.4.2.1.2.3 Infectious/inflammatory (vasculitis) and non-inflammatory blood vessel conditions
10.4.2.1.2.4 Metabolic conditions
10.4.2.1.2.5 Drug ingestion like cocaine or methamphetamine
10.4.2.1.3 Presentation: Seizures at presentation are more common than in the adult population and more common in children under the age 2 years.
10.4.2.1.4 Infants may present with focal weakness, altered level of consciousness, and seizures.
10.4.2.1.5 Children may present with new-onset headache, focal neurological deficit, altered level of consciousness, slurred speech or refusal to speak, and seizures.
10.4.2.1.6 Possible stroke-related focal neurological deficits:
10.4.2.1.6.1 Hemiparesis
10.4.2.1.6.2 Speech disturbance: aphasia/confusion, dysarthria, slurring of speech
10.4.2.1.6.3 Visual disturbance
10.4.2.1.6.4 Cranial neuropathies
10.4.2.1.6.5 Hemisensory loss

10.4.2.1.6.6 Ataxia-loss of balance
10.4.2.1.6.7 New-onset seizure: <2 years old have increased risk of stroke presenting as new-onset seizure
10.4.2.1.6.8 Lateralized tonic-clonic activity
10.4.2.1.6.9 Seizure with a post-ictal focal deficit that does not resolve quickly
10.4.2.1.7 Head and eye deviation indicate focal lesion. Interview patient, family members, and other witnesses to determine symptoms, time of symptom discovery and last known well (LKW), or last time patient without symptoms.
10.4.2.1.8 Obtain a mobile number of next of kin and witnesses.
10.4.2.1.9 NOTE: For "wake-up strokes," the time documented is the time last known well, not the time the patient was found.
10.4.2.1.10 NOTE: Sudden onset of any of the following suggests the possibility of acute stroke:
10.4.2.1.10.1 Numbness or weakness of face, arm, and/or leg (especially on one side of the body)
10.4.2.1.10.2 Confusion
10.4.2.1.10.3 Trouble speaking or understanding language
10.4.2.1.10.4 Trouble seeing in one or both eyes or double vision
10.4.2.1.10.5 Trouble walking
10.4.2.1.10.6 Dizziness
10.4.2.1.10.7 Loss of balance or coordination
10.4.2.1.10.8 Sudden onset of severe headache with no known cause (suggests hemorrhagic stroke)
10.4.2.1.10.9 Any asymmetry of the neurological exam.

10.4.2.2 Additional History
10.4.2.2.1 Obtain patient history, including co-morbid conditions.
10.4.2.2.2 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)].
10.4.2.2.3 Additional history: Past medical history, allergies (iodinated contrast).
10.4.2.2.4 Be alert to common stroke mimics*.
10.4.2.2.5 Determine if the patient has a substantial pre-existing disability (e.g., unable to walk independently).
10.4.2.2.6 Medications – obtain a list of all mediations, 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 last dose.)

10.4.2.2.7 Device/implant history (e.g., left ventricular assist device, pacemaker, valve replacement).

10.4.2.3 Examination

10.4.2.3.1 Assess and record blood pressure, rate, rhythm, respiratory rate, and oxygen saturation.

10.4.2.3.2 Apply a validated and standardized instrument for stroke screening such as FAST (Face, Arm, Speech, Time), Los Angeles Prehospital Stroke Screen, or Cincinnati Prehospital Stroke Scale.

10.4.2.3.3 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.

10.4.2.3.4 Alternatively, the Pediatric Committee recommends the use of the Pediatric NIHSS (Annex C: *Pediatric NIHSS*) in the pediatric population. Rapid identification of pediatric patients with stroke using the NIH scale to evaluate stroke symptoms is the most important step in stroke care.[14-17]

10.4.2.4 Management

10.4.2.4.1 EMS personnel should begin the initial management of stroke in the field as outlined in this document.

10.4.2.4.2 Prevent aspiration, HOB >30. Ensure airway patency with suctioning and OPA or NPA, as needed.

10.4.2.4.3 Provide supplemental oxygen if needed to keep oxygen saturation >94%.

10.4.2.4.4 Normotension target systolic blood pressure between 50th and 90th percentile for age.

10.4.2.4.5 Pediatric Systolic Blood Pressure Parameters:

Systolic Blood Pressure Parameters- Female

Age	50%	95%	>15% above 95%	>20% above 95%
1-4 years	90	111	128	133
5 years	94	113	130	145
6-10 years	96	121	139	145
11-18 years	105	131	151	157

Systolic Blood Pressure Parameters- Male

Age	50%	95%	>15% above 95%	>20% above 95%
1-4 years	90	112	129	134
5 years	95	113	130	136
6-10 years	96	121	139	145
11-18 years	105	140	161	168

10.4.2.4.6 Treat hypotension. Evaluate, document, and treat signs/symptoms of shock according to the Shock CPG. If possible, obtain EKG during workup, as long as it does not delay transport to the appropriate facility.

10.4.2.4.7 Avoid dextrose-containing fluids in non-hypoglycemic patients.

10.4.2.4.8 Perform and document a POC Glucose analysis and treat according to the ASA 2019 Guidelines for Management of Acute Ischemic Stroke.

10.4.2.4.8.7 Hypoglycemia (blood glucose <60 mg/dL) should be treated in patients suspected of acute ischemic stroke.

10.4.2.4.9 To facilitate expedited stroke workup in the ED, place 2 peripheral IVs.

10.4.2.4.10 To facilitate the fastest Door-to-Needle and stroke care, when possible, collect blood sample to provide the receiving facility, however, as long as it does not delay transfer.

10.4.3 System Triage

10.4.3.1 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.

10.4.3.2 Destination decision-making for pediatric patients less than 18 years of age with possible stroke.

10.4.3.2.1 Transport the patient to or contact Cook Children's Medical Center or Children's Health Dallas for guidance.

10.4.3.2.2 Call stroke alert, and pre-notify the receiving facility that a suspected stroke patient is in route so that the appropriate resources may be mobilized before patient arrival.

10.4.3.2.2.1 Pre-notification should include patient's name, LKW, vitals, blood glucose, stroke severity score, and the phone number for next of kin.

10.4.3.2 Goal: 30 seconds for EMS to ED triage nurse hand-off.

10.4.3.3 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.

11. HELICOPTER ACTIVATION

11.1 Goals

11.1.1 Regional air transport resources may be appropriately utilized in order to reduce delays in providing optimal stroke care.

11.2 Committees Charged

11.2.1 Responsibilities are charged to the NCTTRAC Air Medical Committee with input from the EMS and Stroke Committees and guidance from the Medical Directors Committee.

11.3 Decision Criteria

11.3.1 Consider Air Medical Transport when:

11.3.1.1 Helicopter activation/scene response may be considered when it can reduce transportation time or provide advanced life support.

11.3.1.2 If ground transportation may take greater than 30 minutes, consider air medical transport.

11.3.2 Patients meeting the criteria for helicopter dispatch should be transported to the most appropriate designated stroke facility.

11.3.3 Pediatric patients should be transported to Cook Children's Medical Center or Children's Health Dallas.

11.3.4 Refer to Annex D: *Aircraft Utilization and Systems Performance Review*

12. FACILITY DIVERSION

12.1 Goals

12.1.1 NCTTRAC stroke facilities will communicate the availability of acute stroke patient care capability status promptly and clearly to the regional EMS and other facilities through EMResource to ensure that stroke patients are transported to the closest appropriate stroke facility. Pediatric patients should be transported to Cook Children's Medical Center or Children's Health Dallas.

12.2 Committees Charged

12.2.1 Responsibilities charged to the NCTTRAC EMS, Medical Directors and Stroke Committees.

12.3 System Objective

12.3.1 The system objective is to ensure that stroke patients will be transported to the closest appropriate facility.

12.3.2 **As a result of a cooperative effort between NCTTRAC and the Dallas Fort Worth Hospital Council (DFWHC), there is no longer an official category of "divert" in Trauma Service Area (TSA) E.**

Facilities may communicate information to EMS that may be relevant in the decision to transport to their destination, such as ED saturation, but may not post a "divert" status or comment within EMResource. EMResource is the primary tool in TSA-E for hospitals to communicate with EMS providers about any facility issues that may be relevant to EMS patient destination decisions. EMResource is used to report on the saturation level of a facility's Emergency Department, the overall status of a facility's Emergency Department, specific clinical service capabilities, facility bed availability, and interfacility transfer availability for MedSurg & ICU patients.

12.3.3 The *Hospital Intake Status* in EMResource is the official method for hospitals to communicate their ED status to pre-hospital partners.

12.3.3.1 If a hospital can accept incoming EMS traffic with no restrictions and without extended ambulance patient offload times, they should list their status as **Open**. If a facility's *Hospital Intake Status* is **Open**, they must update their status at least once every 24 hours.

12.3.3.2 Hospitals experiencing high levels of patient surge can change their *Hospital Intake Status* to **Advisory – ED Surge**; this notifies EMS agencies to anticipate extended patient off-load times and asks them to consider the hospital's current status when making patient destination decisions. When EMS sees that a potential destination hospital is on **Advisory – ED Surge**, they should consider whether the patient will be better served going to an alternate facility when deciding where to take the patient.

12.3.3.3 Hospitals unable to accept certain types of patients due to a clinical service closure can change their *Hospital Intake Status* to **Advisory – Capability** and list the types of patients they are unable to accept in the comments. When EMS sees that a potential destination hospital is on **Advisory – Capability**, they should reroute patients of the types listed in the comments to a facility that has the capability to treat that patient. Hospitals can pre-select if they are unable to accept Trauma, Stroke, or STEMI patients, and may utilize an "Other" category for all other patient types.

12.3.3.4 Hospitals experiencing an internal or external environmental disaster that prevents them from safely accepting any new patients can set their *Hospital Intake Status* to **Closed**. This should only be used when there is an external hazard at the facility that presents a danger to the patient (e.g., fire, flooding, active shooter); hospitals cannot go on **Closed** due to extreme patient

surge or hospital staffing shortages.

12.3.4 In addition to *Hospital Intake Status*, NCTTRAC has integrated the use of National Emergency Department Over Crowding Study (NEDOCS) scoring within EMResource for hospitals to help determine emergency department saturation and reporting. Hospitals with emergency departments are required to update their NEDOCS once every 6 hours; if they do not, the system marks their NEDOCS as "Overdue". EMS providers are required to monitor the NEDOCS of facilities in their service area. This can be accomplished by either actively monitoring EMResource on the website or mobile application or by receiving notifications when the NEDOCS goes above a certain threshold. A high NEDOCS is generally associated with longer patient offload times for EMS.

12.3.5 In addition to the statuses outlined above, there are four stroke-specific hospital statuses in EMResource. These statuses and their status options are detailed below.

12.3.6 Status: Stroke General Service

12.3.7 Status: Stroke NeuroIR

12.3.7.1 Reflects the current status of a facility's ability to provide NeuroIR services. Can only be updated by Level I and II designated facilities. Should be updated as needed.

12.3.8 A facility relinquishing stroke designation shall provide 30 days advance notice to the DSHS Department, NCTTRAC, EMS providers and facilities which customarily transfer–out and/or transfer–in stroke patients.

9.5.1.5.6 The facility is responsible to continue providing stroke care services and ensure that stroke care continuity for the region remains in place for the 30 days following the notice of relinquishing its stroke designation.

12.3.9 A designated facility must provide written notification of a temporary event or decision impacting the ability of a stroke facility to comply with designation requirements to maintain the current designation status, or to increase the stroke facilities capabilities that affect the region. The notice shall be provided as soon as possible within 24 hours to the EMS providers, healthcare facilities to which it customarily transfers–out and/or transfers–in stroke patients, NCTTRAC and the DSHS Department.

12.3.10 Designated stroke facilities failing to meet and /or maintain critically essential criteria, as outlined by the State of Texas and the accrediting agency (TJC, DNV-GL, etc.) shall provide notification about such failings within five days to the NCTTRAC, the DSHS office, regional EMS and other healthcare facilities (from which it receives and to which it transfers stroke patients) through

EMResource.

12.3.11 Currently, there is no certification for pediatric stroke facilities. Cook Children's Medical Center and Children's Health Dallas are regional pediatric hospitals with a stroke program that meets subspecialty and imaging capability to manage strokes in patients under 18 years old.

13. INTERFACILITY TRANSFER

13.1 Goals

13.1.1 The goal for establishing and implementing interfacility transfer criteria in NCTTRAC is to ensure that stroke patients requiring additional or specialized care and treatment beyond a facility's capability are identified and transferred to the most appropriate facility as quickly as possible. Regional facilities transferring stroke patients to a higher level of care, for the purposes of endovascular revascularization therapy (EVT), an urgent neurosurgical procedure or other urgent treatment, should establish a goal Door-In Door-Out (DIDO) time for patients arriving at the emergency department. For patients with an LVO needing transfer for mechanical thrombectomy, goal DIDO should be set to meet current ASA guidelines.[1-2, 4, 7]

13.2 Committee Charged

13.2.1 Responsibilities charged to the NCTTRAC Stroke Committee with input from Air Medical, Emergency Department Operations, EMS, and Medical Directors Committees.

13.3 Purpose

13.3.1 The interfacility transfer recommendation encourages the identification and expedited transfer of stroke patients requiring additional or specialized care and treatment beyond a facility's capability. Multi-society endorsed guideline statements and recommendations, as well as the consensus of expert opinion (Pediatric Neurologist, Vascular Neurologists, Neuroendovascular Surgeons, and Neurosurgeons) based on clinical experience and in conferment with NCTTRAC Medical Directors and Stroke Committee members are outlined in these recommendations. [1-2, 4, 7, 14-17] Refer to the latest NCTTRAC Stroke Committee source documents; Interfacility Transfer Guideline and Interfacility EMS Transport Documentation.

13.4 Objectives

13.4.1 To ensure that all regional facilities caring for stroke patients within the NCTTRAC SSOC develop, adopt and adhere to care protocols that reflect current care guidelines as established by national and international professional organizations along with state/federal agencies and laws.

13.4.1.1 Patients identified to have an acute ischemic stroke from an LVO and are less than 24 hours from the last known well should be considered for transfer to a Comprehensive Stroke Center (Level 1) if eligible for EVT.

13.4.1.2 Patients <18 years identified to have an acute ischemic stroke from an LVO and are less than 24 hours from last known well consider transfer to Cook Children's Medical Center or Children's Health Dallas.

13.4.2 To establish well-delineated guidelines for triage and transportation.

13.4.3 To outline a goal transfer time for TSA-E:

13.4.3.1 DIDO of 90 minutes for patients with an LVO (Emergency)

13.4.3.2 Picture to Door-Out of 90 minutes for patients with an LVO (Inpatient)

13.5 Facility Triage from Emergency Department and Inpatient Service

13.5.1 Prehospital triage as outlined in Annex B: *NCTTRAC Acute Stroke Triage Algorithm*

13.5.2 All facilities caring for stroke patients within the SSOC should develop, adopt and adhere to care protocols that reflect current care guidelines established by national and international professional organizations and state and federal agencies and laws. Refer to the latest NCTTRAC Stroke Committee source document Interfacility Transfer Guideline for further detail.

13.5.3 Using telestroke and teleradiology networks in evaluating AIS patients can be effective for correct IV thrombolysis eligibility decision-making. Additionally, communication platforms with image sharing capability may be reasonable for triaging patients with AIS who may be eligible for interfacility transfer in consideration for mechanical thrombectomy.

13.5.4 Regional facilities that may transfer patients for a higher level of care should establish hand-off, transfer protocols, and procedures that ensure safe and efficient patient care within and between facilities.

13.5.5 Protocols for interfacility transfer of patients should be established and approved beforehand so efficient patient transfers can be accomplished at all hours of the day and night.

13.5.6 Regional facilities that may transfer patients for a higher level of care should establish transfer protocols, terminology (code stroke), agreements, and procedures that ensure safe and efficient patient care with EMS agencies capable of transportation via ground and air.[5]

13.5.7 Use of the NCTTRAC Stroke Committee endorsed interfacility stroke terminology to convey the level of stroke emergency isrecommended:

13.5.7.1 Level 1 Stroke – Patient with an ischemic or hemorrhagic stroke in need of an emergent intervention.

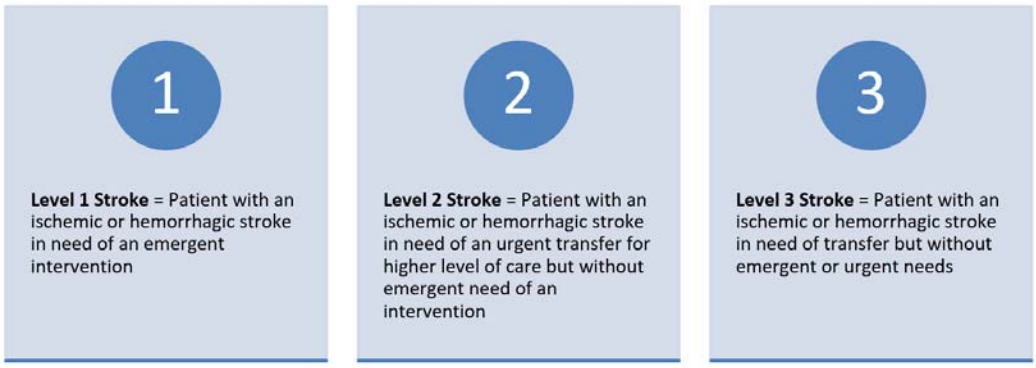
13.5.7.2 Level 2 Stroke – Patient with an ischemic or hemorrhagic stroke in need of an urgent transfer for a higher level of care but without need of an emergent intervention.

13.5.7.3 Level 3 Stroke – Patient with an ischemic or hemorrhagic stroke in need of transfer but without emergent or urgentneeds.

13.5.7.3.1 Level 1 and level 2 Strokes, time from agency notification to transportation arrival at the transferring hospital ≤30 minutes. Consider the option of lights and sirens.

13.5.7.4 Level 1 stroke, if ground transportation will take >30 minutes to reach the receiving facility, consider air transport.

NCTTRAC Interfacility Stroke Terminology to Convey Level of Stroke Emergency



- **Level 1 and 2 Stroke**- time from ***agency notification*** to transportation ***arrival at the transferring hospital*** ≤ 30 minutes. Consider option of lights and sirens
- **Level 1 Stroke**- if ground transportation will take > 30 minutes to reach the receiving facility consider air transport

13.5.7.5 In all patients within 24 hours from the last known well suspected of having an acute ischemic stroke, early identification of possible LVO is recommended.

13.5.7.5.1 Consider utilizing a stroke severity scale or NIHSS upon arrival to the emergency room to identify possible LVO,or the Pediatric NIHSS in the pediatric population (Annex C: *Pediatric NIHSS*)

13.5.7.5.2 Recommended stroke severity scale: 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.

13.5.8 Early Notification of CSC (Level 1) and activation of EMS transport team.

13.5.8.1 Notify CSC (Level 1) on arrival and dispatch EMS transport team (should be on standby for transfer prior to imaging) if LVO screen is positive and patient meets established criteria for transfer.

13.5.9 It may be useful for primary stroke centers and other healthcare facilities that provide initial emergency care, including administration of IV thrombolysis, to develop the capability of performing emergent noninvasive vascular and perfusion imaging to identify patients eligible for endovascular intervention. Imaging programs with artificial intelligence and communication platforms may reduce the time to mechanical thrombectomy and revascularization.[1-2, 4]

13.5.9.1 0-6 hours from last known well: EVT eligibility will be based in part on NIHSS, CT ASPECT score, and demonstration of an LVO on CT angiogram of the head and neck.

13.5.9.2 6-24 hours from last known well: EVT eligibility will be based in part on NIHSS, CT ASPECT score, demonstration of an LVO on CT angiogram of head and neck, and target mismatch profile on CT perfusion, DW-MRI or MRI perfusion (performed either at transferring or receiving facility).

13.5.9.3 0-24 hours from last known well in a pediatric patient: MRI is ideally used. MRI RAPID and MRI with arterial spin labeling are just a few tools considered for EVT eligibility. EVT in pediatric patients (0-<18 years) should only be considered at a pediatric center with an established stroke program, such as Cook Children's Medical Center or Children's Health Dallas.[14-17]

13.5.10 Regional facilities triaging stroke patients suspected of having an intracranial LVO (positive stroke severity screen) should consider concurrent vascular imaging with non-contrast head CT or MRI/MRA in patients <18 years of age (contact Cook Children's Medical Center or Children's Health Dallas for guidance).[2, 14-17]

13.5.10.1 6-24 hours from last known well consider CT perfusion, DW-MRI, or MRI perfusion if capable.[2]

13.5.11 In patients with AIS who awake with stroke symptoms or have an unclear time of onset >4.5 hours from last known well or at baseline

state, an MRI to identify diffusion-positive FLAIR-negative lesions can be useful for selecting those who can benefit from IV thrombolysis administration within 4.5 hours of stroke symptom recognition.[2]

13.5.12 For patients who otherwise meet the criteria for EVT, a noninvasive intracranial vascular study is recommended during the initial imaging evaluation of the acute stroke patient but should not delay IV thrombolysis if indicated.[2]

13.5.12.1 For patients who qualify for IV thrombolysis according to guidelines from professional medical societies, initiating IV thrombolysis before noninvasive vascular imaging is recommended for patients who have not had noninvasive vascular imaging as part of their initial imaging assessment for stroke. Noninvasive intracranial vascular imaging should be obtained as quickly as possible or at the receiving facility if intracranial vascular imaging will add delay to transfer.[2]

13.5.12.2 It is not recommended to give IV thrombolysis to pediatric patients (0 to <18 years) prior to noninvasive vascular imaging. Contact Cook Children's Medical Center or Children's Health Dallas for guidance.[14-17]

13.5.13 Per ASA guidelines: in patients without a history of renal impairment, suspected of having an LVO, and who otherwise meet the criteria for EVT, it is reasonable to proceed with CTA before obtaining a serum creatinine concentration.[2] (Not applicable for pediatric patients.)

13.5.14 If an LVO is identified on imaging: immediate transfer with goal metrics as outlined above.

13.5.15 If no LVO is identified on imaging: notify receiving facility and transportation crew if the transfer is canceled.

13.5.16 Patients with large territorial cerebral and cerebellar infarctions are at high risk for developing brain swelling and herniation. Therefore, consideration should be given to transferring the patient to a higher level of care if neurocritical care and neurosurgical needs cannot be met at the transferring facility.

13.5.17 All related documents should accompany all stroke patient transfers:

13.5.17.1 Diagnostics scans and reports if available

13.5.17.2 Hospital records

13.5.17.3 Medication Administration Record

13.5.18 Untimely transfers may be reported to the NCTTRAC SPI Committee for review.

13.6 EMS Transportation for Interfacility Care

13.6.1 Use of the NCTTRAC Stroke Committee endorsed

interfacility stroke terminology to convey the level of stroke emergency is recommended:

13.6.1.1 Level 1 Stroke – Patient with an ischemic or hemorrhagic stroke in need of an emergent intervention.

13.6.1.2 Level 2 Stroke – Patient with an ischemic or hemorrhagic stroke in need of an urgent transfer for a higher level of care but without the emergent need of an intervention.

13.6.1.3 Level 3 Stroke – Patient with an ischemic or hemorrhagic stroke in need of transfer but without emergent or urgent needs.

13.6.1.3.1 Level 1 and level 2 Strokes, time from agency notification to transportation arrival at the transferring hospital ≤30 minutes. Consider the option of lights and sirens.

13.6.2 Level 1 stroke, if ground transportation takes >30 minutes to reach the receiving facility, consider air transport.

13.6.3 NCTTRAC Pediatric Committee recommends that a pediatric stroke patient or patient with findings that meet NCTTRAC stroke guidelines (age less than 18) is an emergent transfer despite level terminology and should be discussed with tertiary pediatric medical center and transferred as such.[14-17]

13.6.4 Refer to the latest NCTTRAC Stroke Committee endorsed Interfacility EMS Transport Documentation.

13.6.5 Stroke Patient Transport: Stroke patients in NCTTRAC are transported according to patient need, availability of air transport resources, and environmental conditions.[5]

13.6.5.1 Pediatric patients <18 years old, contact Cook Children's Medical Center or Children's Health Dallas for guidance

13.6.6 Ground transport capable of providing the appropriate level of care should be utilized based on patient needs. For instance, transportation via ALS or MICU ground ambulance should be considered for patients receiving IV thrombolysis.

13.6.7 All related documents should accompany all stroke patient transfers:

13.6.7.1 Diagnostics scans and reports, if available

13.6.7.2 Hospital records

13.6.7.3 Medication Administration Record

13.6.8 Transport teams should follow established transfer protocols and procedures to ensure safe and efficient patient care with the mindset that "time is brain." Because the time from onset of symptoms to treatment has a powerful impact on outcomes, there should be the same level of urgency during interfacility transfers as there in the prehospital setting.

13.7 Management

13.7.1 Prevent aspiration, HOB ≥30. Ensure airway patency with suctioning and OPA or NPA, as needed.

13.7.2 Transportation team will monitor vitals and perform neuro assessments, such as an NIHSS/Neuro Assessment, at a minimum of every 15 minutes.

13.7.3 Utilize continuous monitoring and supplemental oxygen to maintain oxygen saturation >94%.

13.7.4 Treat hypotension. Evaluate, document, and treat signs/symptoms of shock according to the Shock CPG.

13.7.5 Monitor and treat blood pressure using appropriate parameters (post IV thrombolysis, ICH, or SAH). See Annex F: *2019 ASA Blood Pressure Recommendation*.

13.7.5.1 Adult patients (≥18 years old) blood pressure goal: patients receiving IV thrombolysis infusion BP <180/105; patients not eligible for IV thrombolysis BP <220/120 mmHg may be reasonable.

13.7.5.2 Pediatric patients (0 to <18 years-old) systolic blood pressure parameters:

Systolic Blood Pressure Parameters- Female

Age	50%	95%	>15% above 95%	>20% above 95%
1-4 years	90	111	128	133
5 years	94	113	130	145
6-10 years	96	121	139	145
11-18 years	105	131	151	157

Systolic Blood Pressure Parameters- Male

Age	50%	95%	>15% above 95%	>20% above 95%
1-4 years	90	112	129	134
5 years	95	113	130	136
6-10 years	96	121	139	145
11-18 years	105	140	161	168

13.7.6 Avoid dextrose-containing fluids in non-hypoglycemic patients.

13.7.7 If IV thrombolysis infusion completes during transport, the remaining drug within the tubing should be infused using an infusion of normal saline at the same rate as the thrombolysis infusion. Do not change the pump's original set volume to be infused (VTBI). The IV

thrombolysis infusion completion time is when that the pump alarms the VTBI is complete.

13.7.8 Monitor for signs of orolingual angioedema. Contact Medical Control should any signs or symptoms develop. See Annex G: 2019 ASA Angioedema Recommendation for managing of orolingual angioedema associated with IV thrombolysis.

13.7.9 Monitor for signs and symptoms of neurological deterioration. Worsening of the neurological exam (NIHSS worsening of >4 points) could represent hemorrhagic conversion of the stroke or worsening ischemia. Contact Medical Control for guidance and send prenotification to the receiving facility.

13.7.9.1 Pediatric patients <18 years old, contact Cook Children's Medical Center or Children's Health Dallas for guidance.

14. SYSTEM PERFORMANCE IMPROVEMENT

14.1 Goals

14.1.1 As outlined by the ASA 2019 Update to AIS Guidelines, multicomponent QI programs to improve stroke care demonstrate clear utility in safely increasing thrombolysis use in the community hospital setting.[2] Establishing and monitoring target time goals can be beneficial and enhance system performance. As such, the NCTTRAC Stroke Committee established the goal to monitor and evaluate the NCTTRAC stroke system's performance and the impact of the system's development. NCTTRAC regional facilities participating in the SSOC must have a separate performance improvement system for stroke patients. Continuous QI processes implemented by the stroke system as a whole will provide a means of improving patient care and outcomes.

14.2 Committees Charged

14.2.1 Responsibilities are charged to the NCTTRAC Stroke Committee.

14.3 Objectives

14.3.1 To provide a multidisciplinary forum for stroke care providers to evaluate stroke patient outcomes from a system perspective and to assure the optimal delivery of stroke care.

14.3.2 To facilitate the sharing of information, knowledge, and scientific data.

14.3.3 To provide a process for medical oversight of regional stroke operations.

14.3.4 Establish regional quality measures:
- 14.3.4.1 EMS Prenotification Triage Time
- 14.3.4.2 Use of Prehospital Stroke Screening and Stroke Severity Tools
- 14.3.4.3 Door-to-Needle – 75% within 45 minutes and 50% within 30 minutes
- 14.3.4.4 DIDO – 50% ≤ 90 minutes
- 14.3.4.5 Door-to-Device - 50% within 60 minutes for transfers and 90 minutes for direct arriving patients

14.4 Discussion

14.4.1 To assess the impact of regional stroke development, system performance must be monitored and evaluated from an outcomes perspective. A plan for the evaluation of operations is needed to determine if system developments are meeting the stated goals.

14.4.2 In adherence to the ASA 2019 Update to AIS Guidelines, NCTTRAC participating stroke facilities must have multicomponent QI initiatives, including ED education and multidisciplinary teams with input from neurological experts, aimed at improving stroke care.[2]

- 14.4.2.1 Each Stroke facility shall demonstrate a written stroke QAPI plan as outlined by the Texas Administrative Code, Rule §157.133 Requirements for Stroke Facility Designation (Texas Administrative Code (state.tx.us)). Additionally, stroke facilities shall actively participate in the RAC Stroke Committee and transport plan; and submit data to the DSHS department as requested.
- 14.4.2.2 As part of the QAPI plan, stroke facility treatment processes, technical outcomes (reperfusion rates), complications, and patient clinical outcomes should be tracked. All certified stroke facilities should meet or exceed the standards outlined by the DSHS-approved stroke facility certifying agency.

14.4.3 The NCTTRAC Stroke Committee will organize a multidisciplinary QI Work Group to review and monitor stroke care quality benchmarks, indicators, evidence-based practices, and outcomes within the region. Stroke facility participation in a stroke data registry, such as the Regional Data Collaborative, is recommended to promote consistent adherence to current treatment guidelines, allow continuous QI, and improve patient outcomes. Integrating prehospital records, including National EMS Information System (NEMISIS) data elements, into the stroke registries should enhance the total system performance. It is recognized that continuous QI processes, implemented by each

component of a SSOC and the NCTTRAC system, can help improve patient care and outcomes.

14.4.4 The NCTTRAC Stroke Committee strongly encourages standardized data collection and reporting from healthcare entities and data sharing between them consistent with the exceptions to privacy laws governing routine healthcare operations and QI.[20-22] These systems should include elements from the provision of stroke care from stroke detection and 911 activation through hospital discharge.[7] Outcomes should be used to assess the effectiveness of the care systems.

14.4.5 Directions – The direction for the development of an NCTTRAC Regional QI program derived from the Texas EMS Rules: 25 TAC: Rule §157.123 (b)(2)(B)(XIV), Regional EMS Trauma Systems requires “a performance improvement program that evaluates processes and outcomes from a system perspective.” Additional support and direction for regional performance improvement program development specific to stroke facility designation can be found in 25 TAC: Rule §157.133 (d), Requirements for Stroke Facility Designation.

14.4.6 Authority - The authority and responsibility for regional QI rests with the Regional Advisory Council. This will be accomplished in a comprehensive, integrated manner through the work of the Medical Directors Committee as well as the Stroke and EMS Committees.

14.4.6.1 Scope & Process – The Stroke Committee, Stroke Committee System Performance Improvement (SPI) subgroup (within the Stroke Committee) and the Medical Directors Committee serve as the oversight committee for regional performance improvement. Referrals for follow-up and feedback to and from the EMS Committee and Providers ensure system-wide multidisciplinary performance improvement.

14.4.6.2 The Stroke Committee SPI subgroup will comprise the Stroke Committee Chair, Chair Elect, Medical Director/Co-Medical Directors and two elected or appointed members of the Stroke Committee to review SPI referrals, issues or requests in a closed session.

14.4.6.3 Specific SPI activities may include the review of SPI events that fall outside the Stroke Committee’s approved SPI indicators.

14.4.6.4 The Stroke Committee SPI subgroup, in consultation with the Stroke Committee, will determine the type of data and manner of collection, set the agenda for the PI process within the regularly scheduled meetings of the committee, and identify the events and indicators to be evaluated and monitored. Indicator identification will be based on high risk,

high volume, and problem prone parameters. Indicators will be objective, measurable markers that reflect stroke resources, procedural/patient care techniques and/or systems/process outcomes.

14.4.6.5 Occurrences will be evaluated from a system outcomes perspective and sentinel events will be evaluated on a case-by-case basis. Activities and educational offerings will be presented to address knowledge deficits and case presentations, or other appropriate mediums will be designed to address systems and behavioral problems. All actions will focus on the opportunity to improve patient care and systems operation. The results from committee activities will be summarized and communicated to the RAC membership. Problems identified that require further action will be shared with the persons and entities involved for follow-up and loop closure. Committee follow-up and outcome reports will be communicated on a standard format.

14.4.6.6 The functions and effectiveness of NCTTRAC QI process will be evaluated on an annual basis in conjunction with the annual evaluation of the NCTTRAC Bylaws. All PI activities and committee proceedings are strictly confidential. Individuals involved in performance management activities will not be asked to review cases involving their facility or affiliated healthcare system.

14.4.6.7 Stroke Centers will provide individual follow-up on acute stroke transports directly to the EMS agency transporting the patient.

14.5 Data Collection

14.5.1 Participation in the RAC Data Collaborative is recommended to promote consistent adherence to current treatment guidelines, to allow continuous regional QI and to improve patient outcomes.

14.5.1.1 NCTTRAC may set minimum standards for what is considered active participation for the purposes of a Letter of Participation:

14.5.1.1.1 **Gold Star Stroke Facility** status is awarded to stroke facilities sharing performance measures with the RAC Data Collaborative, as part of the NCTTRAC quality initiative to improve regional stroke care in the NCTTRAC SSOC.

14.5.1.1.2 Gold Star Stroke Facility Plus status is awarded to stroke facilities providing transparent performance measures with the Regional Data Collaborative, as part of the NCTTRAC quality initiative to improve regional stroke care in the NCTTRAC SSOC.

14.5.2 Data will be shared with EMS by each certified/designated facility. Data sharing may occur within NCTTRAC.
14.5.3 Summary reports are submitted for each NCTTRAC facility and EMS provider.
14.5.4 Sentinel events will be used to focus attention on specific situations/occurrences of major significance to patient care outcomes and be reviewed by the Stroke Committee SPI subgroup.
14.5.5 Performance Improvement data is reviewed and updated annually.
14.5.6 Confidentiality - All information and materials provided and/or presented during closed SPI meetings are strictly confidential. Closed Stroke Committee SPI subgroup meeting participants will sign an *NCTTRAC SPI Confidentiality Agreement* prior to the start of each closed meeting.

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