STROKE REFERENCE CARDS

LOUISIANA
EMERGENCY
RESPONSE
NETWORK

Right Place. Right Time. Right Care.

v.2025

LERN Stroke System of Care

LERN's ongoing development of Louisiana's statewide stroke care system is guided by the evidence-based "hub and spoke" model that facilitates widespread patient access to lifesaving care and treatment with thrombolytic (clot busting medication) for appropriate patients. Additionally, the system is designed to provide access to endovascular therapy for certain patients suffering large vessel occlusive stroke.

Louisiana's "hub and spoke" model includes Comprehensive Stroke Center and Primary Stroke Center hubs, and spoke hospitals connected by telemedicine.

More information about the LERN Stroke System of Care can be found online at www.lern.la.gov

LERN Communication Center – 1 -866-320-8293

The LERN Communications Center (LCC) is a key component of our statewide systems of care for trauma, stroke and STEMI. The LCC serves as a resource for directing stroke patients to appropriate hospitals.

LOUISIANA EMERGENCY RESPONSE NETWORK

NIH STROKE SCALE (NIHSS)

1a. Level of Consciousness (LOC)

0 = Alert, keenly responsive
1 = Not alert; but arousable by minor stimulation
2 = Not alert; requires repeated stimulation, or is obtunded and needs strong/painful stimuli to make movements
3 = Responds only with reflex motor or autonomic effects or totally unresponsive, flaccid, and areflexic

Examiner must choose a response if full evaluation is prevented by such obstacles as ET tube, language barrier, oral trauma/bandages etc. A3 is only scored only if the patient makes no movement (other than reflexive posturing) in response to noxious stimuli.

1b. LOC Questions – "What month is it?" and "How old are you?"

0 = Answers both questions correctly
1 = Answers one question correctly
2 = Answers neither question correctly

Score only initial answer (no credit for being close). Patients unable to speak due to intubation, oral trauma, severe dysarthria, language barrier, etc. are scored 1. Aphasic and stuporous patients, score 2.

1c. LOC Commands – "Open and close your eyes", and "Grip and release your hand"

0 = Performs both tasks correctly
1 = Performs one task correctly
2 = Performs neither task correctly

Substitute another one-step command if hands cannot be used. Credit given if attempt made but unable to complete due to weakness. If patient does not respond to command, task should be demonstrated and result scored. Only first attempt scored.

LOUISIANA EMERGENCY RESPONSE NETWORK

NIHSS (continued)

2. Best Gaze (only horizontal movement tested)

Establish contact and ask patient "follow my finger"

0 = Normal
1 = Partial gaze palsy
2 = Forced deviation or total gaze paresis

Appropriate for aphasic patients. Forced deviation or total gaze paresis is not overcome by oculocephalic maneuver. Score voluntary or reflexive, horizontal movements (not caloric test). Test patients with ocular trauma, bandages, blindness, etc., for reflexive movement. Patients with conjugate deviation of the eyes (overcome by voluntary or reflexive activity) and those with peripheral nerve paresis (oculomotor valve CN III, IV, VI) are scored 1.

3. Visual Fields – Use confrontation, finger counting, or visual threat. Confront upper/lower quadrants of visual field

0 = No visual loss
1 = Partial hemianopia
2 = Complete hemianopia
3 = Bilateral hemianopia

Test patients with unilateral blindness or enucleation in remaining eye. Patients with clear-cut asymmetry, including quadrantanopia, are scored 1. Blind patients are scored 3. Test again using double simultaneous stimulation. Score 1 for extinction and record under item #13.

LOUISIANA EMERGENCY RESPONSE NETWORK

NIHSS (continued)

4. Facial Palsy

By words or pantomime, encourage the patient to "Show me your teeth." "Raise your eyebrows." "Close your eyes."

0 = Normal symmetrical movements
1 = Minor paralysis (flattened nasolabial fold, asymmetry on smile)
2 = Partial paralysis (lower face)
3 = Complete paralysis

Remove bandages, tape, tubes before testing if possible. In poorly responsive patients, some symmetry of grimace to noxious stimuli.

5 & 6. Motor Arm (Right and Left)

Alternately position patient's arm. Extend each arm with palms down (90 degrees if sitting, 45 if supine).

0 = No drift
1 = Drift
2 = Some effort vs. gravity
3 = No effort against gravity
4 = No movement
UN = Amputation or joint fusion

Test each arm in turn (nonparetic first). Drift is scored if arm falls before 10 seconds.

7 & 8. Motor Leg (Right and Left)

Alternately position patient's leg. Extend each leg (30 degrees while supine).

0 = No drift
1 = Drift
2 = Some effort vs. gravity
3 = No effort against gravity
4 = No movement
UN = Amputation or joint fusion

Test each leg in turn (nonparetic first). Drift is scored if leg falls before 5 seconds.

LOUISIANA EMERGENCY RESPONSE NETWORK

NIHSS (continued)

9. Limb Ataxia

Ask patient (eyes open) to "Touch your finger to your nose." "Touch your heel to your shin."

0 = Absent
1 = Present in one limb
2 = Present in two limbs
UN = Amputation or joint fusion

Preform finger-nose and heel-shin test on both sides to determine unilateral cerebellar lesion. Score 0 if paralyzed or cannot understand. Score 1 or 2 only if ataxia disproportionate to weakness. Only UN if amputated or contracted.

10. Sensory

Test as many body parts as possible (arms [not hands], legs, trunk, face) for sensation using pinprick or noxious stimulus
(if obtunded or aphasic).

0 = Normal
1 = Mid to moderate sensory loss
2 = Severe to total sensory loss

Score sensory loss due to stroke only. Stuporous or aphasic, score 0 or 1.

11. Best Language

Using included pictures and sentence list, ask the patient to "Describe what you see in this picture." "Name the items in the picture." " Read these sentences."

0 = No aphasia
1 = Mild to Moderate aphasia
2 = Severe aphasia
3 = Mute, global aphasia

Patients with visual loss can be asked to identify and describe objects placed in the hand. Intubated patients should be asked to write their answers. The examiner must choose a score for stuporous or uncooperative patients. Only comatose patients & mute patients unable to follow one step commands are scored 3.

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NIHSS (continued)

12. Dysarthria

Use simple word list and ask "Read or Repeat these words." (Mama, Tip-Top, Fifty-Fifty, Thanks, Huckleberry, Baseball Player)

0 = Normal articulation
1 = Mild to moderate dysarthria
2 = Severe dysarthria (<50% intelligible)
X = Intubated/physical barrier

Patients with severe aphasia can be scored based on the clarity of articulation of their spontaneous speech. Score X only if intubated or have other physical barrier to speech. Do not tell patients why they are being tested.

13. Extinction and Inattention

Sufficient info to determine these scores may have been obtained during prior testing
0 = No abnormality
1 = Visual, tactile, auditory, spatial, or personal inattention
2 = Profound hemi-attention or extinction to more than one modality

Lack of patient response and inattention may already be evident from the previous items. Score 0 if the patient has a severe visual loss preventing visual double simultaneous stimulation, but the response to cutaneous stimuli is normal, or if the patient has aphasia but does appear to attend to both sides. The presence of visual spatial neglect or anosagnosia may also be evidence of abnormality.

Stroke severity scaling:

< 7 = mild	15-20 = moderately severe
7-14 = moderate	> 20 = severe

LOUISIANA EMERGENCY RESPONSE NETWORK

NIHSS testing card-picture description

LOUISIANA EMERGENCY RESPONSE NETWORK

NIHSS testing card-naming list

LOUISIANA EMERGENCY RESPONSE NETWORK

NIHSS testing card-sentences

- You know how
- Down to earth
- I got home from work
- Near the table in the dining room
- They heard him speak on the radio last night

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NIHSS testing card-word list

- MAMA
- TIP-TOP
- FIFTY-FIFTY
- THANKS
- HUCKLEBERRY
- BASEBALL PLAYER
- CATERPILLAR

LOUISIANA EMERGENCY RESPONSE NETWORK

AHA/ASA Exclusions for alteplase (tPA)

Exclusions:

- CT Head demonstrates hemorrhage or intracerebral mass lesion (meningioma is not an exclusion)
- History of previous intracerebral hemorrhage (no longer FDA contraindication, recent ICH falls under Warnings & Precautions)
- Intracranial surgery, serious head trauma or prior stroke in previous 3 months
- Symptoms suggests of SAH
- Evidence of active bleeding or acute trauma (fracture) on exam
- BP Systolic > 185 or Diastolic > 110 at time of treatment
- Platelet count < 100,000
- If receiving Heparin in last 48 hours, PTT outside of normal range
- If on warfarin (Coumadin), INR > 1.7
- Current use of new oral anticoagulants (use in last 48 hours)

  (dabigatran/Pradaxa, rivaroxaban/Xarelto, apixaban/Eliquis, edoxaban/Lixiana)

Powers, W. J., et al. (2019). Guidelines for the early management of patients with acute ischemic stroke: 2019 update to the 2018 guidelines for the early management of acute ischemic stroke. A guideline for healthcare professionals from the American Heart Association/American Stroke Association. Stroke, 50, e344-e418.

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AHA/ASA Warnings for alteplase (tPA)

Warnings:

- Blood glucose < 50mg/dl at time of treatment
  - Elevated blood glucose is a risk factor for hemorrhagic conversion and should be treated, but treatment should not delay initiation of alteplase (tPA)
- Myocardial infarction in past 3 months
- Major surgery or serious trauma in past 14 days
  - Risk of bleeding should be considered and/or discussed with surgeon
- Arterial puncture @ noncompressible site in the past 7 days
- GI or GU hemorrhage in the past 21 days
- Multilobar infarction (hypodensity > 1/3 cerebral hemisphere on CT)

Powers, W. J., et al. (2019). Guidelines for the early management of patients with acute ischemic stroke: 2019 update to the 2018 guidelines for the early management of acute ischemic stroke. A guideline for healthcare professionals from the American Heart Association/American Stroke Association. Stroke, 50, e344-e418.

Care with alteplase (tPA)/tenecteplase (TNKase)

- BP must be < 185/110 for treatment with thrombolytic
- Nicardipine infusion is the preferred medication to achieve and maintain BP <180/105 in the 24 hours following treatment with tPA/TNK. An alternative is labetalol 10-20mg IV over 1-2 min, provided the HR >60

  AND
- Neuro Checks & Mini NIHSS monitored
  - q 15 minutes for 2 hours
  - q 30 minutes for 6 hours
  - then hourly for 16 hours

All treatment decisions should be made in collaboration with your facility's neurological expert.

- Monitor for signs of angioedema (especially if on ACE-Inhibitor)
  - Recommended treatment for angioedema includes – maintain airway, discontinue alteplase & hold ACEIs, administer IV methylprednisolone 125 mg, IV diphenhydramine 50 mg, and ranitidine 50 mg IV or famotidine 20 mg IV. If there is an increase in angioedema despite therapy consider epinephrine (0.1%) 0.3 mL subQ or by neb (0.5 mL)
- HOB flat x 24 hours following alteplase (tPA)/tenecteplase (TNKase) (if tolerated and secretion management not problematic)
- CT head without contrast to be ordered at 24 hours. Once no hemorrhage confirmed, antithrombotic therapy/pharmacological DVT prophylaxis can be started.

Powers, W. J., et al. (2019). Guidelines for the early management of patients with acute ischemic stroke: 2019 update to the 2018 guidelines for the early management of acute ischemic stroke. A guideline for healthcare professionals from the American Heart Association/American Stroke Association. Stroke, 50, e344-e418.

Hill MD, Lye T, Moss H, Barber PA, Demchuk AM, Newcommon NJ, GreenTL, Kenney C, Cole-Haskayne A, Buchan AM. Hemi-orolingual angioedema and ACE inhibition after alteplase treatment of stroke. Neurology.2003;60:1525–1527.

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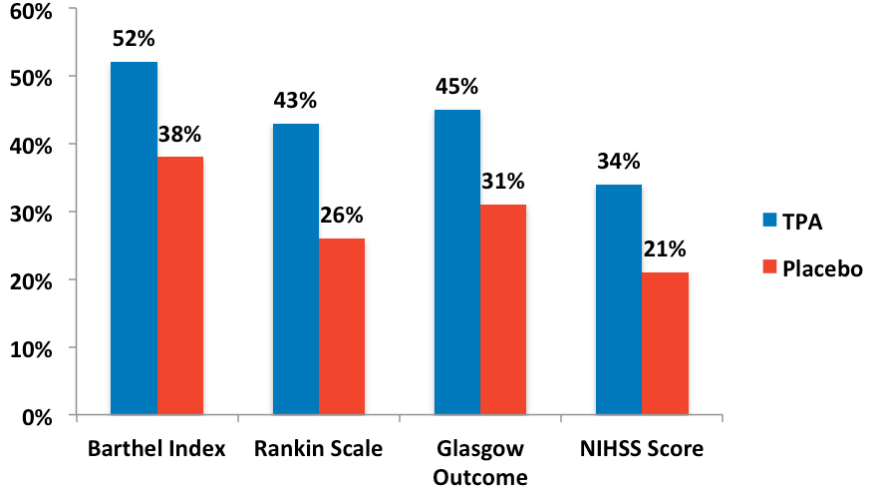
NINDS TPA Stroke Trial



Global outcome statistic: OR = 1.7, 50% v. 38% = 12% benefit

N Engl J Med 1995;333;1581-7

*From American Heart Association, Target: Stroke

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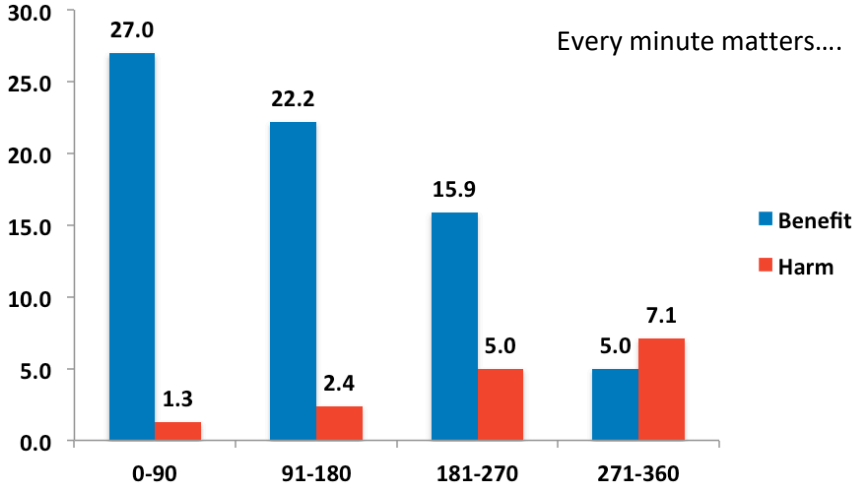
Number of Patients Who Benefit and Are Harmed per 100 Patients tPA Treated in Each Time Window



Lansberg et al, Stroke 2009

*From American Heart Association, Target: Stroke

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Number Needed to Treat to Benefit from IV tPA Across Full Range of Functional Outcomes

Outcome	NNT
Normal/Near Normal	8.3
Improved	3.1

For every 100 patients treated with tPA,
32 benefit, 3 harmed

Better outcome by 1 or more grades on the mRS

Saver JL et al Stroke 2007; 38:2279-2283

*From American Heart Association, Target: Stroke

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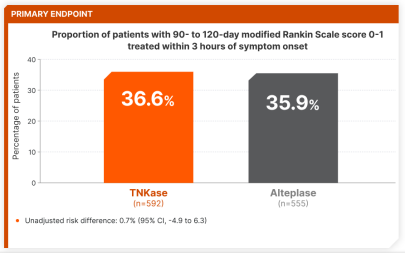
Tenecteplase (TNKase) and the AcT Trial

- In the AcT Trial, TNKase was compared to Alteplase in reducing stroke disability and the study results demonstrated no significant differences between treatment groups.



Menon BK, Buck BH, Singh N, et al. Intravenous tenecteplase compared with alteplase for acute ischaemic stroke in Canada (AcT): a pragmatic, multicentre, open-label, registry-linked, randomised, controlled, non-inferiority trial. *Lancet*. 2022;400(10347):161-169. doi:10.1016/S0140-6736(22)01054-6
And
TNKase Prescribing Information. South San Francisco, CA. Genentech, Inc.

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Complications with Thrombolytics

Who should be treated?

- Neurological deterioration with parenchymal hemorrhage (PH) thought to be causing or contributing to the acute worsening, within 24hrs of when thrombolytic was administered with anticipated risk for hemorrhage expansion; also consider those without neurologic deterioration when hemorrhage expansion risk is high
  - Consider treating hemorrhage occurring beyond 24hrs of when thrombolytic was administered, if fibrinogen is low
- The median time from thrombolytic administration to detection of symptomatic intracranial hemorrhages is 8 hours.

Plan for Treatment – every minute matters

All treatment decisions should be made in collaboration with your facility's neurological expert.

1. Stop alteplase (tPA) if still infusing.
2. CBC, PT (INR), aPTT, fibrinogen level, and type and cross match
3. Emergent nonenhanced head CT
4. STAT CT of head without contrast
5. Cryprecipitate (includes factor VIII): 10 U infused over 10-30 min (onset in 1 h, peads in 12h); administer additional dose for fibrinogen level of <150 mg/dL. Check fibrinogen level 30 minutes after infusion. Goal 100-200 mg/dL
6. Tranexamic acid 1000 mg IV infused over 10 min OR E-aminocaproic acid 4-5 g over 1 h, followed by 1 g IV until bleeding is controlled (peak onset in 3h)
7. Hematology and neurosurgery consultations
8. Supportive therapy, including BP management, ICP, CPP, MAP, temperature and glucose control. (SBP should be lowered to <140 mmHg.

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Suggested Goals for Stroke Care

- Temperature < 37.2°C
- Blood Glucose < 160mg/dl
- HOB
  - Ischemic flat for 24 hours, unless poor control of secretions
  - ICH 30 degrees elevation
- Blood Pressure
  1. During tPA/TNKase and Post tPA/TNKase < 180/105 x 24 hours
  2. For patients NOT treated with thrombolytic - Permissive HTN up to SBP < 220, DBP < 110 (should be individualized)
  3. For patients with ICH presenting with systolic blood pressure (SBP) between 150 and 220 mm Hg and without contraindication to acute BP treatment, acute lowering of SBP to 140 mm Hg is safe (Class I; level of evidence A) and can be effective for improving functional outcome (Class IIa; level of evidence B; revised from the previous guideline).

All treatment decisions should be made in collaboration with your facility's neurological expert.

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Initial Assessment of ICH

- Airway/breathing-Low threshold for intubation
- Measure GCS; brainstem reflexes
- Measure coagulation profile and platelets
- CT of head without contrast (determine location & volume)
  - CTA Head is reasonable to ID patients at risk for hematoma expansion and to evaluate underlying vascular abnormality

All treatment decisions should be made in collaboration with your facility's neurological expert.

- **Recommendations**:
  - For most patients, reduce SBP to 130-140mmHg, to reduce hemorrhagic expansion and mortality
    - AHA Guidelines do not specify the antihypertensive to use, but IV nicardipine is the most frequently used medication in modern clinical trials; other options include labetalol (if not bradycardic), clevidipine, hydralazine (if bradycardic), enalapril
  - HOB elevated to 30 degrees; do not leave HOB flat for prolonged imaging or during transfer –
  - Frequent neurocheck and vital signs: 0-6 hours from symptom detection – every 30 minutes; 6-24 hours from symptom detection – every 1 hour; >24 hours and blood pressure not at goal or worsening exam – every 1 hour; >24 hours and blood pressure at goal – every 4 hours, in neurologically stable patient
  - Consult with neurology and/or neurosurgery for determination of neurosurgical intervention
  - Document the severity of the ICH with the ICH score (refer to Spontaneous intracranial hemorrhage)
  - Prophylactic antiseizure medication is not recommended
  - Treatment of glucose 180mg/dL, it is reasonable.
  - Cardiac monitoring for at least 24hrs
  - ***For anticoagulant associated ICH, see page 22.

Greenberg, S. M. 2022 AHA/ASA Guideline for the Management of Spontaneous Intracerebral Hemorrhage.

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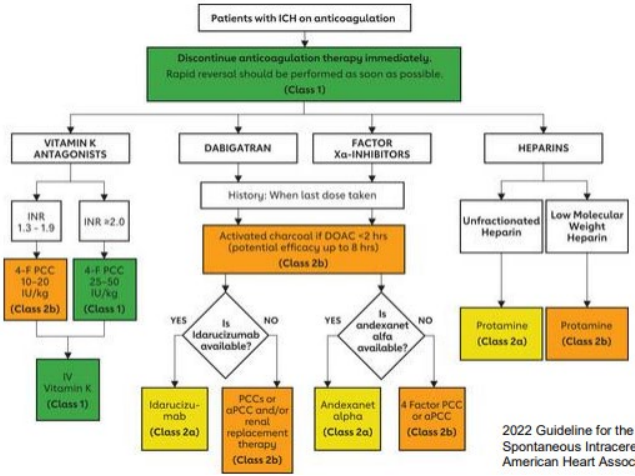
Suggested Methods for Reversal of Coagulopathy in ICH

All treatment decisions should be made in collaboration with your facility's neurological expert.



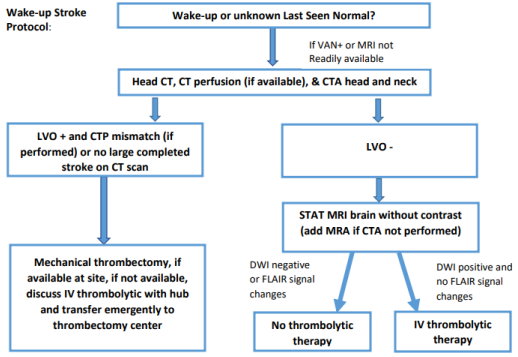
2022 Guideline for the Management of Patients With Spontaneous Intracerebral Hemorrhage: A Guideline From the American Heart Association/American Stroke Association

LOUISIANA EMERGENCY RESPONSE NETWORK

Greenberg, S. M. 2022 AHA/ASA Guideline for the Management of Spontaneous Intracerebral Hemorrhage.

Wake Up/Unknown Onset Stroke

- About 20% of strokes are detected upon awakening. Historically, these patients were excluded from treatment with IV lytic due to being "out of the window" from last seen normal.
- Radiographic studies of patients with wake-up strokes support the onset is likely shortly upon awakening.
- A randomized controlled study demonstrated efficacy of IV lytic (alteplase) in improving the odds of an independent outcome when selected by MRI of the brain, performed within 4.5 hours of symptom detection. The number needed to treat was nine. The symptomatic hemorrhage rate was only 2.4%.
- Since 2019, our AHA/ASA Guidelines for the Emergency Management of Acute Ischemic Stroke issued a Class 11a, level of evidence B recommendation for IV alteplase (0.9mg/kg, maximum dose 90mg) within 4.5 hours of symptom detection for patients who have MRI confirmation of DWI lesion less than one-third of the MCA territory and no visible signal change on FLAIR. This applies to patients who are found with stroke symptoms whose last seen normal is more than 4.5 hours prior.



- If your center does not have CT perfusion imaging and the patient has LVO, emergently transfer to a thrombectomy center.
- If your center does not have emergent MRI capability and the patient does not have LVO, emergently transfer to closest hospital with MRI capability, if feasible within 4.5 hours of symptom detection.

Powers, W. J., et al. (2019). Guidelines for the early management of patients with acute ischemic stroke: 2019 update to the 2018 guidelines for the early management of acute ischemic stroke. A guideline for healthcare professionals from the American Heart Association/American Stroke Association. Stroke, 50, e344-e418.

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