American Stroke Association.
A division of the American Heart Association.

SVIN Society of Vascular and Interventional Neurology

International Perspectives on Stroke Triage, Diagnosis and Treatment

Episode 1: Triage: Optimizing Stroke Patient Transport to the Right Center

American Stroke Association.
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SVIN Society of Vascular and Interventional Neurology

Overview

- Jointly presented by ASA and SVIN
- No CEs available for webinar
- Certificate of Completion is available
- An on-demand recording will be available on our website

Disclosures

- Dr. Robin Novakovic-White: none
- Dr. Peter Panagos: none
- Dr. Ashu Jadhav: none
- Jeanie Luciano: none
- Dr. Natalia Pérez de la Ossa: co-principal investigator of the RACECAT trial, Medtronic
- Dr. Sheila Martins: Research Grant from Ministry of Health/CNPq (National Council for Research) – RESILIENT Trial; Speaker Boehringer Ingelheim, Pfizer, Bayer, Medtronic, Penumbra; International Board of Angels Program

To Ask a Question

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Moderators

Ashu Jadhav, MD, PhD

Jeanie Luciano, MSN, RN, CNRN, SCRN, CRNP, FAHA

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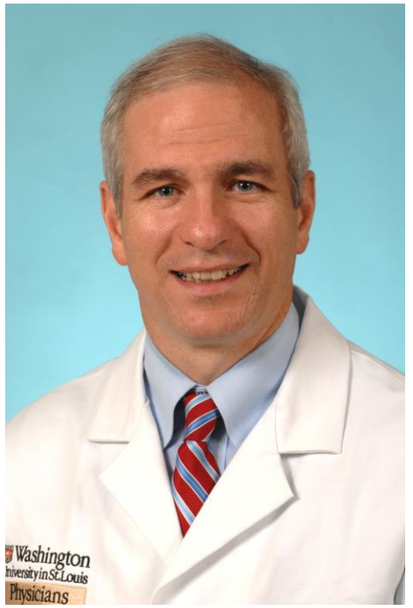
Panelists

Robin Novakovic-White, MD

Peter D. Panagos, MD, FACEP, FAHA



Panelists

Natalia Pérez de la Ossa, MD

Sheila Cristina Ouriques Martins, MD, PhD

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Prehospital Triage

Robin Novakovic-White, MD

Associate Professor Departments of Radiology & Neurology
UT Southwestern Medical Center, Dallas, TX

Role of EMS

- Emergency medical responders are often the first medical professional with direct patient contact.
- Their initial assessment, treatment and decisions on diversion and routing will have significant consequences on a patient's subsequent care, in many ways..... seal their fate and impact their outcome.

Stroke System of Care

AHA/ASA Guideline

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

Endorsed by the Society for Academic Emergency Medicine and The Neurocritical Care Society

Reviewed for evidence-based integrity and endorsed by the American Association of Neurological Surgeons and Congress of Neurological Surgeons.

- SSOC should be organized to transport patients to the nearest hospital capable of administering stroke treatment.
- A system of care that reduces stroke-related deaths by just 2% to 3% annually would translate into ≈20 000 fewer deaths in US.
- Reducing post-stroke disability would also improve quality of life, reduce costs, and reduce the burden on patients, their families, third-party payers and governments.

Adeoya O, Nystrom KV, Yavagal DR, et al. Recommendations for the establishment of stroke systems of care: a 2019 Update. Stroke. 2019;50:e187-e210.

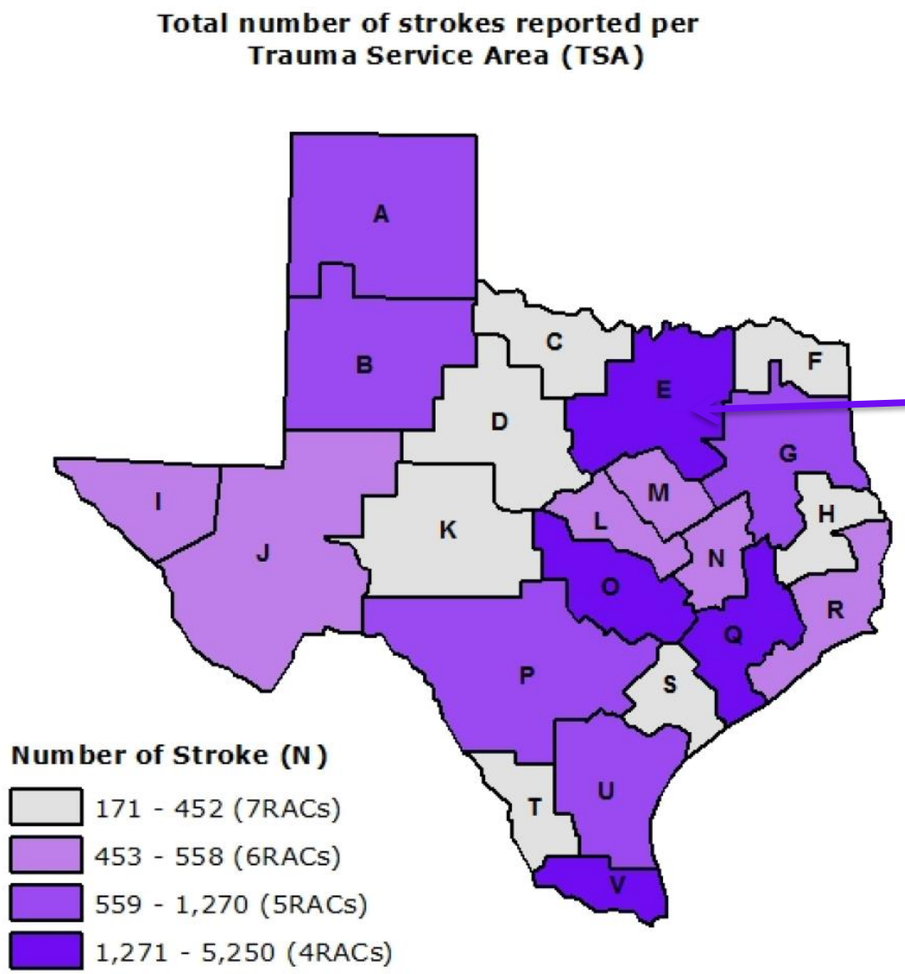
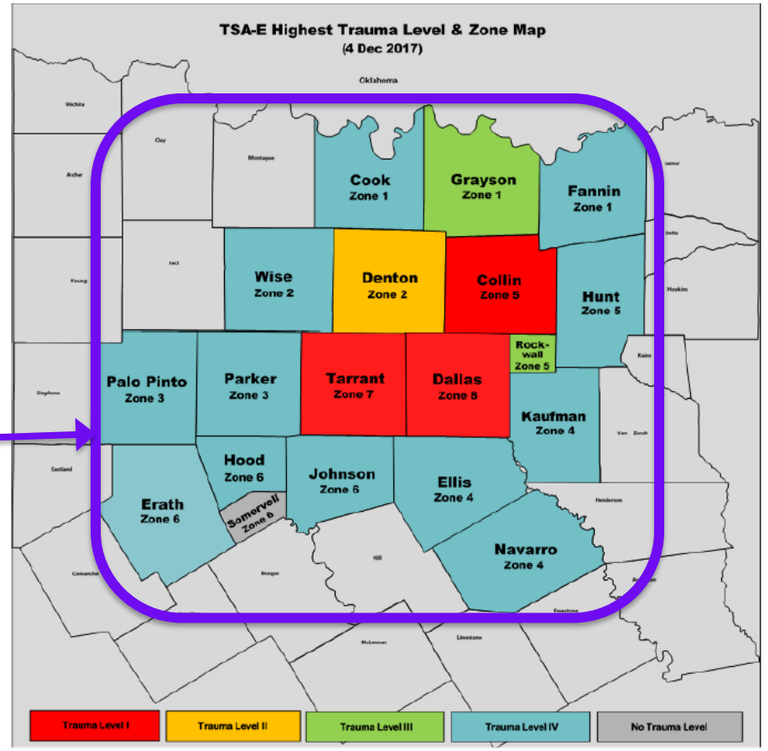


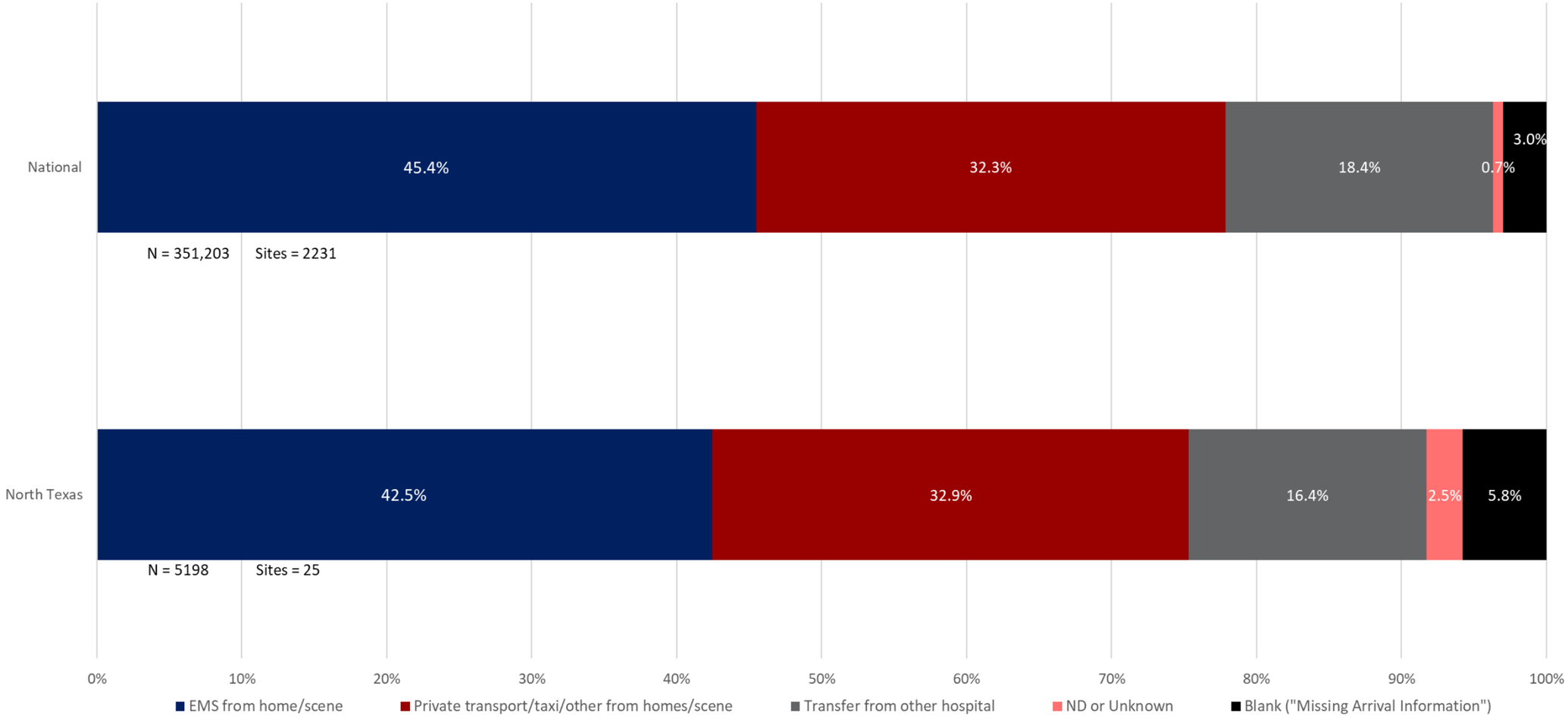
Figure 2. Total number of strokes reported by region, January-June 2017.



44 Stroke Facilities

- 11 CSC
- 27 PSC
- 6 ASRH

Arrival Mode



NCTTRAC Get With The Guidelines® data

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SVIN
Society of Vascular and Interventional Neurology

Example of our Regional Stroke Plan

2020 Regional Stroke Plan

Endorsed by NCTTRAC Board of Directors

Date: September 10, 2020

Approved by NCTTRAC General Membership

Date: Pending

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www.NCTTRAC.org

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

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Prehospital Triage of Stroke Patients

Basic Level

1. Assess and support ABCs according to UNIVERSAL CARE – ADULT:
   - **A (Airway)**: Airway support and ventilator assistance are recommended for patients with acute stroke who have decreased consciousness or who have compromised airway. Ensure airway patency with suctioning and OPA or NPA, as needed.
   - **B (Breathing)**: Supplemental oxygen should be provided to maintain oxygen saturation > 94% (continuous monitoring).
   - **C (Circulation)**: Evaluate, document and treat signs/symptoms of shock according to the Shock Clinical Practice Guidelines (CPG).
   - **D (Disability)**: Assess and document GCS, pupillary size and reactivity.
   - **E (Exposure/Environmental)**: Assess for evidence of traumatic injury, especially head injury.
2. Positioning/stabilization:
   - Place the patient in a supine position, head of the bed elevated 30 degrees.
   - Cardiac monitoring during transport is recommended. If there is evidence of **shock**, treat according to the **Shock CPG.**
   - If there is **hypoglycemia** (POC glucose < 60 mg/gL), treat according to **Diabetic Emergencies CPG.**
   - If there is **Seizure** activity, treat according to the **Seizure CPG.**

Assessment

History

1. Interview patient, family members and other witnesses to determine symptoms, **time of symptom discovery** and **last known well**, or last time patient without symptoms:
   - Obtain mobile number of next of kin and witnesses.
   - NOTE: For "wake up strokes" the time documented is the time last known well not the time the patient was found.
   - NOTE: **Sudden** onset of **any** of the following suggests the possibility of acute stroke:
     - Numbness or weakness of face, arm and/or leg (especially on one side of the body)
     - Confusion
     - Trouble speaking or understanding language
     - Trouble seeing in one or both eyes or double vision
     - Trouble walking
     - Dizziness
     - Loss of balance or coordination
     - Sudden onset of severe headache with no known cause (suggests hemorrhagic stroke)
     - Any asymmetry of the neurological exam
2. Additional History:
   - Obtain patient history including co-morbid conditions.

https://ncttrac.org/2018-regional-stroke-plan/

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3. General Supportive Care and Emergency Treatment

3.1. Airway, Breathing, and Oxygenation

3.1. Airway, Breathing, and Oxygenation	COR	LOE	New, Revised, or Unchanged
1. Airway support and ventilatory assistance are recommended for the treatment of patients with acute stroke who have decreased consciousness or who have bulbar dysfunction that causes compromise of the airway.	I	C-EO	Recommendation and COR unchanged from 2013 AIS Guidelines. LOE amended to conform with ACC/AHA 2015 Recommendation Classification System.
2. Supplemental oxygen should be provided to maintain oxygen saturation >94%.	I	C-LD	Recommendation and COR unchanged from 2013 AIS Guidelines. LOE amended to conform with ACC/AHA 2015 Recommendation Classification System.
3. Supplemental oxygen is not recommended in nonhypoxic patients with AIS.	III: No Benefit	B-R	Recommendation unchanged from 2013 AIS Guidelines. COR and LOE amended to conform with ACC/AHA 2015 Recommendation Classification System.
Additional support for this unchanged recommendation from the 2013 AIS Guidelines is provided by an RCT of 8003 participants randomized within 24 hours of admission. There was no benefit on functional outcome at 90 days of oxygen by nasal cannula at 2 L/min (baseline O_2 saturation >93%) or 3 L/min (baseline O_2 saturation ≤93%) continuously for 72 hours or nocturnally for 3 nights.[112]			See Table XXVII in online Data Supplement 1.

3.4. Blood Glucose

3.4. Blood Glucose	COR	LOE	New, Revised, or Unchanged
1. Hypoglycemia (blood glucose <60 mg/dL) should be treated in patients with AIS.	I	C-LD	Recommendation and COR unchanged from 2013 AIS Guidelines. LOE amended to conform with ACC/AHA 2015 Recommendation Classification System.
2. Evidence indicates that persistent in-hospital hyperglycemia during the first 24 hours after AIS is associated with worse outcomes than normoglycemia, and thus, it is reasonable to treat hyperglycemia to achieve blood glucose levels in a range of 140 to 180 mg/dL and to closely monitor to prevent hypoglycemia in patients with AIS.	IIa	C-LD	Recommendation and COR unchanged from 2013 AIS Guidelines. LOE amended to conform with ACC/AHA 2015 Recommendation Classification System.

Powers WJ, Rabinstein AA, Ackerson T. et al. Guidelines for the early management of patients with acute ischemic stroke: 2019 update to the 2018 guidelines for the early management of acute ischemic stroke. Stroke. 2019;50:e344-e418.

LKW &TSD

History

- Interview patient, family members and other witnesses to determine symptoms, **time of symptom discovery** and **last known well**, or last time patient without symptoms.
- Obtain mobile number of next of kin and witnesses.

https://ncttrac.org/2018-regional-stroke-plan/

Prehospital Triage of Stroke Patients

Basic Level

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   - **B (Breathing)**: Supplemental oxygen should be provided to maintain oxygen saturation > 94% (continuous monitoring).
   - **C (Circulation)**: Evaluate, document and treat signs/symptoms of shock according to the Shock Clinical Practice Guidelines (CPG).
   - **D (Disability)**: Assess and document GCS, pupillary size and reactivity.
   - **E (Exposure/Environmental)**: Assess for evidence of traumatic injury, especially head injury.
2. Positioning/stabilization:
   - Place the patient in a supine position, head of the bed elevated 30 degrees.
   - Cardiac monitoring during transport is recommended. If there is evidence of **shock**, treat according to the **Shock CPG.**
   - If there is **hypoglycemia** (POC glucose < 60 mg/gL), treat according to **Diabetic Emergencies CPG.**
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Assessment

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     - Trouble walking
     - Dizziness
     - Loss of balance or coordination
     - Sudden onset of severe headache with no known cause (suggests hemorrhagic stroke)
     - Any asymmetry of the neurological exam
2. Additional History:
   - Obtain patient history including co-morbid conditions.

Identify Stroke and Mimics

- Note sudden onset of symptoms that suggest stroke

- Screen for stroke mimics

Prehospital Triage of Stroke Patients

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1. Assess and support ABCs according to UNIVERSAL CARE – ADULT:
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     - Any asymmetry of the neurological exam
2. Additional History:
   - Obtain patient history including co-morbid conditions.

https://ncttrac.org/2018-regional-stroke-plan/

History

Additional History:

- Items to Report: Seizure at onset, head trauma, history of recent surgeries, determine pre-existing disability (e.g. nursing home care or unable to walk independently)
- Additional history: PMH, allergies (iodinated contrast)
- Medications – Identify current medications, especially anticoagulants
  - If possible record when last dose was taken

https://ncttrac.org/2018-regional-stroke-plan/

Assessment

History

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     - Trouble walking
     - Dizziness
     - Loss of balance or coordination
     - Sudden onset of severe headache with no known cause (suggests hemorrhagic stroke)
     - Any asymmetry of the neurological exam
2. Additional History:
   - Obtain patient history including co-morbid conditions.
   - Items to Report: seizure at onset, head trauma, history of recent surgeries, history of bleeding problems, signs of possible brain hemorrhage [severe headache of sudden onset, nausea/vomiting with headache or loss of consciousness (LOC)].
   - Additional history: Past medical history, allergies (iodinated contrast).
   - Be alert to common stroke mimics*.
   - Determine if patient has pre-existing substantial disability (e.g. need for nursing home care or unable to walk independently).
   - 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 [i.e. warfarin (Coumadin), rivaroxaban (Xarelto), dabigatran (Pradaxa), apixaban (Eliquis), edoxaban (Savaysa), enoxaparin (Lovenox)].
     - If possible, record when last dose was taken.
   - Device/implant history (i.e. left ventricular assist device, pacemaker, valve replacement).

Examination

- Assess and record blood pressure, rate, rhythm, respiratory rate and oxygen saturation.
- Apply a validated and standardized instrument for stroke screening such as FAST (Face, Arm, Speech, Time), Los Angeles Prehospital Stroke Screen, or Cincinnati Prehospital Stroke Scale
- 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.

Exam

Examination

- Apply stroke assessment tool: Cincinnati Prehospital Stroke Scale, Los Angeles Prehospital Stroke Screen or FAST (Face, Arm, Speech, Test)

Assessment

History

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ASA Policy Statement

Recommendations for the Establishment of Stroke Systems of Care: A 2019 Update

A Policy Statement From the American Stroke Association

Opeolu Adeoye, MD, MS, FAHA, Chair; Karin V. Nyström, RN, MSN, FAHA; Dileep R. Yavagal, MD; Jean Luciano, CRNP; Raul G. Nogueira, MD; Richard D. Zorowitz, MD; Alexander A. Khalessi, MD, MS, FAHA; Cheryl Bushnell, MD, MHS, FAHA; William G. Barsan, MD; Peter Panagos, MD; Mark J. Alberts, MD, FAHA; A. Colby Tiner, MA; Lee H. Schwamm, MD, FAHA; Edward C. Jauch, MD, MS, FAHA

Recommendations

1. Public health leaders along with medical professionals and others should design 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 should be repetitive and designed to reach diverse populations. Further research is needed to establish the most effective programs for diverse populations. (New)
2. EMS leaders, in coordination with local, regional, and state agencies and in consultation with medical authorities and local experts, should develop triage paradigms and protocols that ensure that all patients with a known or suspected stroke are rapidly identified and assessed with a validated and standardized instrument for stroke screening such as FAST (Face, Arm, Speech, Time), Los Angeles Prehospital Stroke Screen, or CPSS. (Revised)
   a. In prehospital patients who screen positive for suspected stroke, a standard prehospital stroke severity assessment tool (eg, Cincinnati Stroke Triage Assessment Tool, Rapid Arterial Occlusion Evaluation, Los Angeles Motor Scale, and Field Assessment Stroke Triage for Emergency Destination) should be used to facilitate triage. In the absence of new data, it is reasonable to adapt the Mission: Lifeline algorithm to the needs of the community. Further research is needed to establish the most effective prehospital stroke severity triage scale, which may be one of the published scales or a novel scale or device. (New)
   b. Standardized approaches to prehospital stroke assessment, triage, and management should be encouraged for 9-1-1 call centers and EMS dispatchers. Further research is needed to establish the most effective programs for stroke recognition by 9-1-1 call centers and EMS dispatchers. (New)
3. When there are several intravenous alteplase–capable hospitals in a well-defined geographic region, extra transportation times to reach a facility capable of endovascular thrombectomy should be limited to no more than 15 minutes in patients with a prehospital stroke severity scale score suggestive of LVO. When several hospital options exist within similar travel times, EMS should seek care at the facility capable of offering the highest level of stroke care. Further research is needed to establish travel time parameters for hospital bypass in cases of prehospital suspicion of LVO. (New)
   a. Protocols that include prearrival notification by EMS that a stroke patient is en route should be used in all cases. (New)

Adeoya O, Nystrom KV, Yavagal DR, et al. Recommendations for the establishment of stroke systems of care: a 2019 Update. Stroke. 2019;50:e187-e210.

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1.3. EMS Systems

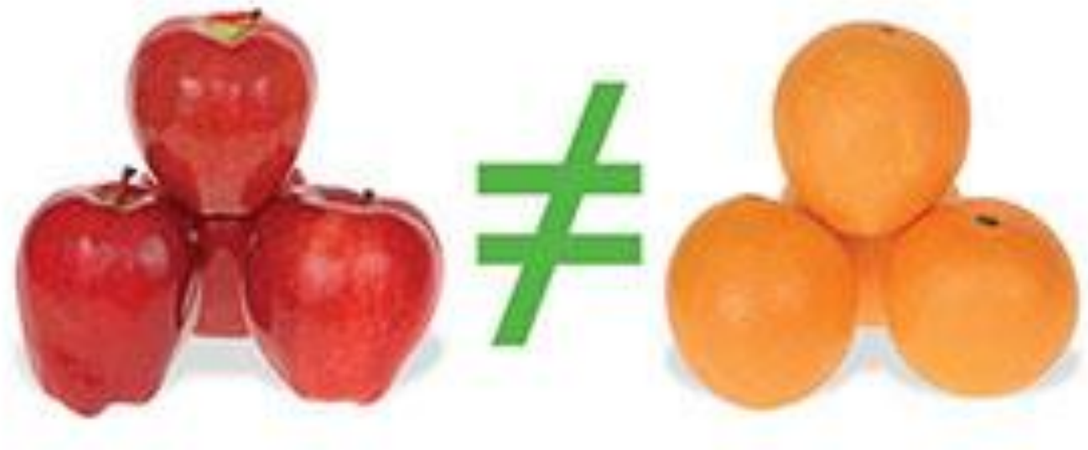
1.3. EMS Systems	COR	LOE	New, Revised, or Unchanged
1. Regional systems of stroke care should be developed. These should consist of the following: (a) healthcare facilities that provide initial emergency care, including administration of IV alteplase, and (b) centers capable of performing endovascular stroke treatment with comprehensive periprocedural care to which rapid transport can be arranged when appropriate.	I	A	Recommendation reworded for clarity from 2015 Endovascular. COR and LOE unchanged. See Table XCV in online Data Supplement 1 for original wording.
2. EMS leaders, in coordination with local, regional, and state agencies and in consultation with medical authorities and local experts, should develop triage paradigms and protocols to ensure that patients with a known or suspected stroke are rapidly identified and assessed by use of a validated and standardized tool for stroke screening.	I	B-NR	Recommendation reworded for clarity from 2013 Stroke Systems of Care. COR and LOE added to conform with ACC/AHA 2015 Recommendation Classification System. See Table XCV in online Data Supplement 1 for original wording.
Multiple stroke screening tools have been developed for prehospital evaluation of suspected stroke. A 2016 systematic review assessed the performance of 7 tools.[26] Those with the highest number of subjects in whom the tool had been applied included Cincinnati Prehospital Stroke Scale (CPSS),[27] Los Angeles Prehospital Stroke Screen (LAPSS),[28] Recognition of Stroke in the Emergency Room (ROSIER),[29] and FAST (Face, Arm, Speech, Time).[30] CPSS and FAST performed similarly with regard to sensitivity (range, 44%–95% for CPSS, 79%–97% for FAST) but both had poor specificity (range, 24%–79% for CPSS, 13%–88% for FAST). More complex tools such as LAPSS had improved specificity (range, 48%–97%) but at the cost of sensitivity (range, 59%–91%). All tools inadequately accounted for false-negative cases, thereby likely artificially boosting performance. The review concluded that no strong recommendation could be made for use of one tool over another.			See Tables III and IV in online Data Supplement 1.

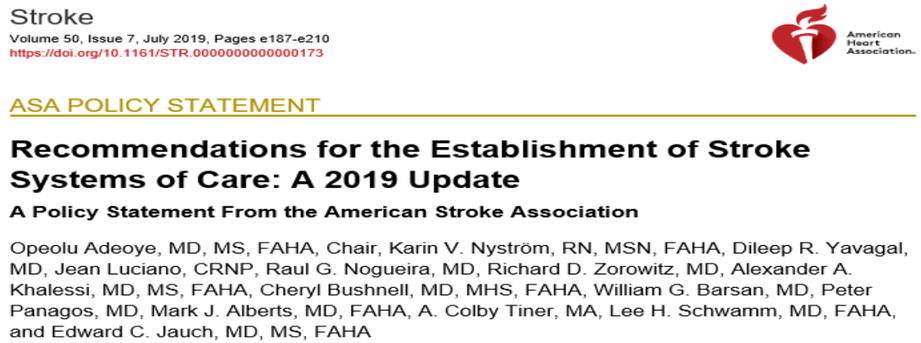
Powers WJ, Rabinstein AA, Ackerson T. et al. Guidelines for the early management of patients with acute ischemic stroke: 2019 update to the 2018 guidelines for the early management of acute ischemic stroke. Stroke. 2019;50:e344-e418.

Are All Strokes Created Equal

LVO

Small Vessel Stroke





Stroke
Volume 50, Issue 7, July 2019, Pages e187-e210
https://doi.org/10.1161/STR.0000000000000173

ASA POLICY STATEMENT

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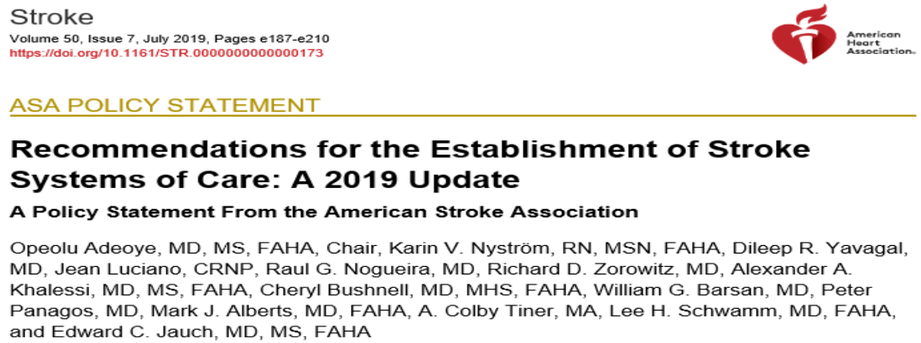
- AHA published an update to reflect the changes needed in this new environment of stroke care
- Sections addressing:
  - Prehospital stroke screening tools and severity scales
  - Preferential triage of patients with suspected large vessel occlusion (LVO) to the nearest EVT-capable stroke center

Adeoye O, Nystrom KV, Yavagal DR, Luciano J, Nogueira RG, Zorowitz RD, et al. Recommendations for the establishment of stroke systems of care: A 2019 update. *Stroke*. 2019;50:e187-e210
Schwamm LH, Pancioli A, Acker 3rd JE, Goldstein LB, Zorowitz RD, Shephard TJ, et al. Recommendations for the establishment of stroke systems of care: Recommendations from the american stroke association's task force on the development of stroke systems. *Circulation*. 2005;111:1078-1091



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Opeolu Adeoye, MD, MS, FAHA, Chair, Karin V. Nyström, RN, MSN, FAHA, Dileep R. Yavagal, MD, Jean Luciano, CRNP, Raul G. Nogueira, MD, Richard D. Zorowitz, MD, Alexander A. Khalessi, MD, MS, FAHA, Cheryl Bushnell, MD, MHS, FAHA, William G. Barsan, MD, Peter Panagos, MD, Mark J. Alberts, MD, FAHA, A. Colby Tiner, MA, Lee H. Schwamm, MD, FAHA, and Edward C. Jauch, MD, MS, FAHA

- Policy statement recommended:
  - In prehospital patients who screen positive for suspected stroke, a standard prehospital stroke severity assessment tool should be used to facilitate triage.
  - When several hospital options exist within similar travel times, EMS should seek care at the facility capable of offering the highest level of stroke care.

Adeoye O, Nystrom KV, Yavagal DR, Luciano J, Nogueira RG, Zorowitz RD, et al. Recommendations for the establishment of stroke systems of care: A 2019 update. *Stroke*. 2019;50:e187-e210
Schwamm LH, Pancioli A, Acker 3rd JE, Goldstein LB, Zorowitz RD, Shephard TJ, et al. Recommendations for the establishment of stroke systems of care: Recommendations from the american stroke association's task force on the development of stroke systems. *Circulation*. 2005;111:1078-1091

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ASA Policy Statement

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If the stroke assessment tool is positive apply a stroke severity scale:

- Cincinnati Stroke Triage Assessment Tool (CSTAT)
- Field Assessment Stroke Triage for Emergency Destination (FAST-ED)
- Rapid Arterial Occlusion Evaluation Scale (RACE)
- Vision, Aphasia, Neglect (VAN)

Recommendations

1. Public health leaders along with medical professionals and others should design 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 should be repetitive and designed to reach diverse populations. Further research is needed to establish the most effective programs for diverse populations. (New)
2. EMS leaders, in coordination with local, regional, and state agencies and in consultation with medical authorities and local experts, should develop triage paradigms and protocols that ensure that all patients with a known or suspected stroke are rapidly identified and assessed with a validated and standardized instrument for stroke screening such as FAST (Face, Arm, Speech, Time), Los Angeles Prehospital Stroke Screen, or CPSS. (Revised)
   a. In prehospital patients who screen positive for suspected stroke, a standard prehospital stroke severity assessment tool (eg, Cincinnati Stroke Triage Assessment Tool, Rapid Arterial Occlusion Evaluation, Los Angeles Motor Scale, and Field Assessment Stroke Triage for Emergency Destination) should be used to facilitate triage. In the absence of new data, it is reasonable to adapt the Mission: Lifeline algorithm to the needs of the community. Further research is needed to establish the most effective prehospital stroke severity triage scale, which may be one of the published scales or a novel scale or device. (New)
   b. Standardized approaches to prehospital stroke assessment, triage, and management should be encouraged for 9-1-1 call centers and EMS dispatchers. Further research is needed to establish the most effective programs for stroke recognition by 9-1-1 call centers and EMS dispatchers. (New)
3. When there are several intravenous alteplase–capable hospitals in a well-defined geographic region, extra transportation times to reach a facility capable of endovascular thrombectomy should be limited to no more than 15 minutes in patients with a prehospital stroke severity scale score suggestive of LVO. When several hospital options exist within similar travel times, EMS should seek care at the facility capable of offering the highest level of stroke care. Further research is needed to establish travel time parameters for hospital bypass in cases of prehospital suspicion of LVO. (New)
   a. Protocols that include prearrival notification by EMS that a stroke patient is en route should be used in all cases. (New)

Adeoya O, Nystrom KV, Yavagal DR, et al. Recommendations for the establishment of stroke systems of care: a 2019 Update. Stroke. 2019;50:e187-e210.

Management

- EMS personnel should begin the initial management of stroke in the field.
- Prevent aspiration, HOB > 30. Ensure airway patency with suctioning and OPA or NPA, as needed.
- Provide supplemental oxygen if needed to keep oxygen saturation > 94%.
- Treatment of hypertension is NOT recommended unless blood pressure > 220/120 mmHg.
- 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 transportation to appropriate hospital.

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- Avoid dextrose containing fluids in non-hypoglycemic patients.
- Perform and document a POC Glucose analysis and treat according to the ASA 2019 Guidelines for Management of Acute Ischemic Stroke.
  - Hypoglycemia (blood glucose < 60 mg/dL) should be treated in patients suspected of acute ischemic stroke.
- To facilitate expedited stroke workup in the ED, place at least one 18 or 20 gauge IV in the antecubital fossa or forearm (right preferable).
- To facilitate fastest Door-to-Needle and stroke care, if possible collect blood sample to provide receiving facility, however, as long as it does not delay transfer.

System Triage

- Goal for on scene time, 10-15 minutes or less. Encourage family to go directly to the ED if not transported with the patient.
- See appendix A for the Acute Stroke Triage and Transport Algorithm.
- Call stroke alert, pre-notify receiving facility that a suspected stroke patient is in route so that the appropriate resources may be mobilized before patient arrival.
  - Goal to provide: LKW, stroke severity score, next of kin phone number
- Goal: 30 seconds for EMS to ED triage nurse hand-off.
- Bypass Exclusions:
  - If severe or life-threatening trauma is suspected in addition to stroke, transfer to the appropriate level trauma center.
  - Patients under hospice care or with Medical Orders for Scope of Treatment (MOST) that outlines no emergency measures should go to the nearest appropriate hospital.

**Common ischemic stroke mimics: alcoholic intoxication, cerebral infections, drug overdose, hemorrhagic stroke, hypoglycemia, hyperglycemia, metabolic disorders, atypical migraines, neuropathies (e.g. Bell's palsy), seizure, post-ictal state and tumors.*

X. Pediatric Stroke Triage and Management

https://ncttrac.org/2018-regional-stroke-plan/

Management

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System Triage

Triage

- Goal for on scene time, 10-15 minutes or less.
- Call stroke alert, pre-notification

Management

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Pre-Hospital Notification

Table 2. In-Hospital Evaluation and Treatment of Patients With Acute Ischemic Stroke With EMS Prenotification Compared With Patients Without EMS Prenotification

	EMS Prenotification	No EMS Prenotification	Absolute Difference (95% CI)	*P* Value
Door-to–imaging time, n, median (25th to 75th percentile), min (in patients arriving ≤3 h)	76 459	28 220		
	26 (16–45)	31 (18–56)	235 min	<0.0001
Door-to–imaging time ≤25 min, (in patients arriving ≤3 h), %	48.8%	40.5%	+8.3% (7.6–8.9)	<0.0001
Door-to–imaging time, n, median (25th to 75th percentile), min	230 430	112 580		
	42 (22–83)	55 (28–103)	−13 min	<0.0001
Door-to–imaging time ≤25 min, %	30.9%	22.4%	+8.5% (8.2–8.8)	<0.0001
Door-to–needle time, median (25th to 75th percentile), min	78 (60–100)	80 (60–103)	−2 min	<0.0001
Door-to–needle time ≤60 min, %	27.0%	25.9%	+1.1% (0.0–2.1)	0.0583
Onset-to–needle time, median (25th to 75th percentile), min	141 (115–169)	145 (116–170)	−4 min	<0.0001
Onset-to–needle time ≤120 min, %	31.9%	29.5%	+2.4% (1.2–3.5)	<0.0001
tPA Rx rate (arrive by 2 h, treat by 3 h), n/n, %	22 305/30 541	7193/11 244		
	73.0%	64.0%	+9.0% (8.0–10.1)	<0.0001

Lin S. et al. Circ Cardiovasc Qual Outcomes. 2012;5:514-522.

System Triage

Triage

- Call stroke alert, pre-notification:
  - LKW, stroke severity score, next of kin phone number
- EMS to ED RN hand-off 30 seconds

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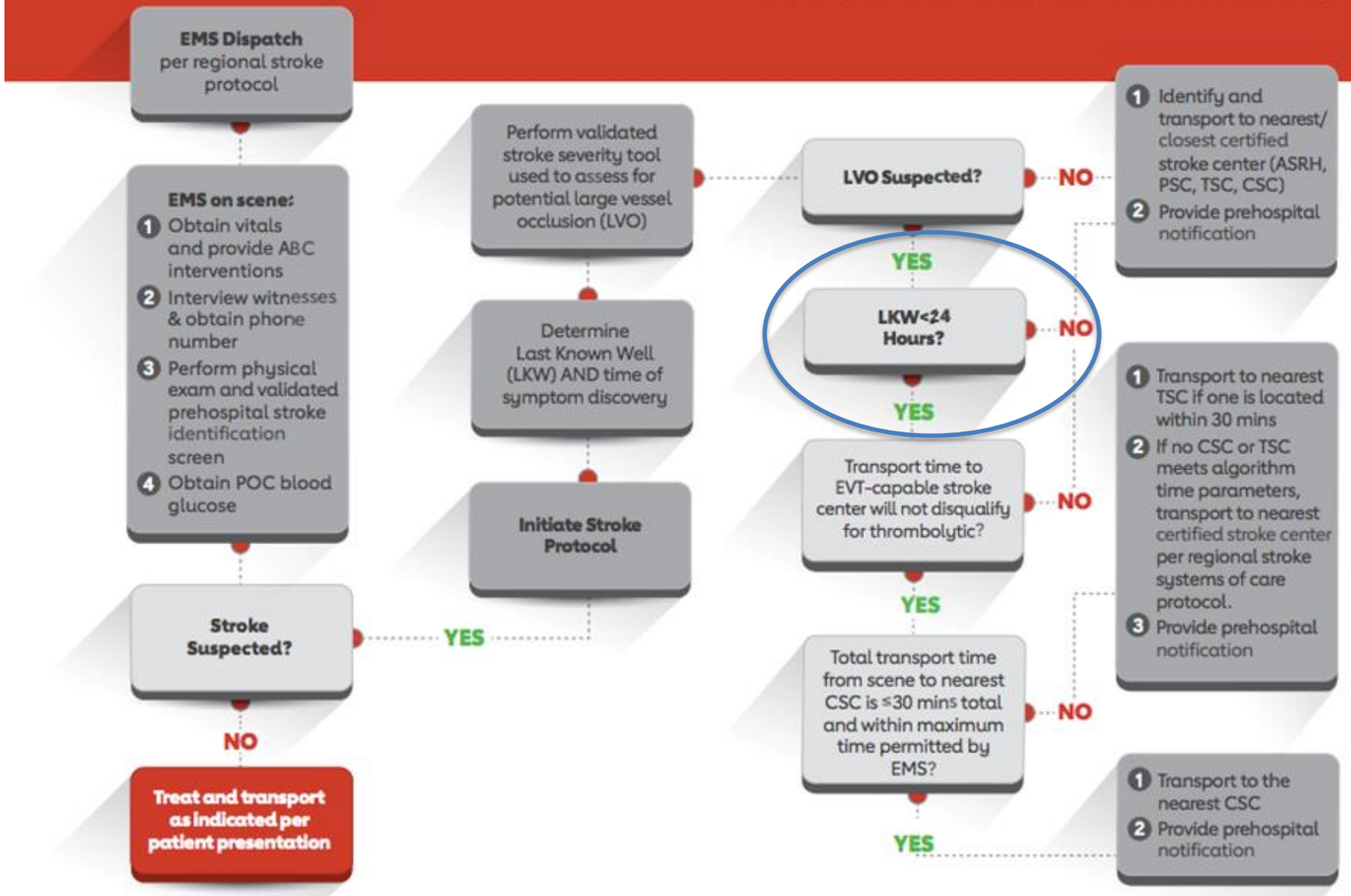
EMERGENCY MEDICAL SERVICES ACUTE STROKE ROUTING



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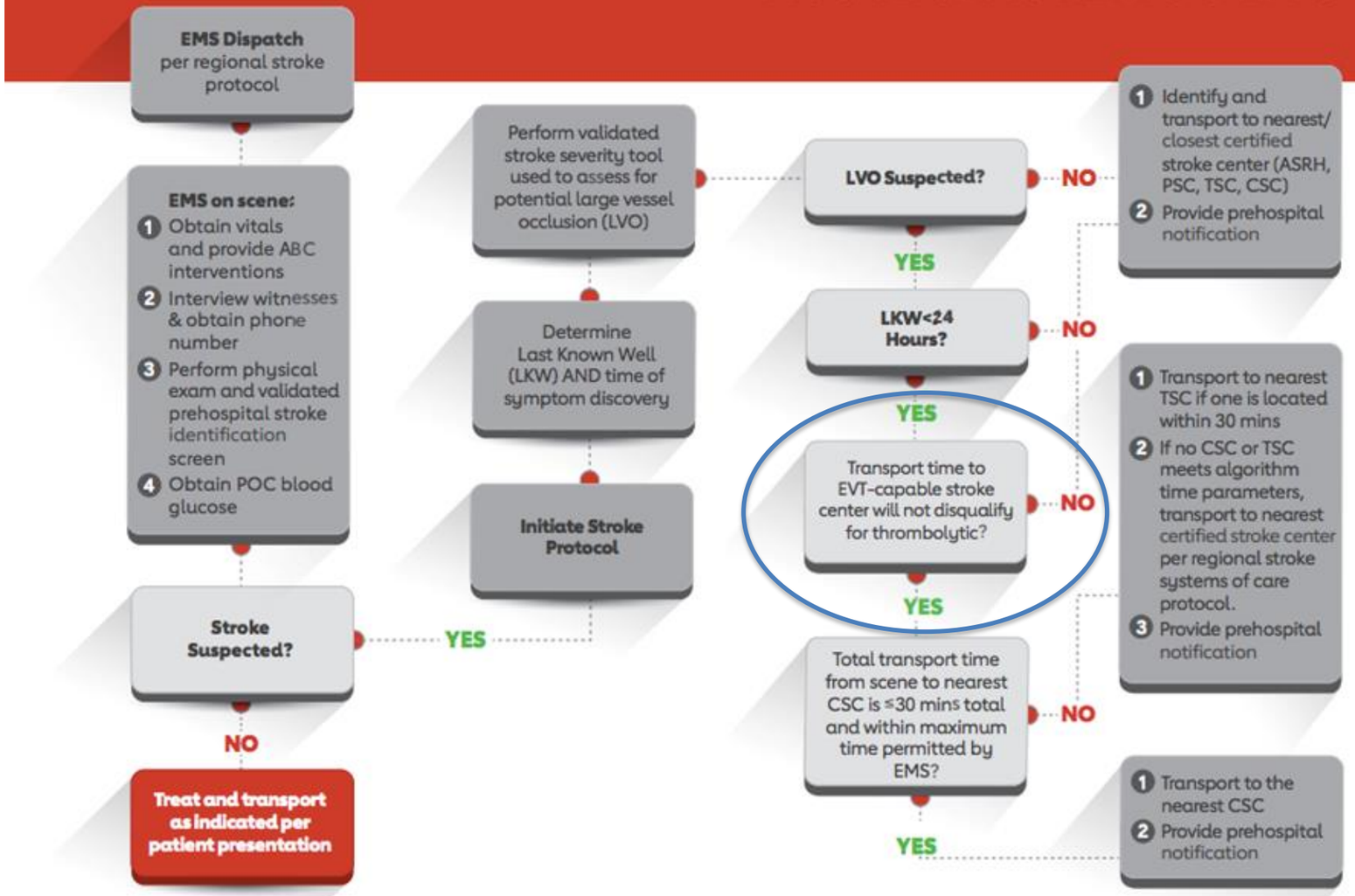

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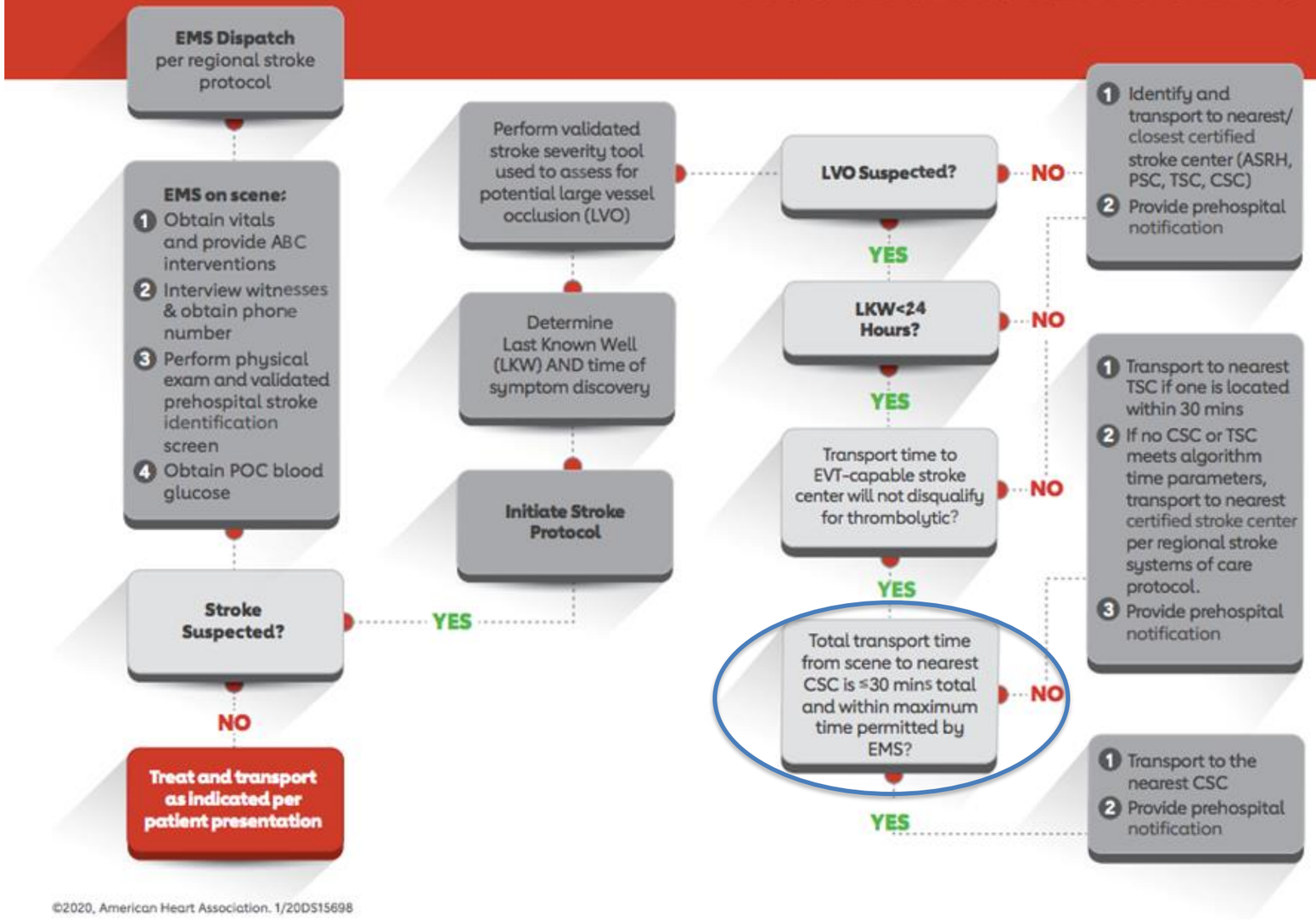

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NCTTRAC
NORTH CENTRAL TEXAS TRAUMA REGIONAL ADVISORY COUNCIL

Date: **Transport #:**
Time Transport Requested:
Time Enter Door Receiving Hospital:

[Place PATIENT LABEL here on all 3 copies]

Level One STROKE Transfer Checklist

1) **Activate emergent transport *FIRST* (air or ground as appropriate) - utilize script "LEVEL ONE STROKE PATIENT"**

2) **Secure acceptance at a Comprehensive/Endovascular Capable Stroke Center**

3) **Review EMS report and/or family report, note the following:**

Blood Glucose
Time and Value

_____/ Date / Time of Last Known Well

_____/ NIHSS **Prior to Alteplase**/ Time of Neuro Assessment

Has a Large Vessel Occlusion been identified? Y / N - Receiving Neuro IR MD _____

Major Neuro Deficits identified at sending facility _____

Pertinent Current Medications _____

Pertinent Medical History _____

Cell Phone Number for Point of Contact: _____ Name: _____

If patient received Alteplase, monitor:

1) Airway – SaO2 > 94%
2) BP < 180/105
3) HR > 50 and < 160
4) RR > 10 and < 30
5) Keep NPO
6) NIHSS / Neuro Assessment

NIHSS SCORE AT TIME OF TRANSFER

Pre-Alteplase BP Goal:
<185/110

Post-Alteplase BP Goal:
<180/105

Alteplase Monitoring
S/S of Neuro Deterioration

- Sudden Onset of Severe Headache
- Decreased LOC
- Sudden Onset of Acute HTN
- Sudden Onset of Severe N/V

If the above S/S or orolingual angioedema (drooling, swelling) appears, STOP Alteplase infusion.

Alteplase Administration

Weight in Kg_____x 0.9 mg/kg =_____Total dose (mg)-MAX DOSE: 90 mg

Amount pulled from vial & wasted_____(mg)

_____ Bolus Amount _____Infusion Amount _____Infusion Completion Time
_____ Bolus Time _____Infusion Start Time _____Flush Start Time _____Flush Stop Time
(50 ml 0.9% NS @ same rate as tPA Infusion)

Frequency Q15 X 2 hours	Time	B/P	HR	RR	O2Sat	Neuro Changes	Neuro Changes Noted/Meds Given	Orolingual Angioedema
1 *Pre Bolus						Y / N		Y / N
2 *Post Bolus						Y / N		Y / N
3						Y / N		Y / N
4						Y / N		Y / N
5						Y / N		Y / N
6						Y / N		Y / N
7						Y / N		Y / N
8						Y / N		Y / N

Bottom Copy Sending/Middle Copy Receiving/Top Copy Keep for EMS Records

DRAFT

https://ncttrac.org/download/Inter-Facility-EMS-Transport-Documentation-Board-Approved-10.8.2019.pdf

Inter-Hospital Stroke Transfer Guideline

The inter-hospital transfer recommendations serves to outline best practices that will facilitate the rapid transfer of stroke patients requiring a higher level of care. The goal for establishing and implementing inter-hospital 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 Hospital Triage Recommendations for Inter-Hospital Transfer*:

- Develop, adopt and adhere to **care protocols** that reflect current care guidelines.
- Establish approved transfer protocols and procedures with **receiving hospitals**, so that efficient patient transfers can be accomplished at all hours of the day and night.
- Establish transfer protocols, terminology (code stroke), agreements and procedures that ensure safe and efficient patient care with **EMS agencies** that are capable of transportation via ground and air.
- In all patients within 24 hours from last known well that are suspected of having an acute ischemic stroke early identification of possible LVO is recommended.
  - Consider utilizing a stroke severity scale or NIHSS upon arrival to the emergency room to identify possible LVOs.
    - Recommended stroke severity scales: **CSTAT, FAST-ED, LAMS, RACE, VAN**
- If **LVO screen is positive** and patient meets established criteria for transfer, **notify CSC (Level 1)** and dispatch **EMS transport team**, crew should be on standby for transfer (prior to imaging).
- It may be useful for healthcare facilities to develop the capability of performing emergency **CT angiogram head and neck** to most appropriately select patients to transfer for thrombectomy.
  - Consider performing **concurrent vascular imaging with the noncontrast head CT** to avoid delay to administering IV alteplase when indicated.
  - **6-24 hours** from last known well consider adding CT perfusion, DW-MRI or MRI perfusion if capable without significantly delaying transfer.
- Per ASA guidelines: it is reasonable to proceed with CT angiogram if indicated before obtaining a serum creatinine in patients with suspected LVO who are without a history of renal impairment.
- If **LVO is identified** on imaging: **immediate transfer with goal metrics** as outlined below.
- If **no LVO is identified** on imaging: notify receiving hospital and transportation crew.
- All related documents should accompany all stroke patient transfers:
  - **Diagnostics scans and reports if available**
  - **Hospital records**
  - **Medication Administration Record**
- Regional hospital transferring stroke patients to a higher level of care, for the purposes of endovascular revascularization therapy, an urgent neurosurgical procedure or other urgent treatment, should establish goal Door-In Door-Out (DIDO) time for patients arriving to the emergency department as well as Picture to Door-Out time for inpatients as outlined below.
  - **DIDO of 60 minutes for patients not receiving IV rt-PA**
  - **DIDO of 90 minutes for patients who receive IV rt-PA**
  - **Picture to Door-Out of 60 minutes for patients not receiving IV rt-PA**
  - **Picture to Door-Out of 90 minutes for patients who receive IV rt-PA**

TSA-E Comprehensive Stroke Center Transfer Hotlines

Baylor Scott & White **214.820.6444**
Children's Medical Center Dallas (Pediatric) **888.730.3627**
Cook Children's Medical Center (Pediatric) **800.543.4878**
John Peter Smith Hospital **817.702.8417**
Medical City (HCA) **877.422.9337**
Methodist Dallas Medical Center **214.947.2003**
Parkland Hospital **214.590.6690**
Texas Health Resources **888.782.8233**
UT Southwestern Medical Center ..... **214-645-FAST(3278)**

- EMResource (https://emresource.juvare.com/login), a web-based regional medical capabilities application, is available to assist you in determining current capabilities at hospitals near you. Please contact NCTTRAC staff at (817) 607-7075 or NCTTRAC_EMCC@NCTTRAC.org for assistance with access credentials if needed. For additional information regarding NCTTRAC, please contact NCTTRAC at 817- 608-0390 or visit www.NCTTRAC.org.

**Refer to NCTTRAC Regional Stroke Plan for detailed recommendations for hospital triage from inpatient service and emergency department, and EMS transportation for inter-hospital care.*
Large vessel occlusion (LVO), Comprehensive Stroke Center (CSC), Cincinnati Stroke Triage Assessment Tool (CSTAT), Field Assessment Stroke Triage for Emergency Destination (FAST-ED), Los Angeles Motor Scale (LAMS), Rapid Arterial Occlusion Evaluation Scale (RACE) or Vision, Aphasia, Neglect (VAN) assessment, diffusion weighted (DW)-MRI

https://ncttrac.org/wp-content/uploads/files/public-files/stroke/buttons/Inter-Facility-Stroke-Transfer-Guidelines-2019.pdf

NCTTRAC recommend inter-facility stroke terminology to convey level of stroke emergency:

- **Level 1 Stroke** = Patient with an ischemic or hemorrhagic stroke in need of an emergent intervention
- **Level 2 Stroke** = Patient with an ischemic or hemorrhagic stroke in need of an urgent transfer for higher level of care but without emergent need of an intervention
- **Level 3 Stroke** = Patient with an ischemic or hemorrhagic stroke in need of transfer but without emergent or urgent needs

- **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

NCTTRAC Quality Project Prehospital Reports – 2020 YTD

Stroke Severity Screen Performed and Reported - Rate Based

Percentage of confirmed stroke patients transported to your hospital by EMS and for whom a validated regional or national severity screen tool was used with documentation of the outcome.

Stroke Severity Screen Performed and Reported - Rate Based				
Benchmark Group	**Time Period**	**Numerator**	**Denominator**	**% of Patients**
All TX Hospitals	2020	536	4910	10.9%
NCTTRAC Stroke Committee	2020	32	841	3.8%

Documentation of Time LKW

Documentation of Time Last Known Well or Time of Discovery of Stroke Symptoms: Percentage of confirmed stroke patients transported to your hospital by EMS and for whom a time "Last Known Well" (LKW) of Stroke Symptoms was documented.

Documentation of Time LKW				
Benchmark Group	**Time Period**	**Numerator**	**Denominator**	**% of Patients**
All TX Hospitals	2020	1827	4148	44.0%
NCTTRAC Stroke Committee	2020	170	739	23.0%

On-Scene Time <= 15 Minutes for Suspected Stroke

Distribution of times for suspected stroke patients transported to your hospital by EMS. Based on AHA Guidelines, the goal for EMS on-scene time is <= 15 minutes.

On-Scene Times <=15 minutes for Suspected Stroke				
Benchmark Group	**Time Period**	**Numerator**	**Denominator**	**% of Patients**
All TX Hospitals	2020	1043	2073	50.3%
NCTTRAC Stroke Committee	2020	88	209	42.1%

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Approach to Pre-Hospital and Emergency Management of Stroke

Peter D. Panagos, MD, FACEP, FAHA

Professor of Emergency Medicine and Neurology
Washington University School of Medicine

Objectives

- Understand optimization of calls to EMS and 9-1-1 type systems, and in-the-field triage and stroke scale usage

- Understand and apply pre-hospital stroke triage tools and recommendations for triage protocols

What is EMS?

- More than red lights and loud sirens
- More than fast driving ambulances
- An integrated system of acute patient care for traumatic and medical conditions
- First point of medical contact for our patients

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Stroke Chain of Survival

ACLS 2018

- **Detection:** Early recognition
- **Dispatch:** Early EMS activation (911)
- **Delivery:** Transport & management
- **Door:** ED triage
- **Data:** ED evaluation & management
- Decision: Neurology input, Rx selection
- Drug: Thrombolytic & future agents
- Disposition: Rapid admission to stroke unit

AHA ACLS Manual 2018

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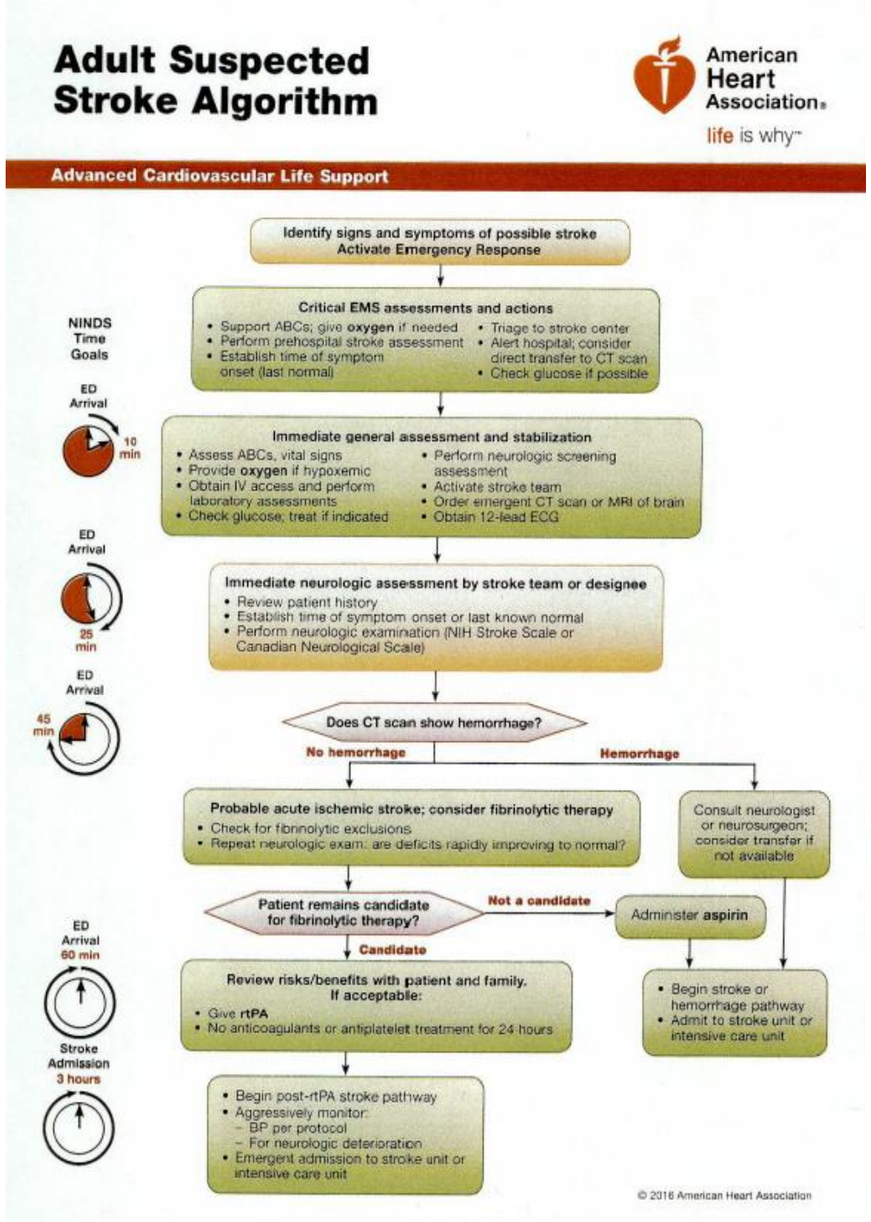

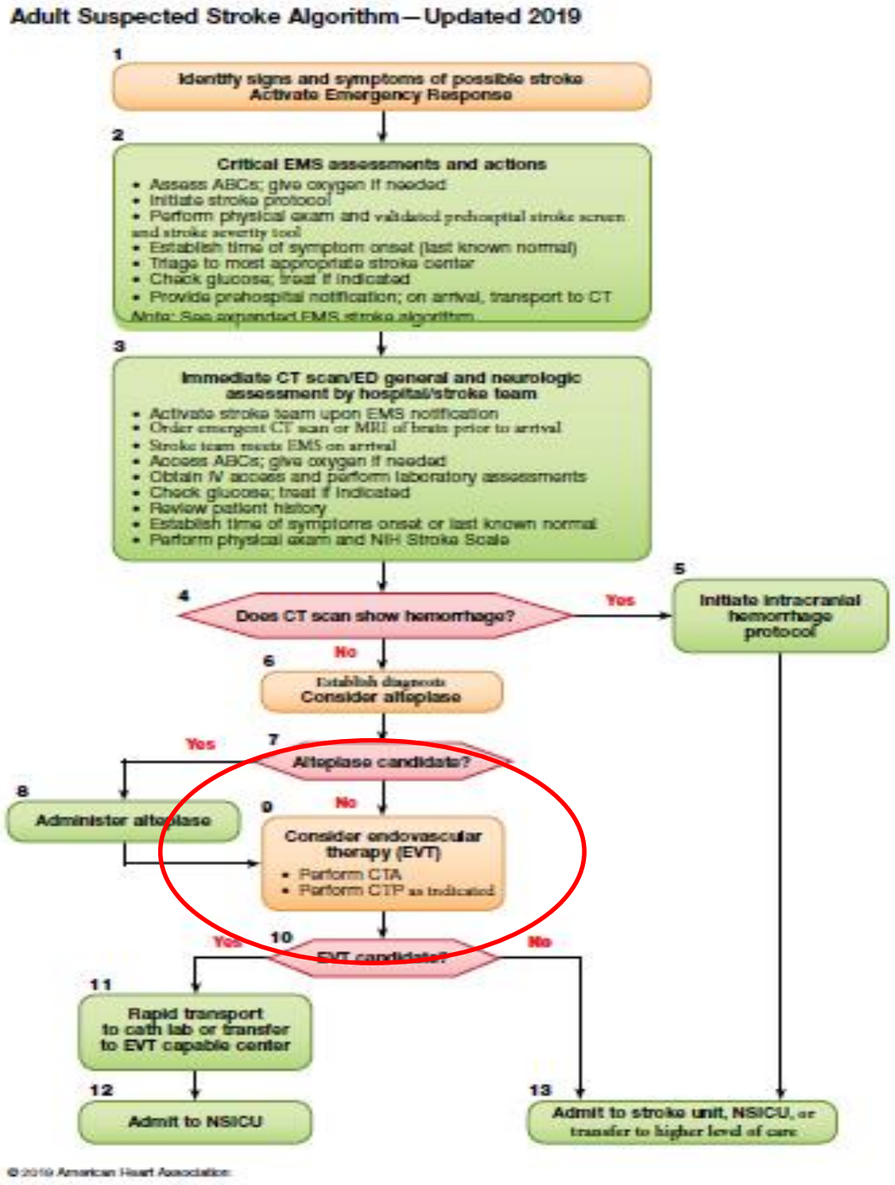

Current Version

2019 Draft

American Stroke Association.
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SVIN Society of Vascular and Interventional Neurology

ASA Policy Statement

Recommendations for the Establishment of Stroke Systems of Care: A 2019 Update

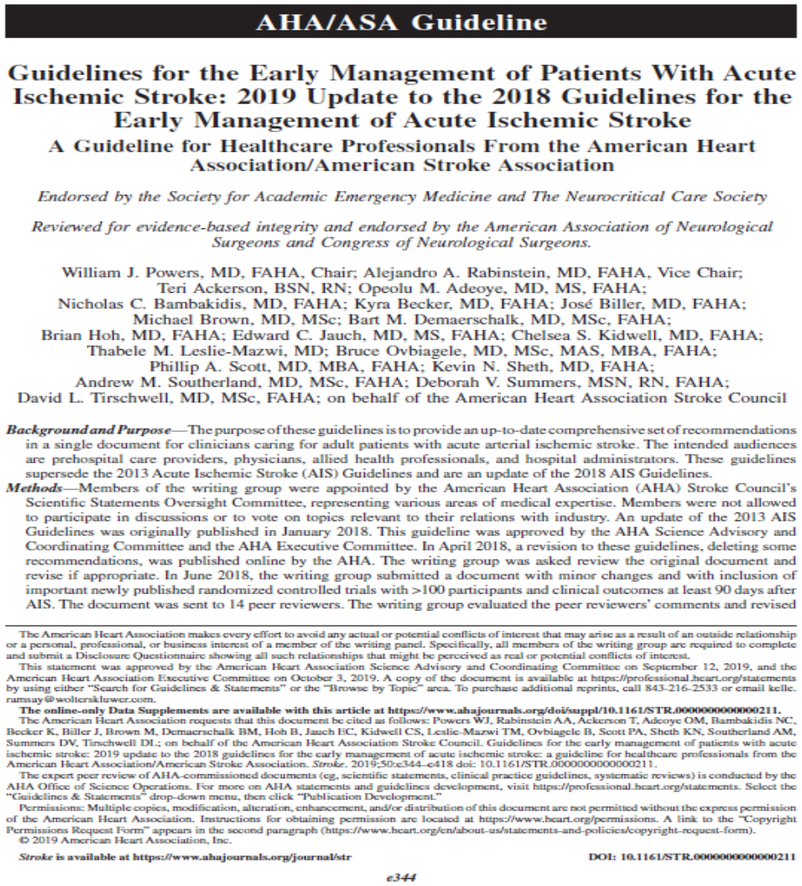
A Policy Statement From the American Stroke Association

Opeolu Adeoye, MD, MS, FAHA, Chair; Karin V. Nyström, RN, MSN, FAHA; Dileep R. Yavagal, MD; Jean Luciano, CRNP; Raul G. Nogueira, MD; Richard D. Zorowitz, MD; Alexander A. Khalessi, MD, MS, FAHA; Cheryl Bushnell, MD, MHS, FAHA; William G. Barsan, MD; Peter Panagos, MD; Mark J. Alberts, MD, FAHA; A. Colby Tiner, MA; Lee H. Schwamm, MD, FAHA; Edward C. Jauch, MD, MS, FAHA

***Abstract*—In 2005, the American Stroke Association published recommendations for the establishment of stroke systems of care and in 2013 expanded on them with a statement on interactions within stroke systems of care. The aim of this policy statement is to provide a comprehensive review of the scientific evidence evaluating stroke systems of care to date and to update the American Stroke Association recommendations on the basis of improvements in stroke systems of care. Over the past decade, stroke systems of care have seen vast improvements in endovascular therapy, neurocritical care, and stroke center certification, in addition to the advent of innovations, such as telestroke and mobile stroke units, in the context of significant changes in the organization of healthcare policy in the United States. This statement provides an update to prior publications to help guide policymakers and public healthcare agencies in continually updating their stroke systems of care in light of these changes. This statement and its recommendations span primordial and primary prevention, acute stroke recognition and activation of emergency medical services, triage to appropriate facilities, designation of and treatment at stroke centers, secondary prevention at hospital discharge, and rehabilitation and recovery. (*Stroke*. 2019;50:00-00. DOI: 10.1161/STR.0000000000000173.)**

Key Words: AHA Scientific Statements ■ brain ■ neurology ■ primary prevention ■ secondary prevention

2019 AHA/ASA Guidelines for the Early Management of Ischemic Stroke



AHA/ASA Guideline

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

Endorsed by the Society for Academic Emergency Medicine and The Neurocritical Care Society

Reviewed for evidence-based integrity and endorsed by the American Association of Neurological Surgeons and Congress of Neurological Surgeons.

William J. Powers, MD, FAHA, Chair; Alejandro A. Rabinstein, MD, FAHA, Vice Chair; Teri Ackerson, BSN, RN; Opeolu M. Adeoye, MD, MS, FAHA; Nicholas C. Bambakidis, MD, FAHA; Kyra Becker, MD, FAHA; José Biller, MD, FAHA; Michael Brown, MD, MSc; Bart M. Demaerschalk, MD, MSc, FAHA; Brian Hoh, MD, FAHA; Edward C. Jauch, MD, MS, FAHA; Chelsea S. Kidwell, MD, FAHA; Thabele M. Leslie-Mazwi, MD; Bruce Ovbiagele, MD, MSc, MAS, MBA, FAHA; Phillip A. Scott, MD, MBA, FAHA; Kevin N. Sheth, MD, FAHA; Andrew M. Southerland, MD, MSc, FAHA; Deborah V. Summers, MSN, RN, FAHA; David L. Tirschwell, MD, MSc, FAHA; on behalf of the American Heart Association Stroke Council

Background and Purpose—The purpose of these guidelines is to provide an up-to-date comprehensive set of recommendations in a single document for clinicians caring for adult patients with acute arterial ischemic stroke. The intended audiences are prehospital care providers, physicians, allied health professionals, and hospital administrators. These guidelines supersede the 2013 Acute Ischemic Stroke (AIS) Guidelines and are an update of the 2018 AIS Guidelines.

Methods—Members of the writing group were appointed by the American Heart Association (AHA) Stroke Council's Scientific Statements Oversight Committee, representing various areas of medical expertise. Members were not allowed to participate in discussions or to vote on topics relevant to their relations with industry. An update of the 2013 AIS Guidelines was originally published in January 2018. This guideline was approved by the AHA Science Advisory and Coordinating Committee and the AHA Executive Committee. In April 2018, a revision to these guidelines, deleting some recommendations, was published online by the AHA. The writing group was asked review the original document and revise if appropriate. In June 2018, the writing group submitted a document with minor changes and with inclusion of important newly published randomized controlled trials with >100 participants and clinical outcomes at least 90 days after AIS. The document was sent to 14 peer reviewers. The writing group evaluated the peer reviewers' comments and revised

The American Heart Association makes every effort to avoid any actual or potential conflicts of interest that may arise as a result of an outside relationship or a personal, professional, or business interest of a member of the writing panel. Specifically, all members of the writing group are required to complete and submit a Disclosure Questionnaire showing all such relationships that might be perceived as real or potential conflicts of interest.

This statement was approved by the American Heart Association Science Advisory and Coordinating Committee on September 12, 2019, and the American Heart Association Executive Committee on October 3, 2019. A copy of the document is available at https://professional.heart.org/statements by using either "Search for Guidelines & Statements" or the "Browse by Topic" area. To purchase additional reprints, call 843-216-2533 or email kelle.ramsay@wolterskluwer.com.

The online-only Data Supplements are available with this article at https://www.ahajournals.org/doi/suppl/10.1161/STR.0000000000000211.

The American Heart Association requests that this document be cited as follows: Powers WJ, Rabinstein AA, Ackerson T, Adeoye OM, Bambakidis NC, Becker K, Biller J, Brown M, Demaerschalk BM, Hoh B, Jauch EC, Kidwell CS, Leslie-Mazwi TM, Ovbiagele B, Scott PA, Sheth KN, Southerland AM, Summers DV, Tirschwell DL; on behalf of the American Heart Association Stroke Council. Guidelines for the early management of patients with acute ischemic stroke: 2019 update to the 2018 guidelines for the early management of acute ischemic stroke: a guideline for healthcare professionals from the American Heart Association/American Stroke Association. *Stroke*. 2019;50:e344–e418 doi: 10.1161/STR.0000000000000211.

The expert peer review of AHA-commissioned documents (eg, scientific statements, clinical practice guidelines, systematic reviews) is conducted by the AHA Office of Science Operations. For more on AHA statements and guidelines development, visit https://professional.heart.org/statements. Select the "Guidelines & Statements" drop-down menu, then click "Publication Development."

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- Prehospital Systems
- EMS Assessment and Management
- EMS Systems
- Hospital Stroke Teams
- Stroke System of Care Quality Improvement Process

Powers WJ et al. 2019 Guidelines for the Early Management of Patients With Ischemic Stroke. Stroke.2019;50(12):e344-e418

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EMS Care of the Stroke Patient in 2020

Limitations

- Imperfect Stroke Symptom Recognition: Patient
- Imperfect Stroke Symptom Recognition: EMS
- Imperfect Compliance: Pre-hospital Notification
- EMS Therapies: Not all Evidenced-based
- Variation Transport Times:
  - Rural vs. Urban vs. Suburban
- Too Many Stroke Scales:
  - Identification and Severity

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Stroke Assessment Tools

Identification and Severity

Stroke Identification Tools

- **Timely recognition critical for stroke patient**
- Mimics: sepsis, hypo-or hyperglycemia, seizure, tumor, intracranial hemorrhage, migraine, syncope
  - Cincinnati Prehospital Stroke Scale (CPSS)
  - Face Arm Speech Time (FAST)
  - Los Angeles Prehospital Stroke Scale (LAPSS)
  - Miami Emergency Neurologic Deficit (MEND)
  - Melbourne Ambulance Stroke Scale (MASS)
  - Ontario Prehospital Stroke Screening Tool (OPSST)
  - National Institutes of Health Stroke Scale (NIHSS)
  - Kurashiki Prehospital Stroke Scale (KPSS)
- **Misdiagnosis may lead to delayed care or wrong Rx**

Gropen TI. Stroke. 2007;38:2765-70
Oostema JA. Stroke. 2015;46:1513-17
Kothari RU. Ann Emerg Med. 1999;33:373-8
Bray JE. Cerebrovasc Dis. 2005;20:28-33
Asimos AW. Ann Emerg Med. 2014;64:509-15
Kidwell CS. Stroke. 2000;31:71-6

Cincinnati Prehospital Stroke Scale

Facial Droop

Arm Drift

Speech

- 10 minutes to train
- < 1 minute to perform
- Diagnosis of stroke[1,2]
  - Sensitivity 90%
  - Specificity 66%
- Carotid stroke
  - Sensitivity = 95%

[1]Tirschwell DL et al. *Stroke* 2003;34:267 (Abstract)
[2]Kothari et al. *Ann Emerg Med* 1999;33:373-78

History

- Age >45
- History of seizures absent
- Duration < 24 hours
- Not bedridden

Evaluation

- Blood glucose <60 to >400 mg/dL
- Facial smile/grimace
- Grip
- Arm strength

- Short training video
- Sensitivity = 93%
- Specificity = 97%

Kidwell CS et al. *Stroke*. 2000;31:71-76.

Cochrane Review Prehospital Stroke Scales

- **Question**: Comparative accuracy of scales in prehospital and ED
- **Inclusion Criteria**: Studies evaluating test accuracy stroke/TIA
- **Database Searched**: CENTRAL, MEDLINE, Science Citation Index
- **Dates**: Earliest possible to 20 January 2018
- **Statistical A**
- **Results**
  - # Studies: 25 studies, 9250 participants, range 31-1130, median 312
  - # Scales Evaluated: 8 scales, CPSS (11 studies), ROSIER (8 studies), FAST (5 studies), LAPSS (5 studies), MASS (3 studies), others only 1 study
  - Settings: 6 studies evaluated scales in ED, 17 in prehospital setting
  - Methodological Quality: 12 high risk bias, 14 unclear risk bias
- **Conclusions**
  - CPSS should be preferred in the field with higher sensitivity in direct comparisons
  - MASS or **ROSIER** might have comparable sensitivity but higher specificity

Just Pick One and Use It

Zhelev Z, Walker G, Henschke N, Fridhandler J, Yip S. Prehospital stroke scales as screening tools for early identification of stroke and transient ischemic attack. Cochrane Database of Systematic Reviews 2019, Issue 4. Art. No.: CD011427. DOI: 10.1002/14651858.CD011427.pub2.

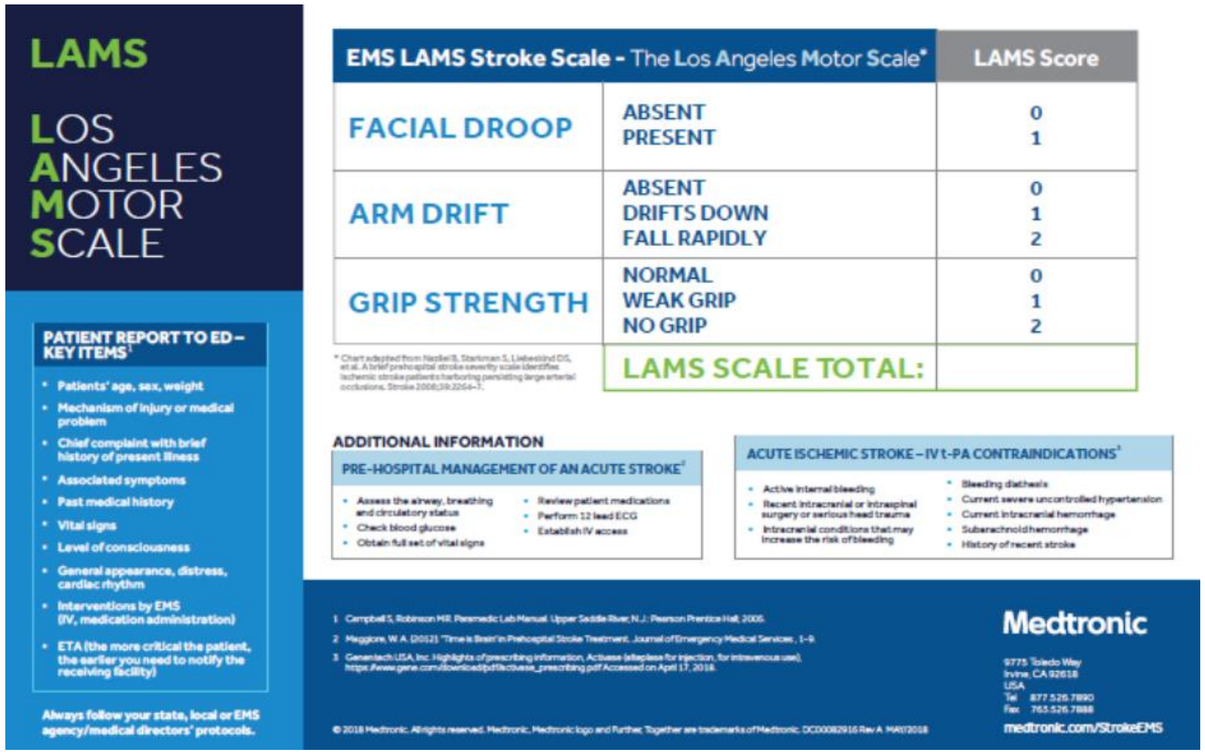
Stroke Severity Scales

- RACE – Rapid Arterial Occlusion Evaluation scale
- MPSS – Maria Prehospital Stroke Scale Score
- LAMS – LA Motor Scale score
- PASS -- Prehospital Acute Stroke Severity score
- 3-ISS – 3-item Stroke Scale
- C-STAT – Cincinnati Stroke Triage Assessment Tool
- NIHSS – NIH Stroke Scale
- VAN – Vision, Aphasia, Neglect
- FAST-ED – Field Assessment Stroke Triage for Emergency Destination scale

Developed to predict LVO (mostly anterior circulation strokes)

LAMS (LA motor scale)

- Predictive LVAO 4-5 = near 100% LVO
- LAMS ≥4 was 7x positive likelihood LVO and
- 0.81 sensitivity, 0.89 specificity, 0.85 accuracy



LAMS

LOS ANGELES MOTOR SCALE

PATIENT REPORT TO ED – KEY ITEMS[1]

- Patients' age, sex, weight
- Mechanism of injury or medical problem
- Chief complaint with brief history of present illness
- Associated symptoms
- Past medical history
- Vital signs
- Level of consciousness
- General appearance, distress, cardiac rhythm
- Interventions by EMS (IV, medication administration)
- ETA (the more critical the patient, the earlier you need to notify the receiving facility)

Always follow your state, local or EMS agency/medical directors' protocols.

EMS LAMS Stroke Scale - The Los Angeles Motor Scale*		LAMS Score
FACIAL DROOP	ABSENT PRESENT	0 1
ARM DRIFT	ABSENT DRIFTS DOWN FALL RAPIDLY	0 1 2
GRIP STRENGTH	NORMAL WEAK GRIP NO GRIP	0 1 2
	LAMS SCALE TOTAL:	

* Chart adapted from Nazliel B, Starkman S, Liebskind DS, et al. A brief prehospital stroke severity scale identifies ischemic stroke patients harboring persisting large arterial occlusions. Stroke 2008;39:2264–7.

ADDITIONAL INFORMATION

PRE-HOSPITAL MANAGEMENT OF AN ACUTE STROKE[2]

- Assess the airway, breathing and circulatory status
- Check blood glucose
- Obtain full set of vital signs
- Review patient medications
- Perform 12 lead ECG
- Establish IV access

ACUTE ISCHEMIC STROKE – IV t-PA CONTRAINDICATIONS[3]

- Active internal bleeding
- Recent intracranial or intraspinal surgery or serious head trauma
- Intracranial conditions that may increase the risk of bleeding
- Bleeding diathesis
- Current severe uncontrolled hypertension
- Current intracranial hemorrhage
- Subarachnoid hemorrhage
- History of recent stroke

1 Campbell S, Robinson MR. Paramedic Lab Manual. Upper Saddle River, N.J.: Pearson Prentice Hall; 2005.
2 Meggiore, W A. (2012) "Time is Brain" in Prehospital Stroke Treatment. Journal of Emergency Medical Services, 1–9.
3 Genentech USA, Inc. Highlights of prescribing information, Activase (alteplase for injection, for intravenous use). https://www.gene.com/download/pdf/activase_prescribing.pdf Accessed on April 17, 2018.

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Nazliel B, Starkman S, Liebskind DS et al. Stroke 2008;39:2264-2267
Noorian AR, Sanossian N et al. Stroke 2018;49:565-572

LAG Score

- 3 item stroke severity scale (Frankfurt)
- **L** = LOC (arouse without painful stimuli)
- **A** = Arm Strength (Lift arm off stretcher)
- **G** = Gaze (Do eyes cross ML to V/V stimuli)
  - 2 – No (not present)
  - 1 – In between
  - 0 – Yes (present)
- Sum = 5-6 then 100% LAO or proximal clot
- Score ≥ 4 as accurate as NIHSS ≥ 14 (0.93)

Singer OC et al. *Stroke* 2005;36:773-776

RACE Scale

- Rapid Arterial OCclusion Evaluation
- Based off NIHSS
- Prospectively validated in field (357 cases)
- Scale-Face/Arm/Leg/Gaze/Speech/Agnosia
  - Correlation with NIHSS (r=0.76; P<0.001)
  - LVO 76 of 357 cases (21%)
  - ROC RACE vs. NIHSS (0.82 and 0.85 respectively)
  - RACE ≥ 5 sens 85%, spec 68%, PPV 0.42, NNP 0.94

Perez de la Ossa N et al. Stroke 2014;45:87-91

Cincinnati Stroke Triage Assessment Tool (C-STAT)
Formally known as CPSSS

- Derived from NINDS and IMS III Cohorts
- Score range 0-4
- Components: Conjugate gaze (NIHSS≥1), LOC & questions (NIHSS ≥ 1), arm weakness (NIHSS ≥ 2)
- AUC 0.89, score ≥ 2 was 89% sensitive and 73% specific identifying NIHSS ≥ 15
- For 222/303 IMS III patients w/ LVO, C-STAT AUC 0.67, score ≥2 83% sens, 40% spec in predicting LVO

Katz BS et al. *Stroke*. 2015;46:1508-1512

Field Assessment Stroke Triage to Determine Emergency Destination

- **FAST-ED** (field assessment stroke triage for emergency destination) based off NIHSS items with high LVO PV
  - Score Points: **F**ace, **A**rm, **S**peech, **T**ime, **E**yes, **D**enial/Neglect
- Tested in Screening and Outcomes Project in Stroke (**STOPStroke**) cohort
- LVO defined by total occlusion carotid, M1, M2 or basilar
- 727 qualifying patients and 240 LVO detected (33%)
- Compared well with NIHSS and more accurate RACE/CPSS

	Sensitivity	Specificity	PPV	NPP
• FAST-ED ≥ 4	60%	89%	72%	82%
• RACE ≥ 5	55%	87%	68%	79%
• C-STAT ≥ 2	56%	85%	65%	78%

- Simple scale, needs field validation

Lima FO. Stroke. 2016 Aug;47(8):1997-2002

Stroke Severity Scales: No Clear Winner Yet

Table 3. Accuracy of the 3ISS, LAMS, RACE, and CPSSS in Comparison With PASS in Prediction of Large Artery Occlusion in the Entire Study Population

	AUC*	CP	Sensitivity	Specificity	AUC†	Odds Ratio	PPV	NPV	LR+	LR−
3ISS (95% CI)	0.74	≥3	0.50 (0.47–0.53)	0.92 (0.91–0.93)	0.71 (0.70–0.73)	11.50 (9.43–14.00)	0.77 (0.74–0.80)	0.77 (0.76–0.79)	6.21 (5.30–7.28)	0.54 (0.51–0.58)
LAMS (95% CI)	0.74	≥4	0.57 (0.54–0.60)	0.84 (0.82–0.85)	0.70 (0.69–0.72)	6.82 (5.77–8.06)	0.66 (0.63–0.69)	0.78 (0.76–0.80)	3.50 (3.13–3.92)	0.51 (0.48–0.55)
RACE (95% CI)	0.78	≥5	0.59 (0.56–0.62)	0.86 (0.84–0.87)	0.72 (0.71–0.74)	8.73 (7.34–10.40)	0.70 (0.66–0.72)	0.79 (0.78–0.81)	4.17 (3.71–4.69)	0.48 (0.44–0.51)
CPSSS (95% CI)	0.76	≥2	0.59 (0.56–0.62)	0.86 (0.84–0.87)	0.72 (0.71–0.74)	8.49 (7.14–10.10)	0.69 (0.66–0.72)	0.79 (0.77–0.81)	4.09 (3.63–4.60)	0.48 (0.45–0.52)
PASS (95% CI)	0.75	≥2	0.64 (0.61–0.67)	0.83 (0.81–0.85)	0.74 (0.72–0.75)	8.66 (7.31–10.30)	0.67 (0.64–0.70)	0.81 (0.79–0.83)	3.76 (3.38–4.18)	0.43 (0.40–0.47)

95% CI indicates 95% confidence interval; 3ISS, 3-Item Stroke Scale; AUC, area under the curve; CP, cut point (optimal); CPSSS, Cincinnati Prehospital Stroke Severity Scale; LAMS, Los Angeles Motor Scale; [illegible] and RACE, Rapid Arter[illegible]

*Overall accuracy.

†Accuracy at cut p[illegible]

- Many available
- Not one dominant
- Equipoise
- Regional variation and

Just Pick One and Use It

	FAST-ED ≥3	FAST-ED ≥4	RACE ≥5	CPSS ≥2	NIHSS ≥6	NIHSS ≥10
Sensitivity	0.71	0.61	0.55	0.56	0.76	0.64
Specificity	0.78	0.89	0.87	0.85	0.70	0.85
PPV	0.62	0.72	0.68	0.65	0.55	0.68
NPV	0.84	0.82	0.79	0.78	0.85	0.83
Accuracy	0.76	0.79	0.77	0.75	0.72	0.78

CPSS indicates Cincinnati Prehospital Stroke Severity Scale; FAST-ED, Field Assessment Stroke Triage for Emergency Destination; NIHSS, National Institutes of Health Stroke Scale; NPV, negative predictive value; PPV, positive predictive value; and RACE, Rapid Arterial Occlusion Evaluation.

•Hastrup S. Stroke.2016;47:1772-76
•Katz BS. Stroke. 2015;46:1508-12
•Perez de la Ossa N. Stroke. 2014;45:87-91
•Singer OC Stroke. 2005;36:773-776
•Lima FO. Stroke. 2016;47:1997-2002

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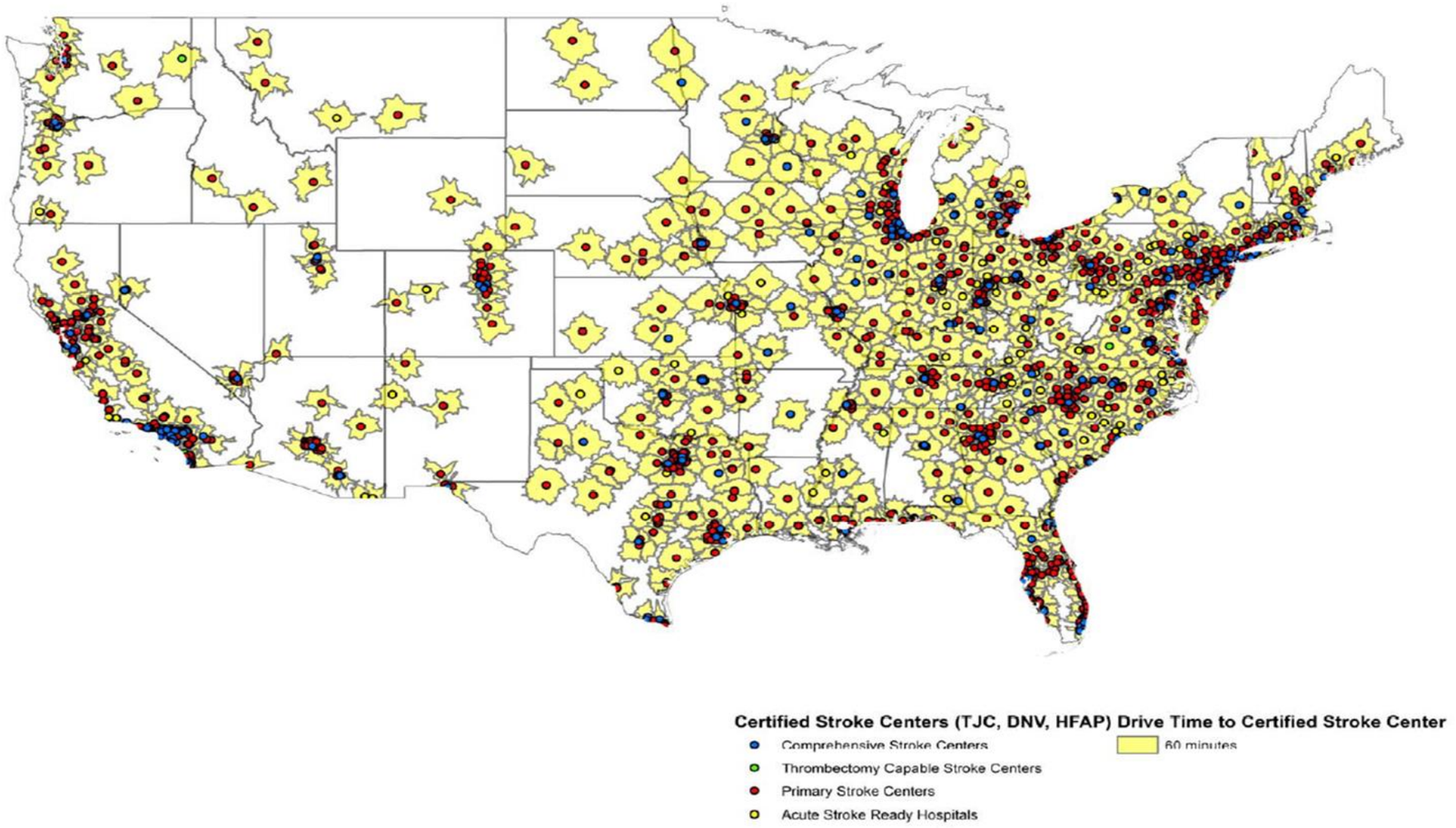
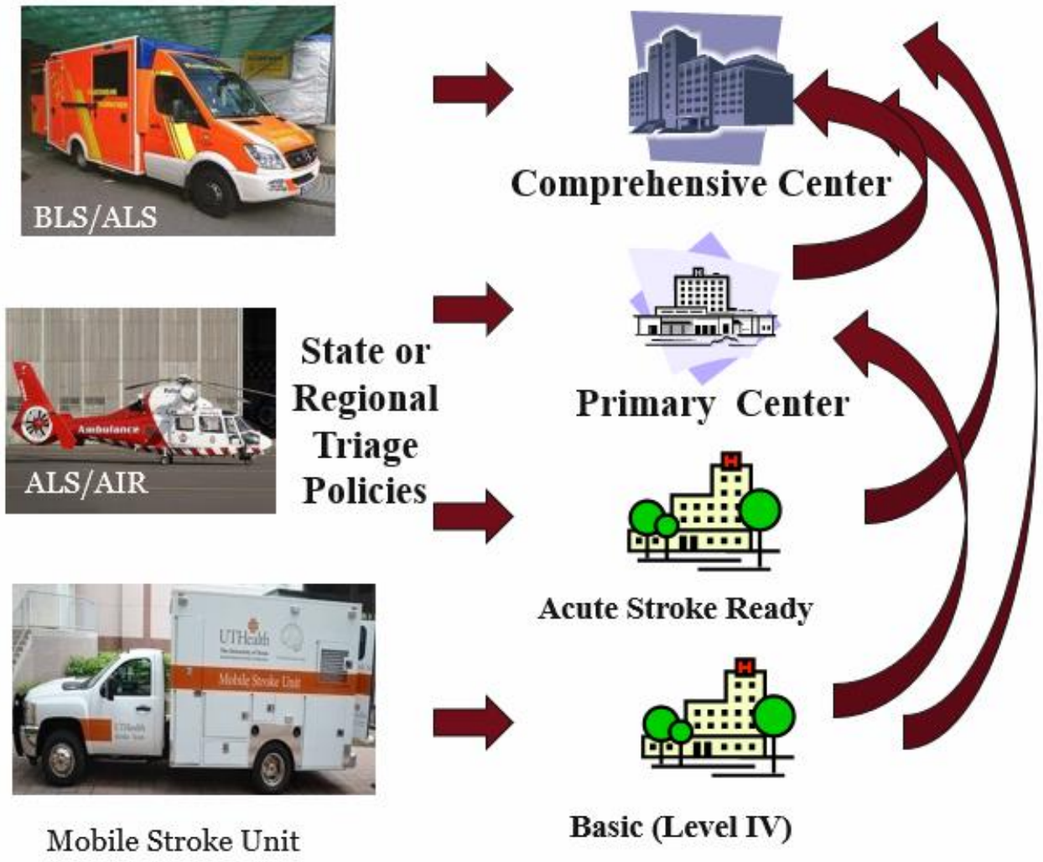
Priority Transport to a Stroke Center

Access to Stroke Therapy Disparities Still Exist



Adeoye O, Albright KC, Carr BG, Wolff C, Mullen MT, Abruzzo T, et al. Geographic access to acute stroke care in the united states. *Stroke*. 2014;45:3019-3024

Pre-Hospital Triage (System Outlook)



Factors:

- Distance
- Run Times
- Designation Tiers
- Availability Services
- Diversion Status
- Medical Control
- ABC stable
- Dispatch Criteria
- Public/Private EMS
- Patient Preference
- Symptom onset

Prehospital Triage of the Stroke Patient Based Upon Both Severity and Time Precision Medicine

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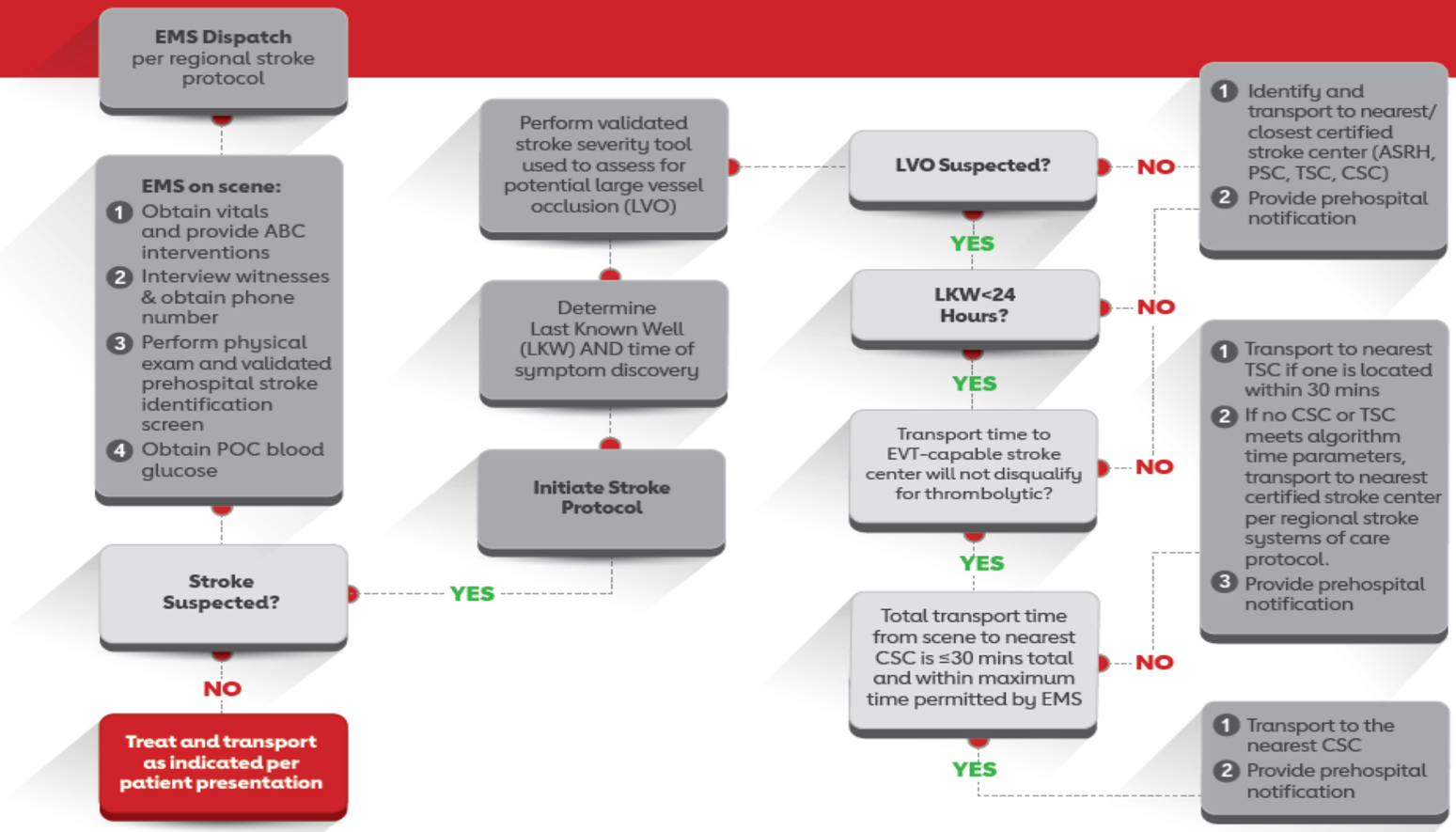
Mission:Lifeline® Stroke

EMERGENCY MEDICAL SERVICES ACUTE STROKE ROUTING



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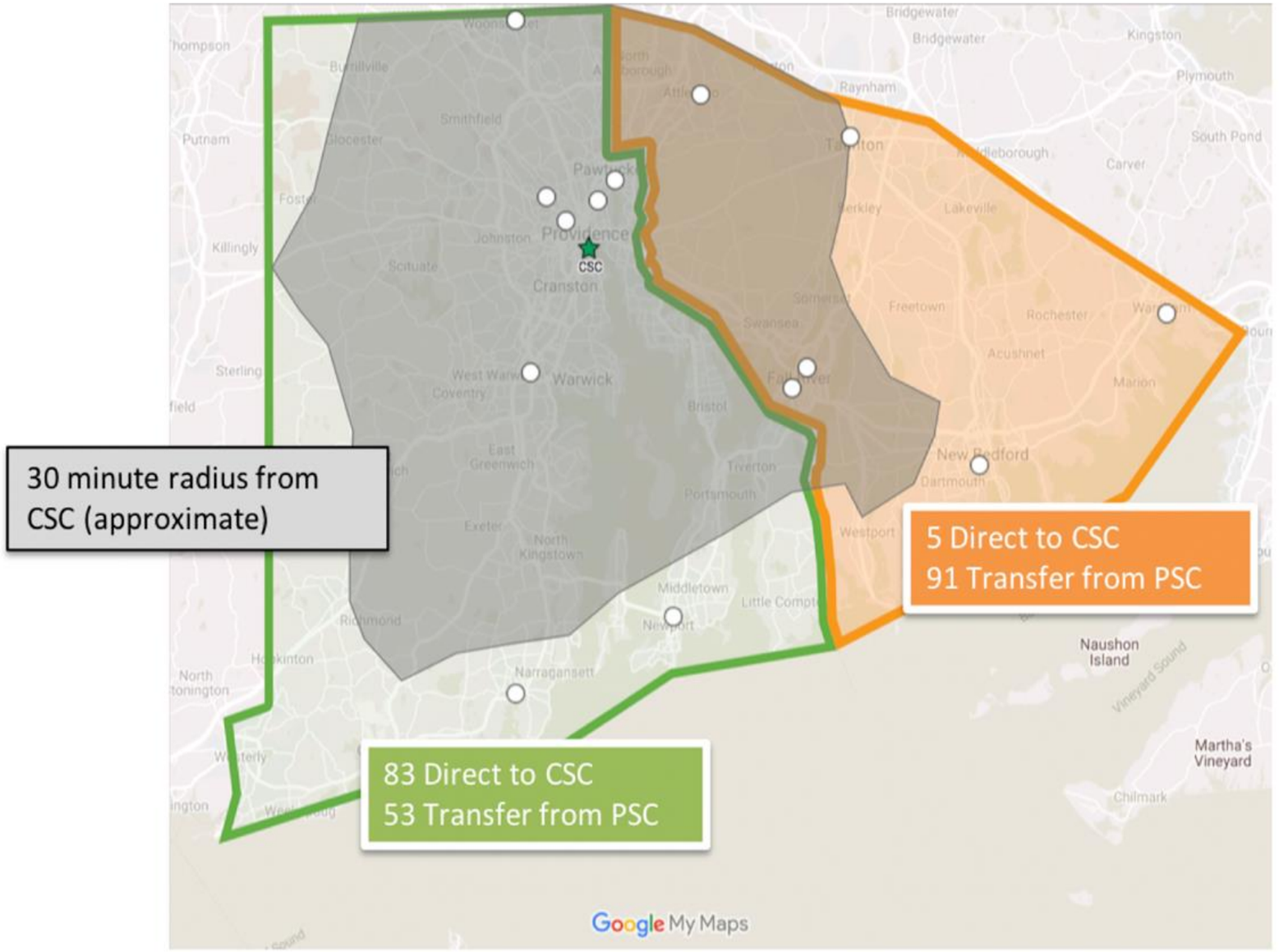
Growing Literature Supporting Selective Triage to the Most Appropriate Hospital

- STEMI and Trauma Models have been in place for years
- Endovascular therapy (EVT) may improve outcomes in patients with LVO
- Direct field transport to CSC/TSC vs. Nearest/Closest
- Customization to local resources and regional plan

Jayaraman MV etl al. J NeuroIntervent Surg 2020:12;233-239
Froehler MT, et al. Circulation 2017;136:2311-21
Mohamad NF et al. Eur Stroke J 2016:1:85-92
Schwamm LH. JAMA Neurol 2018:75:1467
Holodinsky JK et al. Stroke 2017;48:233-8
Katz BS et al. Stroke 2017;48:2164-70
Jadhav AP et al. Stroke 2017;48:1884-9


30 minute radius from CSC (approximate)
5 Direct to CSC
91 Transfer from PSC
83 Direct to CSC
53 Transfer from PSC
CSC
Providence
Cranston
Warwick
Pawtucket
Taunton
New Bedford
Fall River
Newport
Narragansett
Middletown
Naushon Island
Martha's Vineyard
Google My Maps

Summary

- EMS is in integral part of stroke care
- Stroke Systems of Care must address strengths and barriers of Prehospital care
- Ongoing impact of the prehospital environment cannot be overlooked

Thank You

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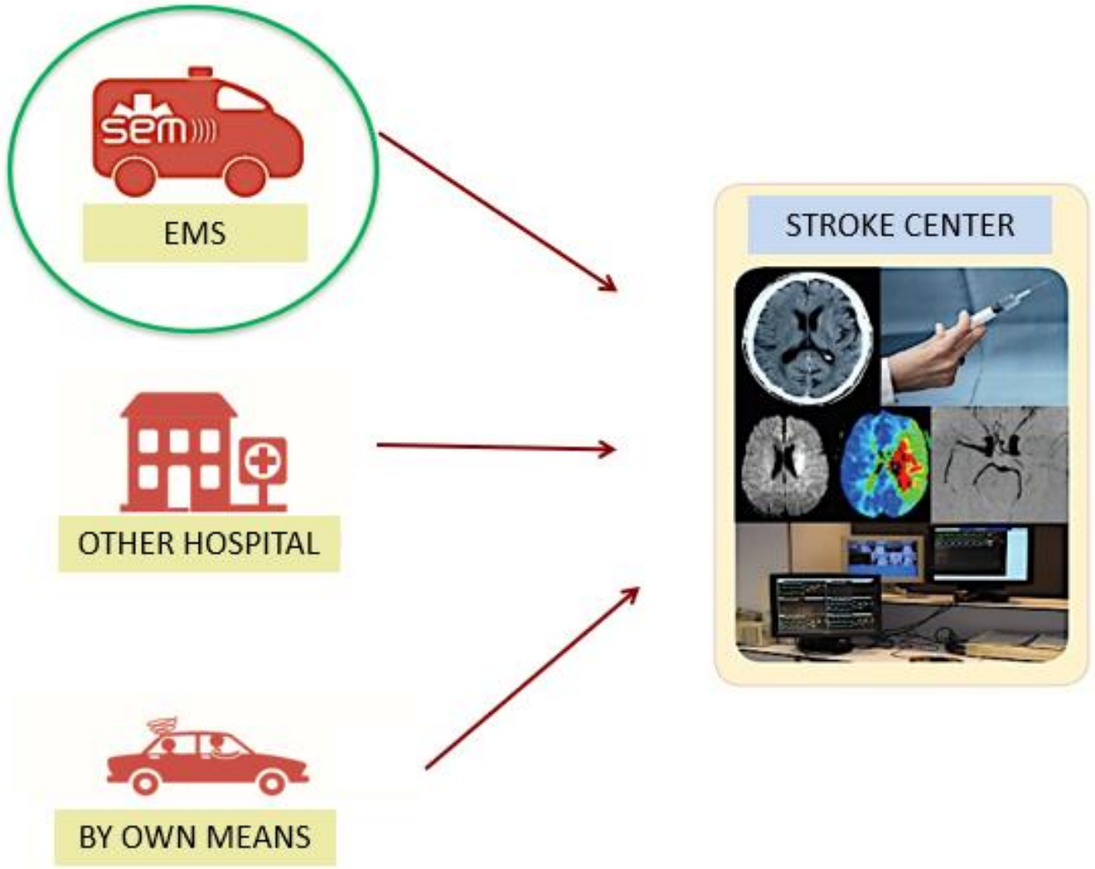
PRE-HOSPITAL STROKE CARE
Our experience in Catalonia

Dr. Natalia Pérez de la Ossa

Director of the Catalan Stroke Plan
Stroke Unit Coordinator, Hospital Universitari Germans Trias i Pujol, Badalona, Spain

BENEFIT OF STROKE CODE SYSTEMS



Via EMS

Shorter:

- Onset to neurologist
- Onset to reperfusion
- Door to needle and groin

- **Better outcome (x3)**

Pérez de la Ossa et al, Neurology 2008

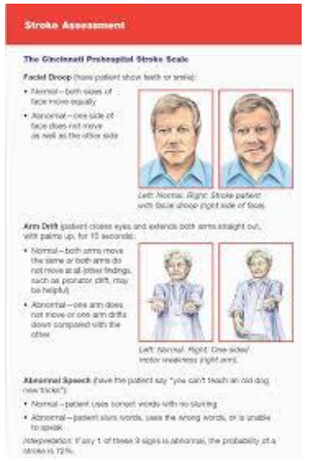
DIAGNOSE

HOSPITAL OF DESTINATION

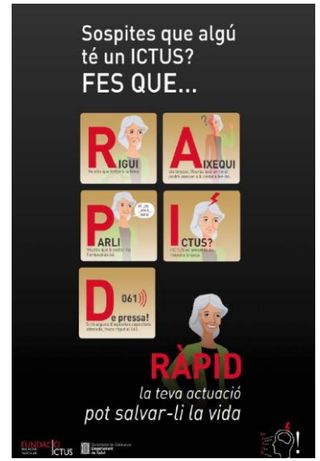
PRE-NOTIFY COMMUNICATION

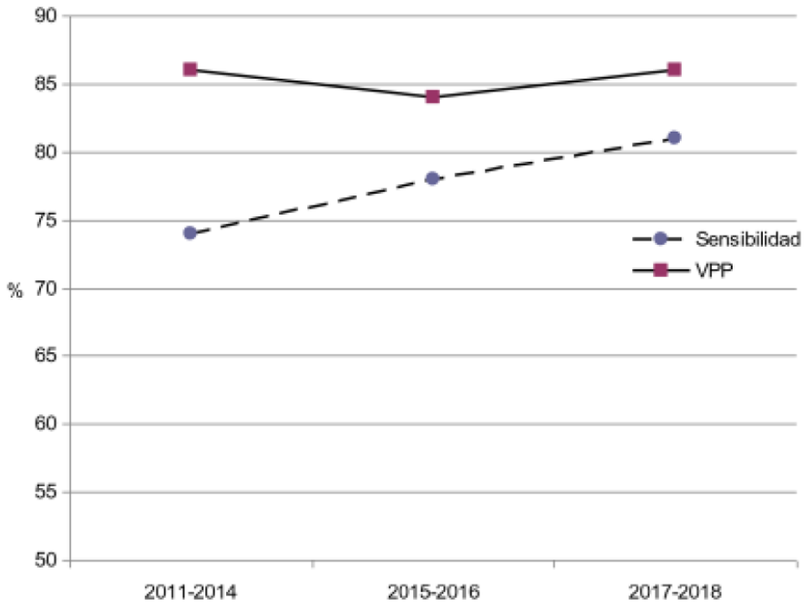
QUALITY CONTROL

Diagnose



Los Angeles Motor Scale (LAMS)[22]		
Face	0	Both sides move normally
	1	One side is weak or flaccid
Arm	0	Both sides move normally
	1	One side is weak
	2	One side is flaccid/doesn't move
Grip	0	Both sides move normally
	1	One side is weak
	2	One side is flaccid/doesn't move
Total	0–5	





- **EMS SENSITIVITY 80%**
- **Stroke patients not identified by EMS were:**
  - More frequently PACI (left) and POCI
  - NIHSS 8 vs. 11
  - Door to needle time 15 minutes longer

Gea et al. Rev Neurol 2020

Diagnose: Identification of Patients with LVO

RACE SCALE

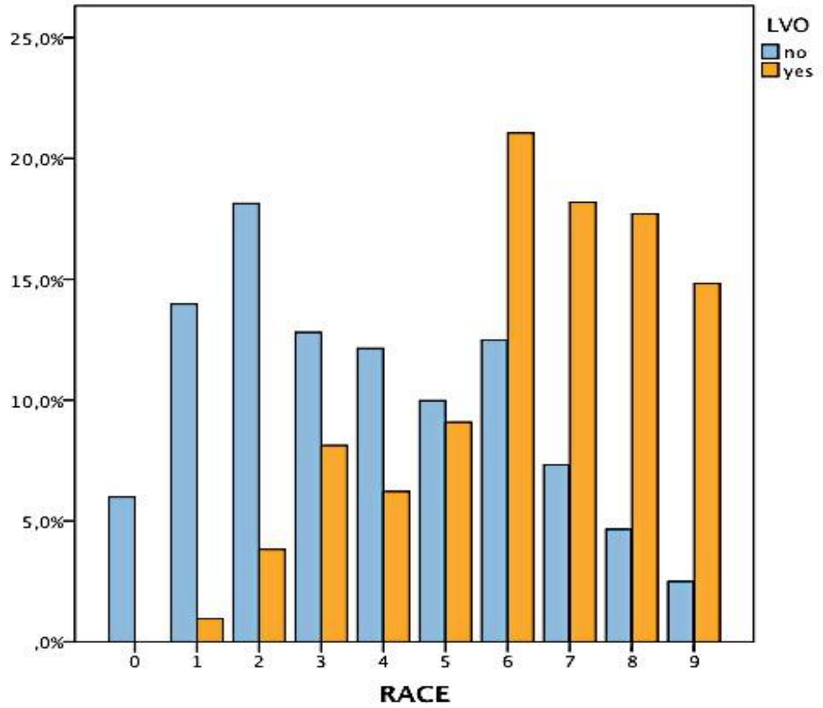
Stroke
JOURNAL OF THE AMERICAN HEART ASSOCIATION

Stroke 2014; 45: 87-9

Design and Validation of a Prehospital Stroke Scale to Predict Large Arterial Occlusion: The Rapid Arterial oCclusion Evaluation Scale

Natalia Pérez de la Ossa, David Carrera, Montse Gorchs, Marisol Querol, Mònica Millán, Meritxell Gomis, Laura Dorado, Elena López-Cancio, María Hernández-Pérez, Vicente Chicharro, Xavier Escalada, Xavier Jiménez and Antoni Dávalos

RACE SCALE	
Facial palsy	0–2
Arm motor	0–2
Leg motor	0–2
Head-gaze deviation	0–1
Aphasia - Agnosia	0–2
TOTAL	**0–9**



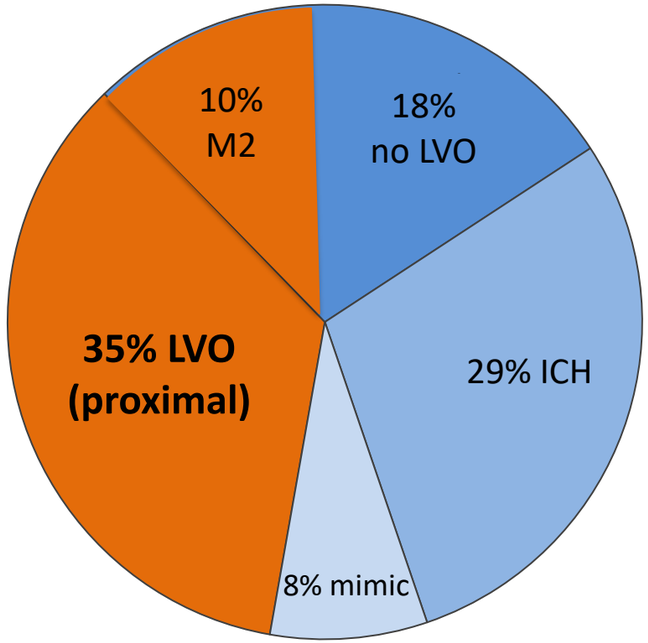
	RACE ≥ 5
Sensitivity	84%
Specificity	60%
PPV	35%
NPV	94%
AUC	0.77

Validated in the field

- *Stroke 2014 (design n=357 patients)*
- *JNIS 2018 (n=1822 - Catalonia)*
- *Prehosp Emerg Care 2019 (n=440 - Texas)*
- *Jumaa, JNIS 2019 (n=492 - Ohio)*

Diagnose: Identification of Patients with LVO

Triage using RACE ≥ 5



70 yo man
RACE 6
Blood pressure 230/120
Vomiting
Alert
No AF, no anticoagulants

85 yo woman
RACE 8
Blood pressure 180/80
Not vomiting
Alert
AF, no anticoagulants

http://shiny-eio.upc.edu/pubs/RACE-PLUS/

Pérez de la Ossa, Poster presentation, ESOC 2020

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RACE SCALE

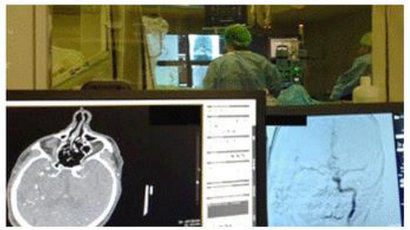
RACE Scale

Identifying patients candidates for endovascular treatment

English · Català · Español

www.racescale.org

Home | How to use | News | Working group



The RACE scale is a prehospital simple and rapid neurological scale to detect acute stroke patients with a high probability of having a large vessel occlusion, candidates to be treated with endovascular techniques in a comprehensive stroke center.

The RACE scale is a simplification of the NIHSS scale using those items with a higher ability to predict the presence of a large vessel occlusion. The RACE scale evaluates 5 items: facial palsy, brachial paresis, crural paresis, oculocephalic deviation and aphasia/agnosia, with a total score of 0-9.

A score ≥ 5 indicates the possibility of a large vessel occlusion with a sensitivity of 85% and specificity of 69%

News

- Online course, NEW!
- RACECAT trial
- International recomendations
- The RACE worldwide
- RACE scale in Catalonia

Search

Search ... Search

RACE SCALE

Prehospital care of acute stroke and patient selection for endovascular treatment using the RACE scale

Universitat de Barcelona

COURSE

4.8 (9)

Intermediate

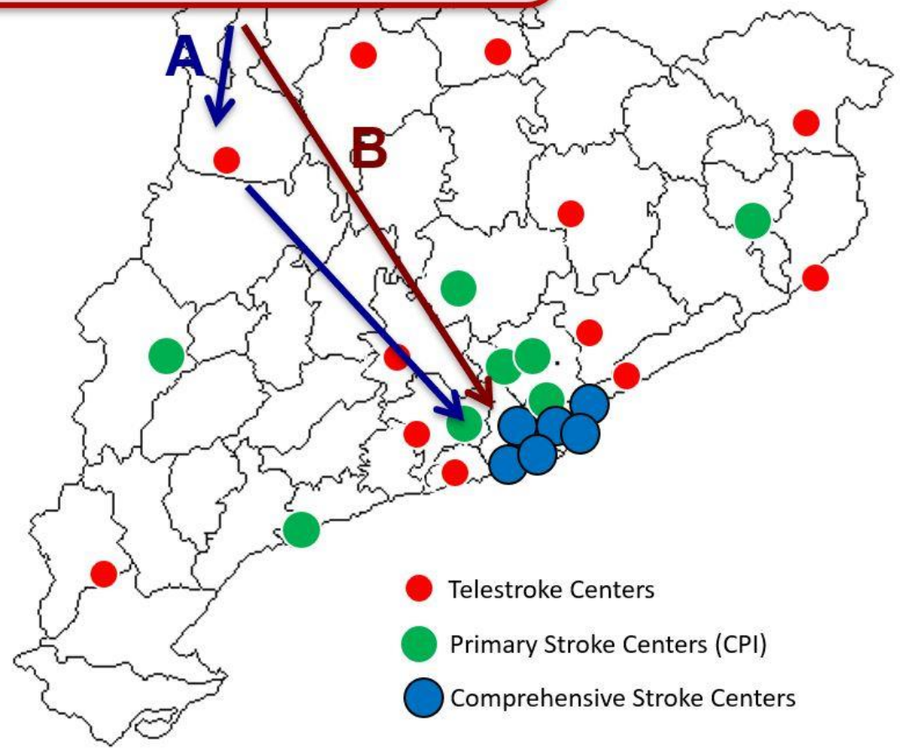
Free training course Coursera

Hospital of Destination

RACE ≥5

CSC <7h

On call neurologist



A: **Drip and ship**
(Local Center)

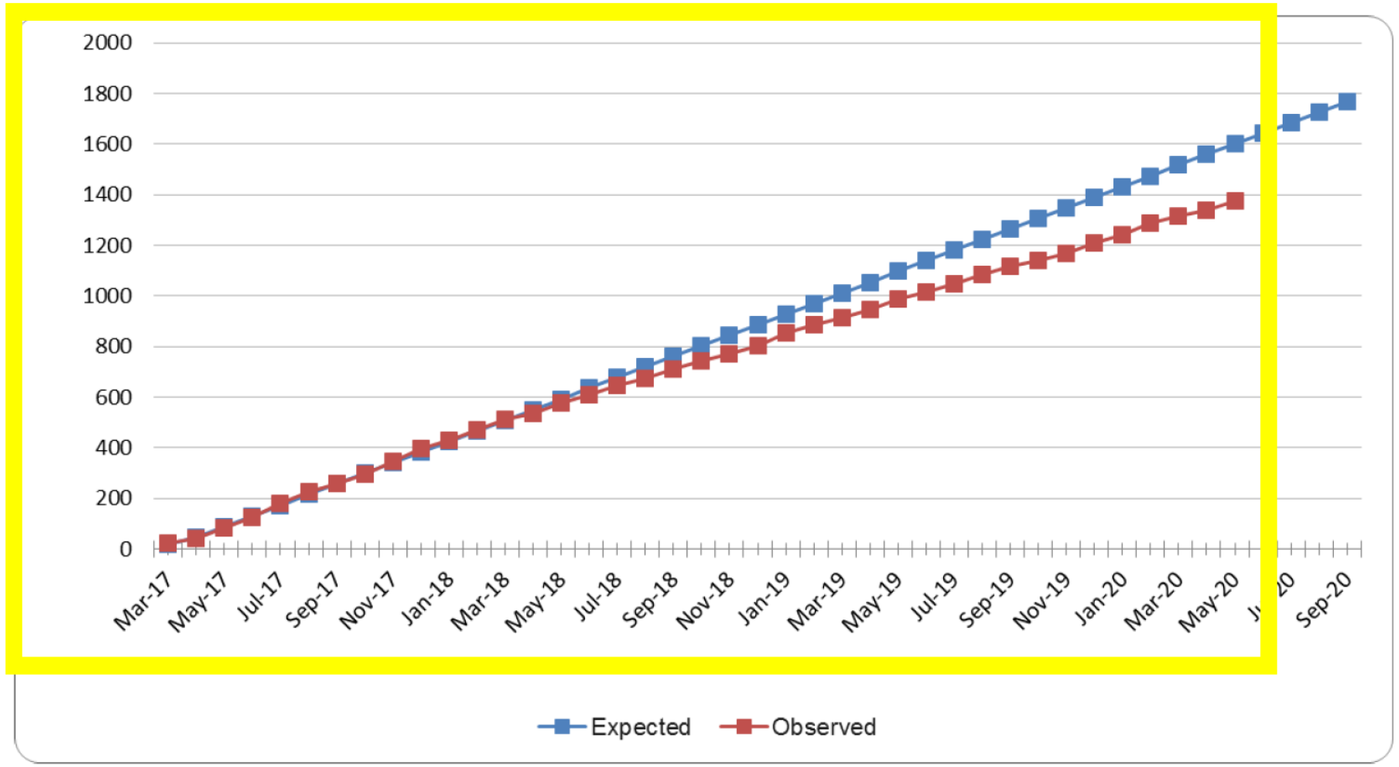
B: **Mother ship**
(Direct to a CSC)

IP:
Marc Ribó
Sònia Abilleira
Natalia Pérez de la Ossa

Funding: Medtronic

- **Primary outcome: mRS at 90d (blinded)**
- Secondary outcomes:
  - RACE 5-6-7 vs. 8-9
  - Candidat to iv tPA yes/no
  - Time from site to Local/CTI hospital

Hospital of Destination



Stopped after 2nd interim analysis

Total 1401 patients

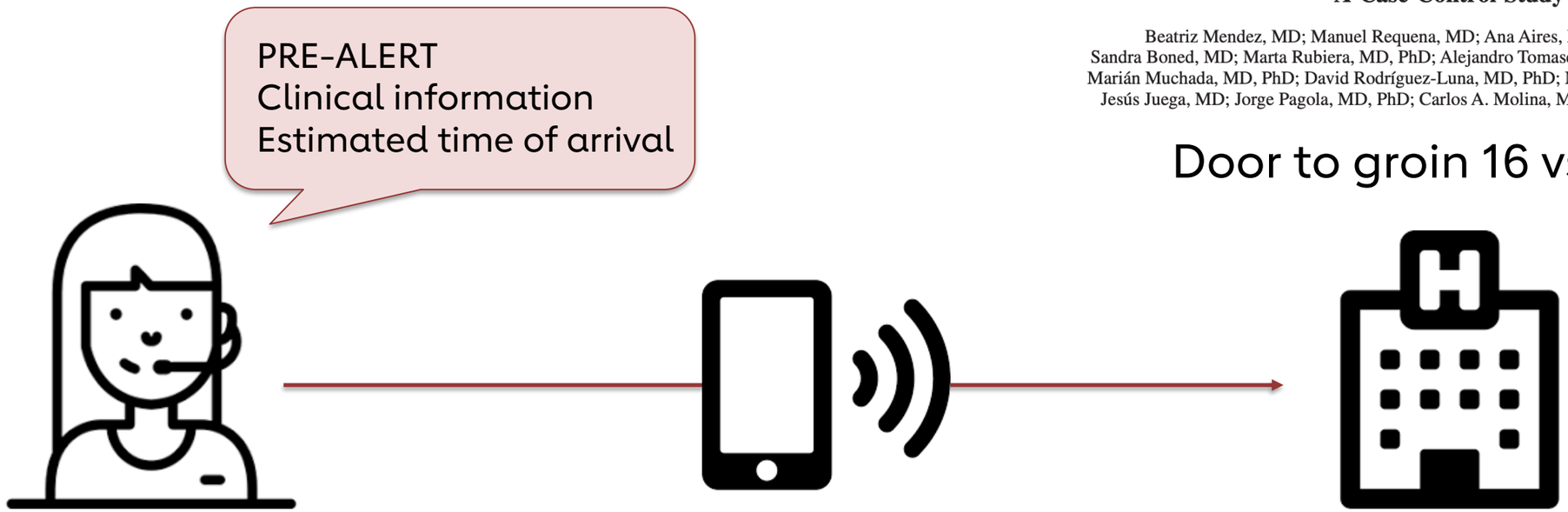
FINAL RESULTS WILL BE PRESENTED AT THE ESOC 2020

Communication

Direct Transfer to Angio-Suite to Reduce Workflow Times and Increase Favorable Clinical Outcome
A Case-Control Study

Beatriz Mendez, MD; Manuel Requena, MD; Ana Aires, MD; Nuno Martins, MD; Sandra Boned, MD; Marta Rubiera, MD, PhD; Alejandro Tomasello, MD; Pilar Coscojuela, MD; Marián Muchada, MD, PhD; David Rodríguez-Luna, MD, PhD; Noelia Rodríguez-Villatoro, MD; Jesús Juega, MD; Jorge Pagola, MD, PhD; Carlos A. Molina, MD, PhD; Marc Ribó, MD, PhD

Door to groin 16 vs. 70 min



Article

An Online Training Intervention on Prehospital Stroke Codes in Catalonia to Improve the Knowledge, Pre-Notification Compliance and Time Performance of Emergency Medical Services Professionals

Montse Gorchs-Molist [1,2,*], Silvia Solà-Muñoz [1], Iago Enjo-Perez [2,*], Marisol Querol-Gil [1], David Carrera-Giraldo [3], Jose María Nicolàs-Arfelis [2], Francesc Xavier Jiménez-Fàbrega [1,2] and Natalia Pérez de la Ossa [4]

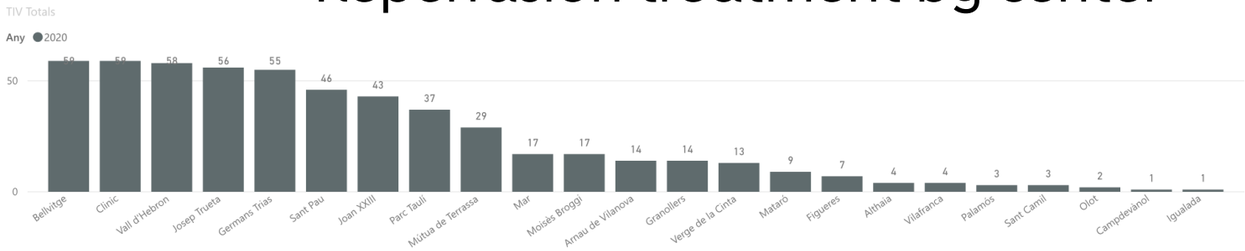
Ribo et al, Neurointerv Surg 2018 Mar;10(3):221-224. "Direct transfer to angio-suite..."
Gorchs et al, Int J Environ Res Public Health. 2020 Sep; 17(17): 6183. An online training intervention..."

Quality Control

CICAT registry

Pre-hospital data
RACE score
NIHSS at admission
Final diagnostic (Ischemic, ICH, mimic)
LVO (M1, M2, ICA, tandem, AB)
Reperfusion treatment (ivtPA +/- EVT)
Times metrics
Outcome 24h
Centralized mRS 3 90 days (phone)

Reperfusion treatment by center



Workflow times

Hospital Receptor (curt)	TIV Totals	Ictus-Arribada	Porta Agulla	Ictus_Tractament	PortaTAC	TAC Rtpa
La Seu d'Urgell		(-)	(-)	(-)	(-)	(-)
Móra d'Ebre		(-)	(-)	(-)	(-)	(-)
Tremp		(-)	(-)	(-)	(-)	(-)
Vic		(-)	(-)	(-)	(-)	(-)
Althaia	4	088 (80 - 115)	20 (19 - 26)	117 (101 - 147)	15 (14 - 15)	07 (5 - 11)
Clinic	59	062 (41 - 183)	26 (21 - 34)	085 (67 - 150)	20 (15 - 24)	05 (2 - 12)
Mútua de Terrassa	29	069 (48 - 117)	26 (23 - 40)	105 (74 - 158)	23 (18 - 28)	02 (2 - 7)
Mar	17	060 (40 - 83)	29 (26 - 38)	079 (59 - 105)	18 (15 - 23)	10 (9 - 21)
Joan XXIII	43	105 (62 - 175)	29 (26 - 42)	139 (103 - 199)	16 (14 - 22)	12 (9 - 19)
Josep Trueta	56	799 (161 - 1072)	30 (21 - 44)	803 (179 - 1091)	25 (20 - 37)	05 (-3 - 16)
Moisès Broggi	17	059 (47 - 102)	30 (26 - 49)	118 (77 - 209)	13 (7 - 18)	15 (12 - 30)
Sant Pau	46	060 (40 - 107)	31 (26 - 40)	090 (69 - 126)	12 (9 - 19)	18 (13 - 23)
Granollers	14	070 (46 - 137)	33 (24 - 56)	124 (88 - 203)	16 (10 - 31)	14 (8 - 20)
Germans Trias	55	087 (60 - 139)	33 (27 - 50)	126 (103 - 173)	18 (12 - 29)	12 (7 - 22)
Arnau de Vilanova	14	091 (69 - 156)	33 (28 - 47)	117 (85 - 175)	18 (14 - 26)	14 (11 - 23)
Bellvitge	59	101 (70 - 185)	34 (29 - 56)	147 (109 - 195)	24 (18 - 29)	16 (6 - 23)
Vall d'Hebron	58	112 (70 - 206)	35 (24 - 51)	140 (101 - 240)	15 (9 - 28)	15 (9 - 22)
Olot	2	042 (36 - 48)	36 (30 - 41)	078 (66 - 89)	21 (17 - 26)	15 (14 - 15)
Palamós	3	084 (68 - 482)	36 (35 - 44)	135 (110 - 525)	05 (5 - 6)	32 (30 - 39)
Parc Taulí	37	075 (38 - 125)	42 (33 - 60)	095 (60 - 133)	29 (20 - 44)	11 (8 - 19)
Sant Camil	3	074 (45 - 135)	44 (43 - 51)	116 (94 - 178)	08 (8 - 13)	34 (30 - 42)
Mataró	9	042 (24 - 86)	47 (40 - 58)	125 (75 - 174)	24 (13 - 32)	35 (20 - 35)
Verge de la Cinta	13	082 (46 - 172)	48 (40 - 51)	130 (80 - 145)	33 (31 - 46)	05 (3 - 15)
Vilafranca	4	068 (47 - 95)	50 (41 - 436)	154 (130 - 524)	09 (4 - 16)	38 (29 - 425)
Figueres	7	116 (99 - 149)	59 (46 - 68)	175 (175 - 202)	26 (23 - 28)	31 (23 - 33)
Campdevànol	1	084 (84 - 84)	61 (61 - 61)	145 (145 - 145)	36 (36 - 36)	25 (25 - 25)
Total	**551**	**089 (54 - 175)**	**33 (24 - 48)**	**120 (82 - 196)**	**20 (13 - 29)**	**12 (5 - 21)**

Newsletter CICAT

LAST UPDATE

14/9/2020

Quality Control

CICAT registry

Pre-hospital data
RACE score
NIHSS at admission
Final diagnostic (Ischemic, ICH, mimic)
LVO (M1, M2, ICA, tandem, AB)
Reperfusion treatment (ivtPA +/- EVT)
Times metrics
Outcome 24h
Centralized mRS 3 90 days (phone)

Newsletter CICAT

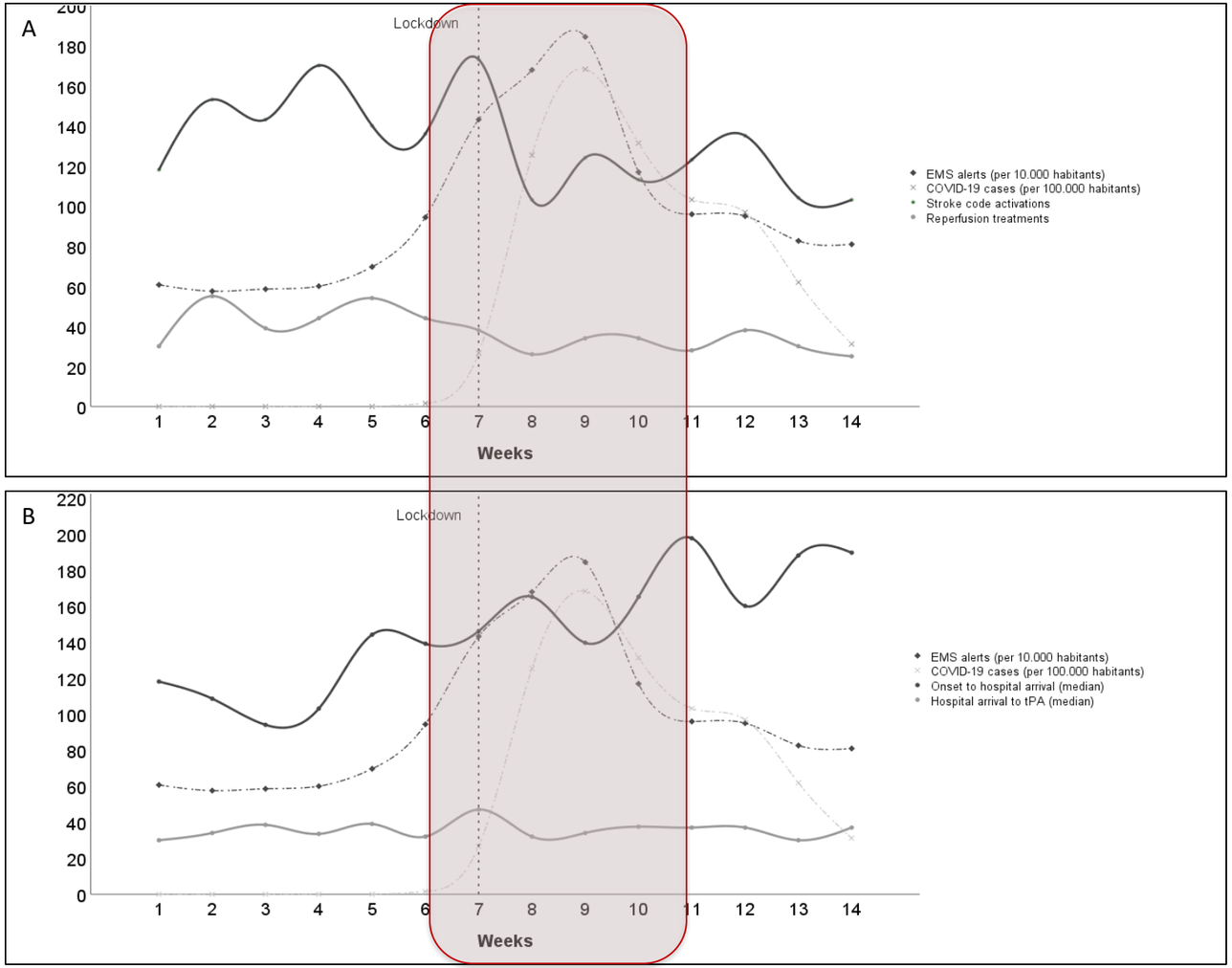
LAST UPDATE

14/9/2020

Pre-hospital quality indicators

Number of stroke code	6828 per year (2019)
Transfered by EMS	72%
With pre-notification	83%
With RACE scale	90%
Time onset-hospital	138 [65-482] min
DIDO (transfered for EVT)	76 [57-98]

Quality Control



Impact of COVID-pandemia in acute stroke care system in Catalonia

Ramos et al, in press

DIAGNOSE

HOSPITAL OF DESTINATION

PRE-NOTIFY COMMUNICATION

QUALITY CONTROL

COORDINATION, COLIDERSHIP

TRAINNING

Thank you for your attention !

International Perspectives on Stroke Triage
LATIN AMERICA

Sheila Cristina Ouriques Martins, MD, PhD

Professor of Neurology Universidade Federal do Rio Grande do Sul
Coordinator of Stroke Program in Hospital de Clínicas de Porto Alegre
Chief of Neurology and Neurosurgery in Hospital Moinhos de Vento
President Brazilian Stroke Network
President Ibero-American Stroke Organization
Vice-President World Stroke Organization for SSO

Latin America Numbers

- Population 570.000.000 inhabitants
- 20 countries
- Social, cultural and economic differences

Characteristics and health care system by country

	Population (million)	Socio-demographic Index	Health-care system		
			Private funding (%)	Public funding (%)	Other (%)
Argentina[20,21]	43·9	High income	8%	100% from MoH (40% from social security)	NA
Bolivia[20,21]	10·9	Lower-middle income	10%	65% (28% from MoH and 37% from social security)	NA
Brazil[3,20,21]	207·7	Upper-middle income	25%	100% from MoH	NA
Chile[20,21]	17·9	High income	18%	76% from MoH	NA
Colombia[20,23]	49·8	Upper-middle income	45%	93% (45% from MoH and 48% from social security)	5% of people have an exception regime; 2% of people do not have any coverage
Costa Rica[20]	4·9	Upper-middle income	10%	90% from social security	NA
Ecuador[20,21]	15·1	Upper-middle income	27%	83% (60% from MoH and 23% from social security)	6% of public funding for special insurance for police, army, and farmers
Guatemala[20,22]	16·5	Upper-middle income	8%	88% (70% from MoH and 18% from social security)	NA
Mexico[20,21]	127·5	Upper-middle income	18%	86% of any coverage (42% from social security and from 44% MoH, but stroke is not covered)	NA
Panama[18,20]	4·0	High income	5–10%	90% (60–80% from social security and 20–40% from MoH)	NA
Paraguay[20,21]	6·7	Upper-middle income	7%	92% (71% from MoH and 21% from social security)	1% of public funding for the military
Peru[20,21]	31·7	Upper-middle income	7%	82% (51% from MoH and 31% from social security [EsSalud])	NA
Uruguay[19-21]	3·5	High income	58%	37% (both from MoH and social security)	NA

MoH=Ministry of Health. NA=not available.

Table 2: **Sociodemographic characteristics and health-care system funding by Latin American country**

Martins SO, Feigin V, Lancet Neurology 2019; 18 (7): 674-683

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A division of the American Heart Association.

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Latin America Scenario

- Stroke is the first or the second cause of death in most countries

- 10% < 45 years old

Ferri CP, Acosta D, Guerra M, Huang Y, et al. (2012) Socioeconomic Factors and All Cause and Cause-Specific Mortality among Older People in Latin America, India, and China: A Population-Based Cohort Study. PLoS Med 9(2): e1001179. doi:10.1371/journal.pmed.1001179

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I Latin American Stroke Ministerial Meeting
August 2018

Declaración de Gramado
Compromiso para enfrentar el Accidente Vascular Cerebral en América Latina
Gramado, 02 de agosto de 2018

Nosotros, los ministros y representantes de los países, reunidos en Gramado, Brasil, el día 02 de agosto de 2018 para el I Encuentro Ministerial Latinoamericano de Accidente Cerebro Vascular;

Reconociendo que las enfermedades cerebrovasculares, incluyendo el Accidente Cerebro Vascular (ACV), está entre las principales causas de muerte en la población de América Latina, y que el ACV es prevenible y tratable por medio de estrategias basadas en evidencias y costo-efectivas;

Destacando que la cooperación entre los países Latinoamericanos para el enfrentamiento al ACV se inserta en el marco de la implementación de los Objetivos de Desarrollo Sostenible de la agenda 2030 de las Naciones Unidas, que propone colaboración para reducir, hasta 2030, la mortalidad precoz por enfermedades no transmisibles a través de la prevención y tratamiento, y promover la salud mental y bienestar;

Recordando el Plan de Acción Global para la Prevención y Control de las Enfermedades No Transmisibles 2013-2020, de la Organización Mundial de la Salud, que tiene por objetivo reducir en 25% la mortalidad precoz por enfermedades crónicas no transmisibles hasta el 2025;

Determinados a unir nuestros esfuerzos para promover el desarrollo y la implementación de políticas publicas efectivas, integradas, sostenibles y basadas en evidencias para la prevención y el tratamiento del ACV y de sus factores de riesgo en América Latina, decidimos:

1. Proporcionar educación a la población acerca de las señales de alarma del ACV, urgencia del tratamiento y control de los factores de riesgo.
2. Promover ambientes seguros y saludables para estimular la actividad física.
3. Implementar políticas para el control del tabaquismo, estimular la alimentación saludable y la actividad física, reducir el consumo de sal y el consumo perjudicial de alcohol, control del peso, con el objetivo de reducir la incidencia de enfermedades cardio y cerebrovasculares.
4. Establecer estrategias de detección de factores de riesgo tratables como hipertensión, fibrilación atrial, diabetes y dislipidemias.
5. Promover la atención buscando el control de factores de riesgo tratables.
6. Organizar la atención prehospitalaria, priorizando el paciente con ACV.
7. Priorizar la estructuración de los Centros de ACV.
   - Organizar las Unidades de ACV con área física definida y equipo multidisciplinario capacitado.
   - Viabilizar los tratamientos de fase aguda basados en evidencia.
   - Viabilizar exámenes para la investigación etiológica mínima.
   - Promover el alta hospitalaria con prescripción de la prevención secundaria al ACV.
   - Estimular el uso de la telemedicina en los hospitales sin acceso a especialista en tiempo integral, para la orientación del tratamiento agudo.
8. Ampliar el acceso a rehabilitación hospitalaria y después del alta hospitalaria.
9. Capacitar profesionales de la salud involucrados en la atención al ACV.
10. Establecer la monitorización nacional de la prevalencia de los principales factores de riesgo en el país y de los indicadores asistenciales de atención al ACV.
11. Establecer directrices Nacionales y regionales basadas en evidencia científica, para el tratamiento estandarizado del ACV con actualizaciones periódicas.
12. Priorizar la estructuración de redes asistenciales integradas de cuidados continuados al paciente con ACV o con factores de riesgo para el ACV, que engloben todos los niveles de atención, estableciendo una Línea de Cuidado.
13. Destinar recursos humanos y financieros para la estructuración de la Línea de Cuidado de ACV.
14. Establecer planes nacionales de atención al ACV.
15. Promover el intercambio de experiencias entre los países, para perfeccionar la atención al ACV.
16. Establecer investigación en ACV basada en las prioridades y realidades de cada país.

Firmamos la Declaración de Gramado, Brasil, y manifestamos nuestro compromiso con estas recomendaciones.

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Panel 2: Declaration of Gramado

We, representatives of the 13 countries and representatives of their Ministries that participated in the 1st Latin-American Ministerial Stroke Meeting in Gramado, Brazil, on Aug 2, 2018:

- acknowledging that cerebrovascular diseases, including stroke, are among the main causes of death in the adult population of Latin America, and that stroke is preventable and treatable through evidence-based and cost-effective strategies;
- highlighting that the cooperation among Latin American countries for tackling stroke is included in the implementation framework of the Sustainable Development Goals of the UN 2030 agenda, which proposes collaboration for reducing premature death by noncommunicable diseases by means of prevention and treatment, and for promoting mental health and wellbeing until 2030;
- and considering the WHO Global Action Plan for Prevention and Control of Noncommunicable Diseases 2013–2020 that aims to reduce in 25% the premature death by chronic diseases until 2025; decided to unite our efforts to promote the development and implementation of effective, integrated, sustainable, and evidence-based public policies for the prevention and treatment of stroke and its risk factors in Latin America,

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	National plan for stroke	Acute stroke care			Rehabilitation		
		Stroke centres and units	Thrombolysis	Thrombectomy	In-hospital	After discharge	Access to stroke care and rehabilitation*
Argentina	No	1 public and 5 private hospitals; no stroke units	5 private hospitals	5 private hospitals	No data	No data	Poor
Bolivia	No	Few private hospitals (no quantitative data available); no stroke units	Private hospitals	Few private hospitals (no quantitative data available)	No data	No data	Poor
Brazil	Yes	156 hospitals, 78 are private; 74 with stroke units	78 public and 78 private hospitals; in 24 hospitals thrombolysis is provided by the use of telemedicine	2 public and 64 private hospitals	Widely available in stroke units	Yes	Intermediate access to acute care; quick access to rehabilitation after discharge is limited
Chile	Yes	54 hospitals (20 public and 34 private); all with stroke units	20 public and 34 private hospitals, including 6 (private) that provide telemedicine	6 public and 6 private hospitals	Widely available in stroke units	Yes	Good
Colombia	No	48 hospitals (including 14 public hospitals); no stroke units	14 public and 34 private hospitals	3 private hospitals	Yes	No data	Intermediate access to acute care; no data about rehabilitation
Costa Rica	No	4 public and 1 private hospitals; all with stroke units	4 public and 1 private hospitals	2 public hospitals	Yes	Yes	Intermediate access to acute care; quick access to rehabilitation after discharge is limited
Ecuador	No	1 public hospital with a stroke unit	1 public hospital	Not available	Only 1 public hospital	No data	Poor
Guatemala	No	1 private hospital with a stroke unit	1 private hospital	1 private hospital	No data	No data	Poor
Mexico	No	2 public and 4 private hospitals; 5 hospitals with stroke units	4 private and 1 public hospitals	4 private hospitals	No data	No data	Poor
Panama	No	8 public and 5 private hospitals	8 public and 5 private hospitals	1 public and 4 private hospitals	Yes	Yes	Intermediate access to acute care; quick access to rehabilitation after discharge is limited
Paraguay	No	2 public hospitals with stroke units; 6 private hospitals without stroke units	2 public and 6 private hospitals	Not available	Yes	No data	Poor access to acute care; no data about rehabilitation after discharge
Peru	No	4 public hospitals with one stroke unit, 1 private hospital without stroke unit	4 public and 1 private hospitals	Not available	No data	No data	Poor access to acute care; no data about rehabilitation after discharge
Uruguay	No	18 hospitals (16 private without stroke units; 1 public and 1 private hospitals with stroke units)	1 public 17 private hospitals	1 private hospital	No data	No data	Poor access to acute care; no data about rehabilitation after discharge

Data based on personal communication with the Ministries and experts in the countries listed in the table. Intermediate access to acute care defined as within 1-2 h and quick access to rehabilitation defined as within 7 days after hospital discharge. *Poor access: only few (one or two) stroke centres in the country; intermediate access: number of stroke centres is not sufficient for the number of inhabitants, or the overall number of centres is sufficient but the country has some areas without coverage; good access: sufficient number of centres for the number of inhabitants and the centres are well distributed across the country.

Table 3: **Delivery of stroke care by Latin American country**

Rio de Janeiro, Brazil March 11 to 13: **the aim to stimulate a global alliance to improve stroke care worldwide and to discuss the best strategies to implement evidence-based interventions in all levels of continuum of care**
20 countries: researchers, health professionals, health managers, scientific societies, private hospitals, industry and patients' associations.

570 participants in person and several by teleconference

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II Latin American Stroke Ministerial Meeting – Global Stroke Alliance

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Stroke Awareness

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¿CONOCES LOS SÍNTOMAS DE UN INFARTO CEREBRAL?

QUERÉTARO UNIDO CONTRA EL INFARTO CEREBRAL

Quiere Querétaro @QUIEREqro

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México

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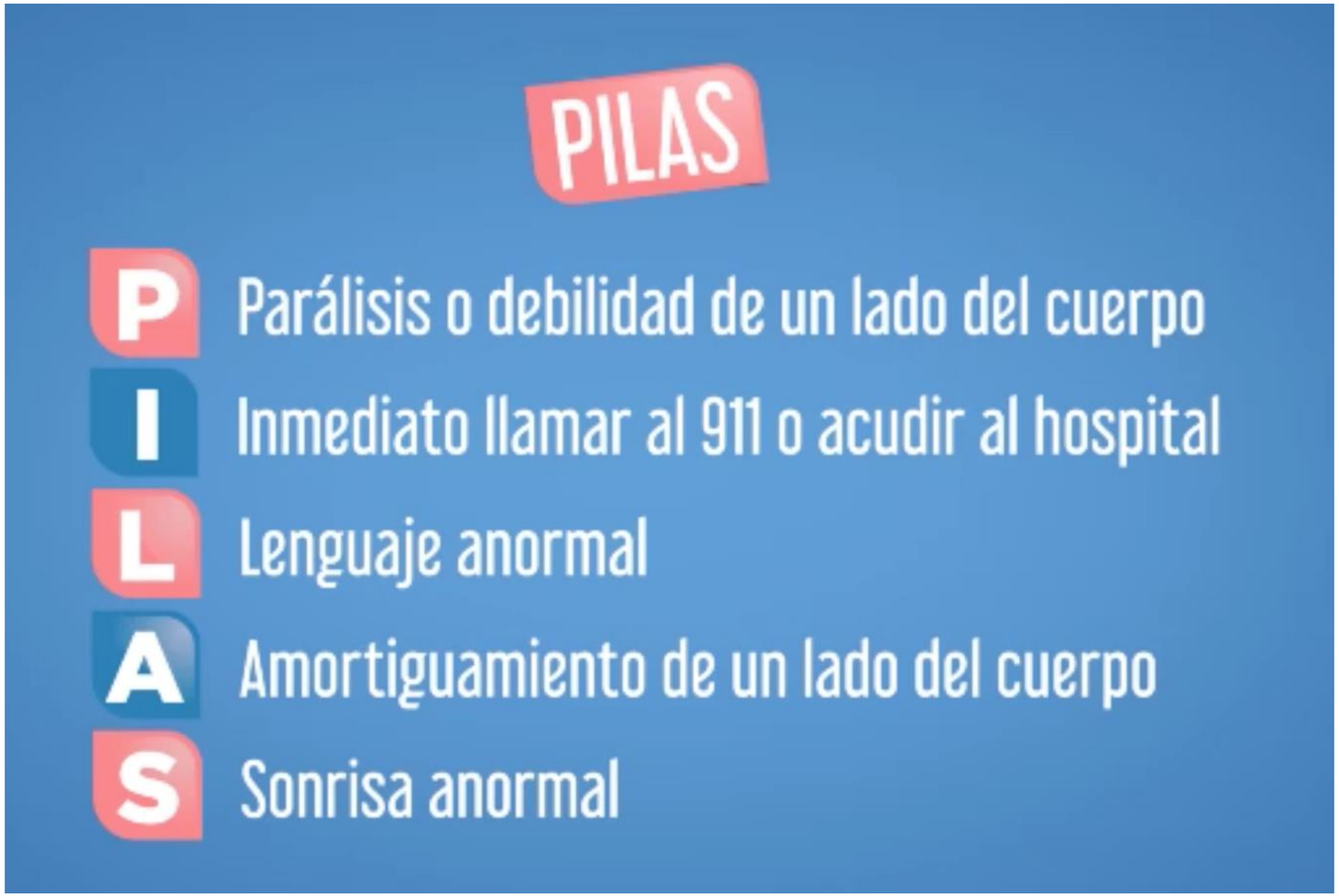
Costa Rica

Ecuador


PILAS
P
Parálisis o debilidad de un lado del cuerpo
I
Inmediato llamar al 911 o acudir al hospital
L
Lenguaje anormal
A
Amortiguamiento de un lado del cuerpo
S
Sonrisa anormal

American Stroke Association.
A division of the American Heart Association.

SVIN Society of Vascular and Interventional Neurology

Aprenda os sinais de AVC, eles iniciam repentinamente

Sorria

Peça para dar um sorriso

Boca torta

Abrace

Peça para elevar os braços

Perda de força

Música

Repita a frase como uma música

Dificuldade fala

Urgente

Ligue SAMU 192

Aja rápido. Tempo perdido é cerebro perdido

29 de OUTUBRO - DIA MUNDIAL DO AVC

Sociedade Brasileira de Doenças Cerebrovasculares · RedeBrasilAVC · Prefeitura de Porto Alegre · SUS · Ministério da Saúde · Governo Federal Brasil País rico é país sem pobreza

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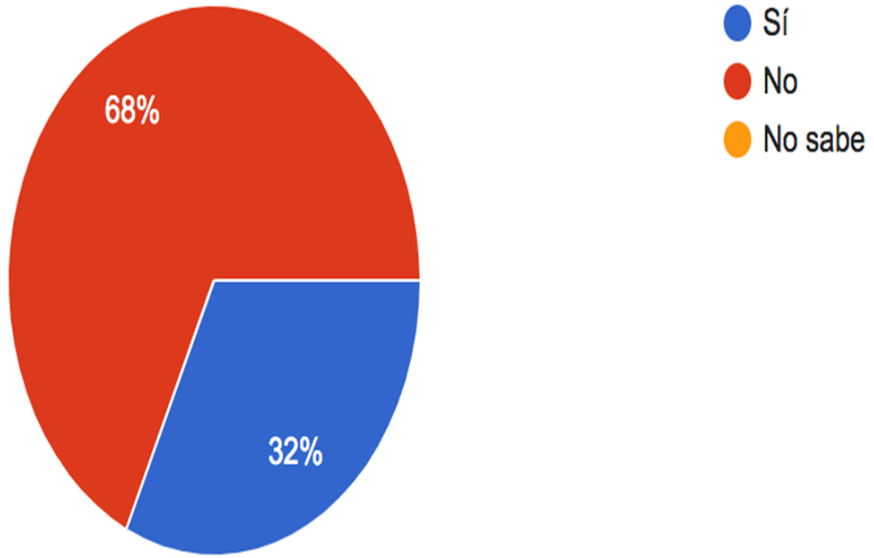
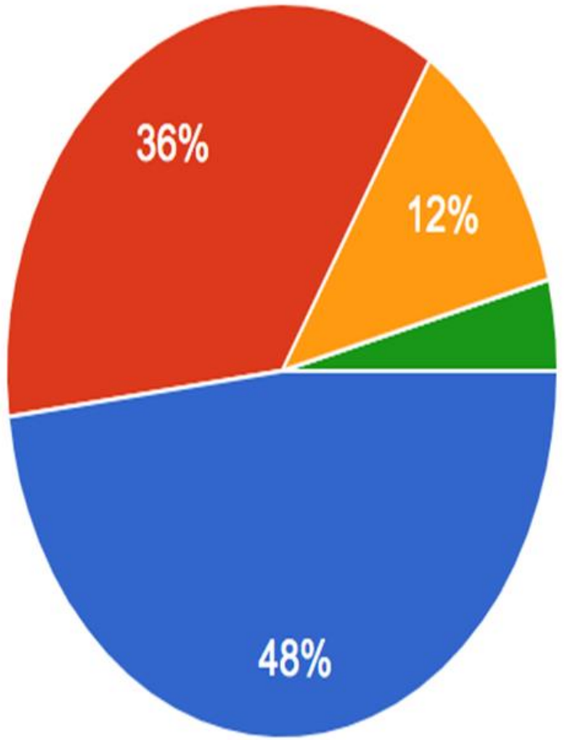
World Stroke Campaign

2020 – 13 Latin American Countries

Have your country a government program for stroke?

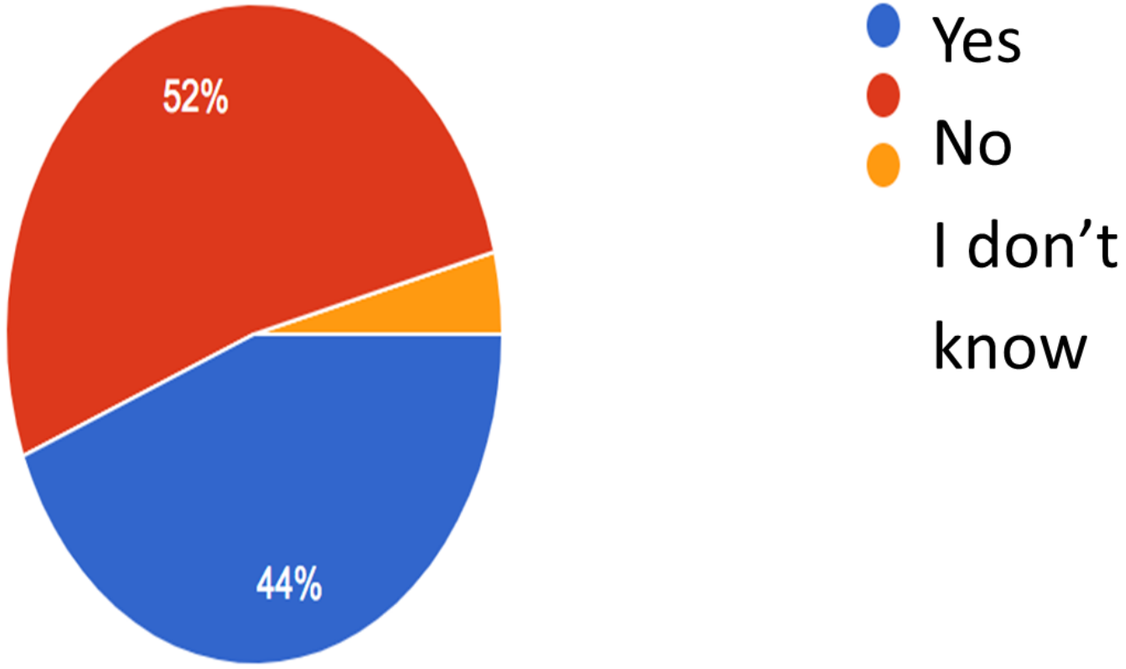


Are there non-governmental initiatives for the population education?

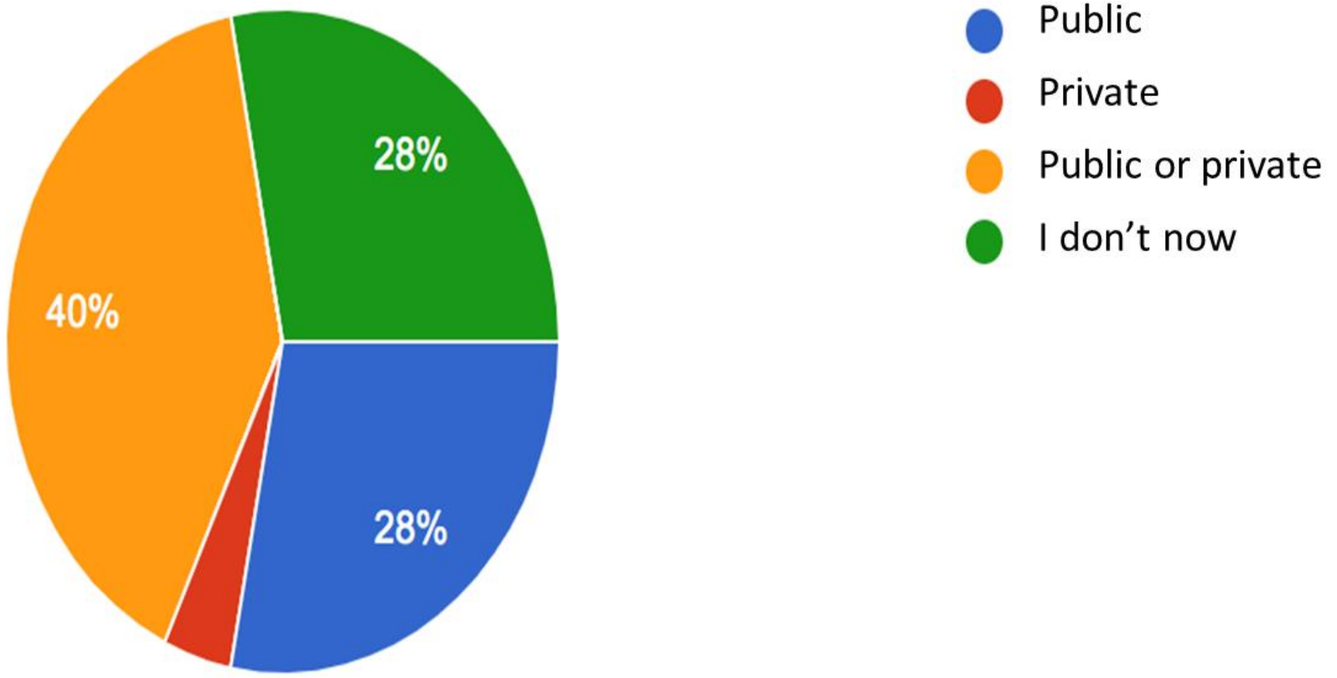


- Yes, on a national level
- Yes, on a local level
- No
- I don’t now

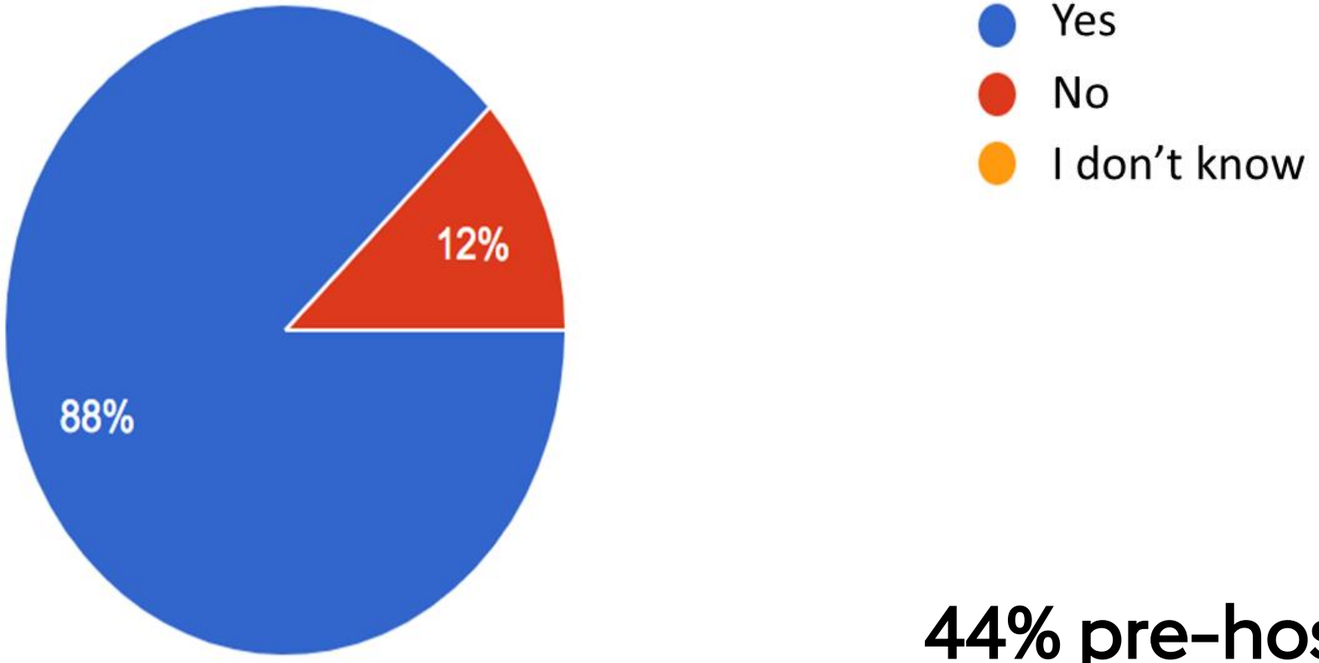
Is the Emergency Medical System organized for stroke care?



If the EMS is organized for stroke care: is it public or private?

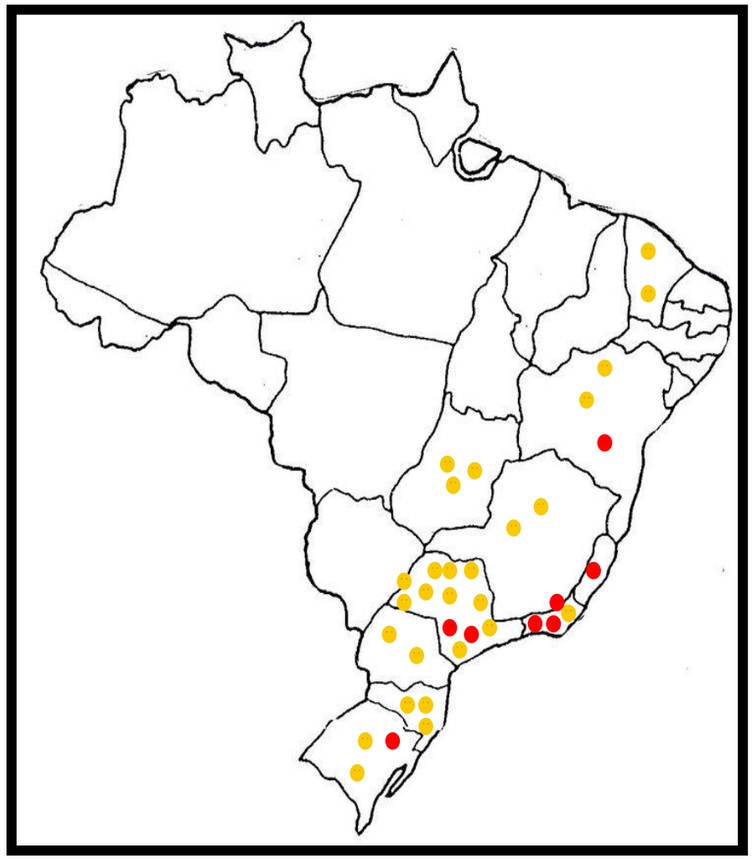


Do you think the stroke care has improved in your country in the last 2 years?

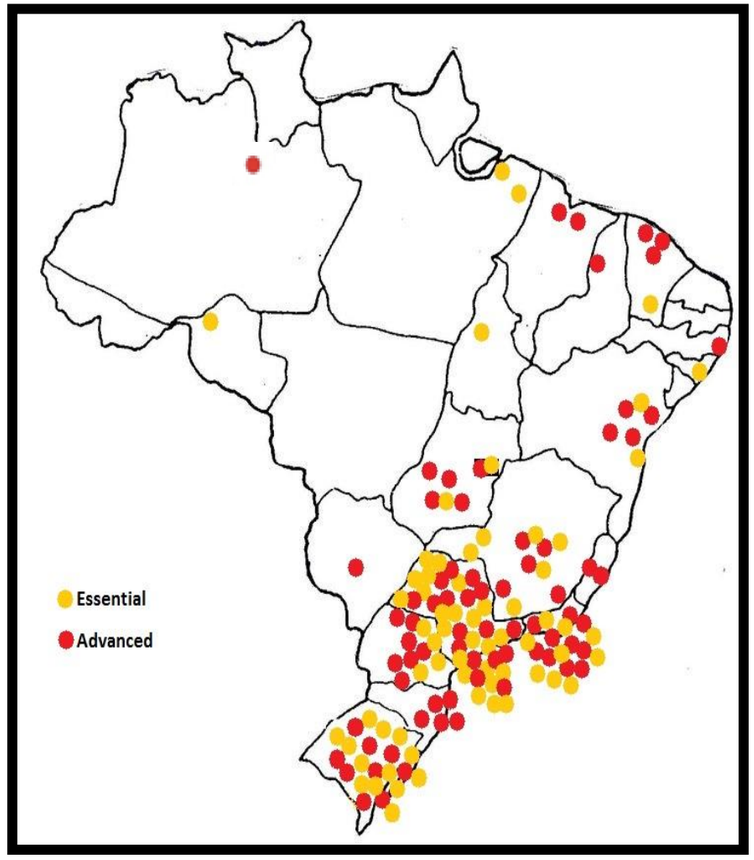


44% pre-hospital

Stroke Centers in Brazil



2008
35 Stroke Centers
5 with Stroke Units
8 Comprehensive Stroke Centers



2020
192 Stroke Centers
90 with Stroke Units
68 Comprehensive Stroke Centers

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Smartphone App for Telestroke

Real cases shared in real time

Quality indicators

CT and MRI

DICOM Viewer

Hospitals Groups

Text message, audio or video call

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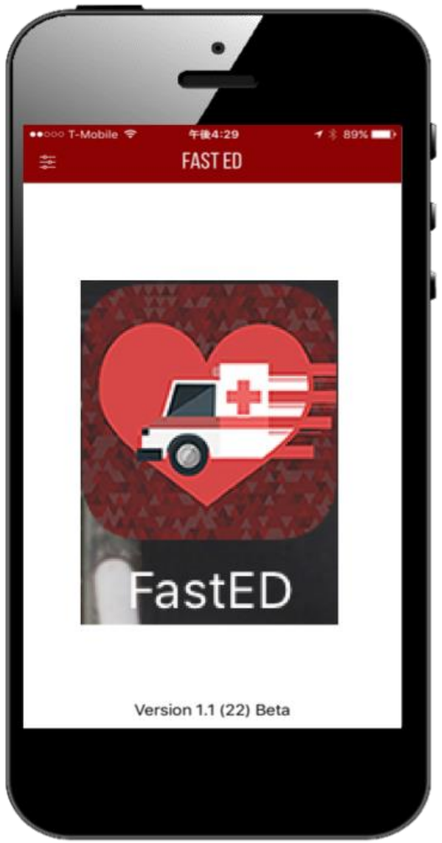
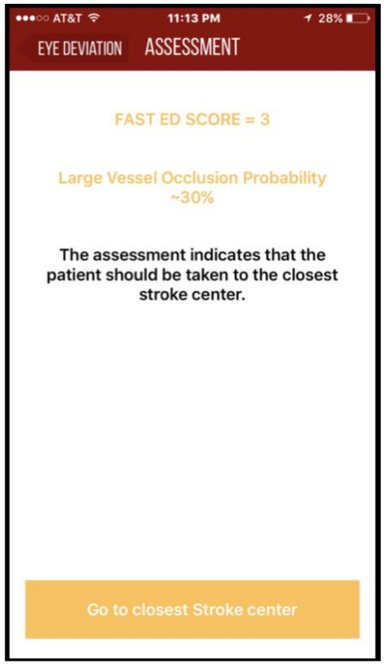
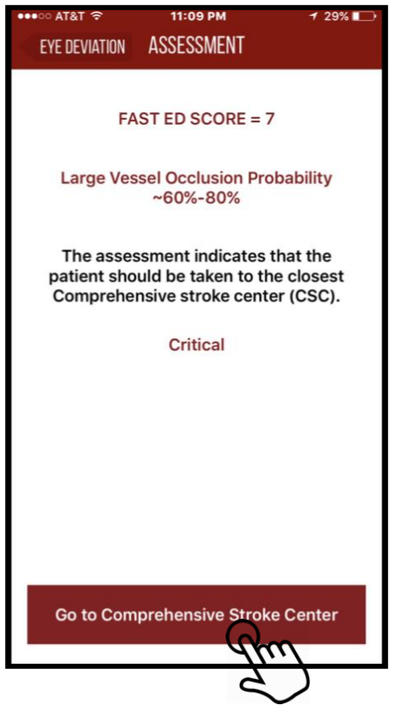
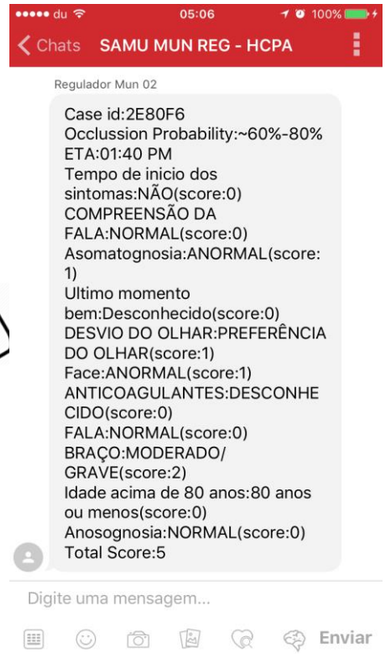
Fast ED Smartphone App

Field Assessment Stroke Triage for Emergency Destination



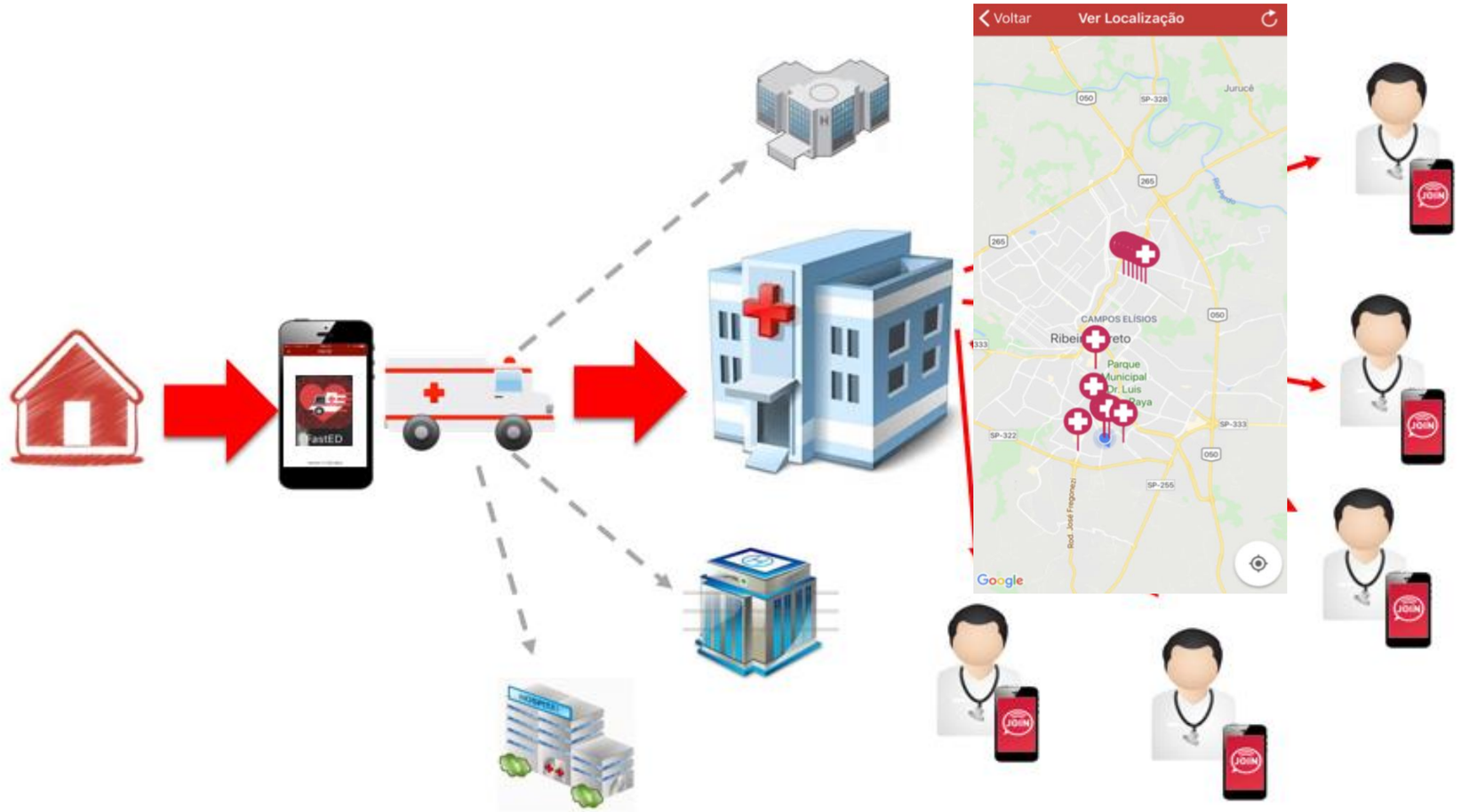


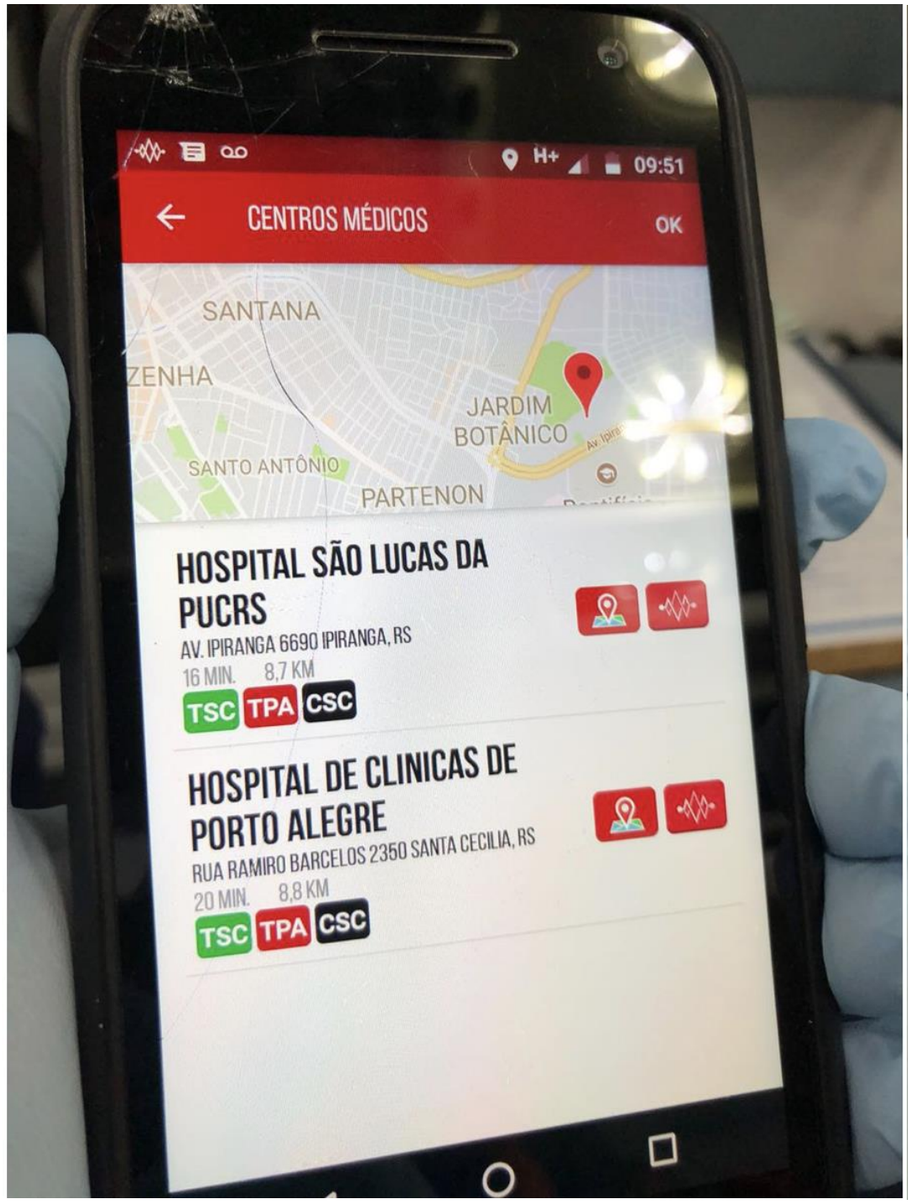


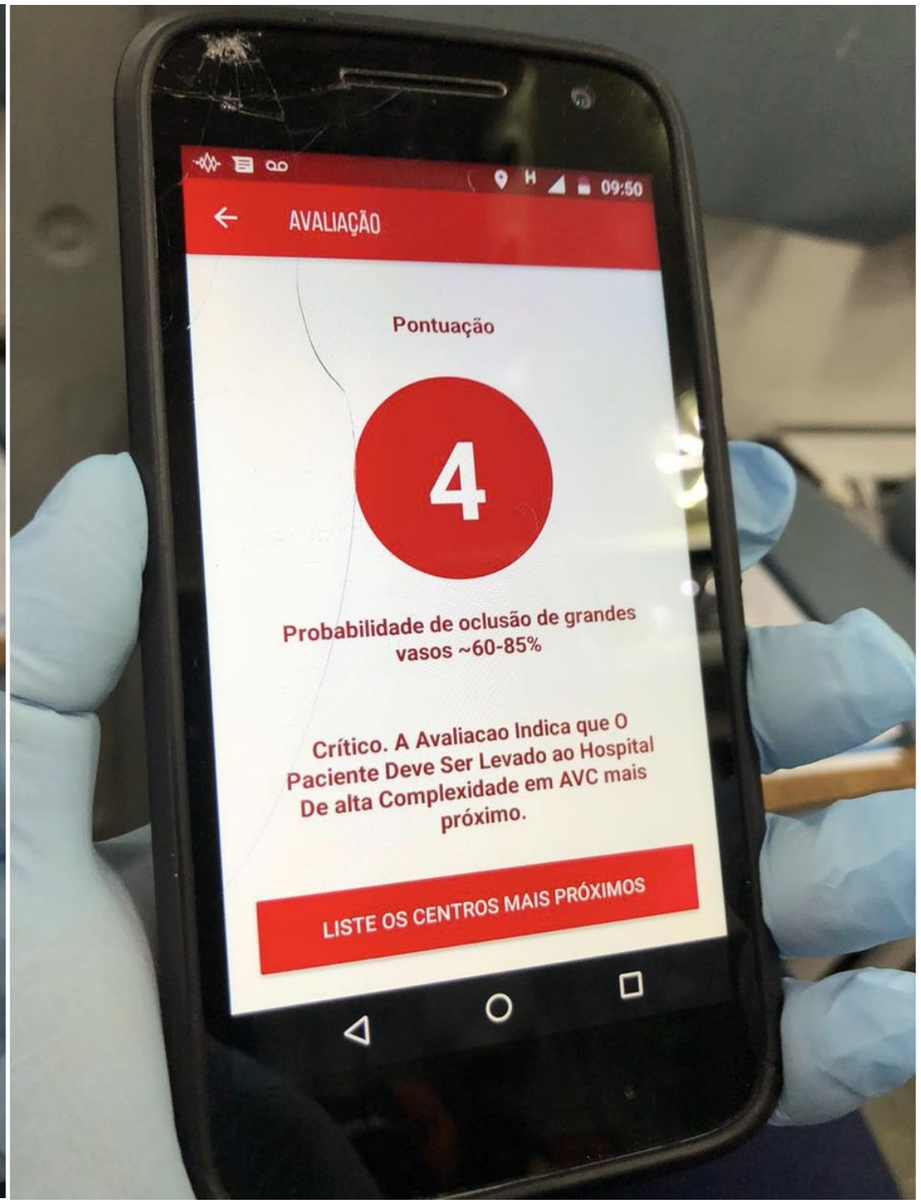


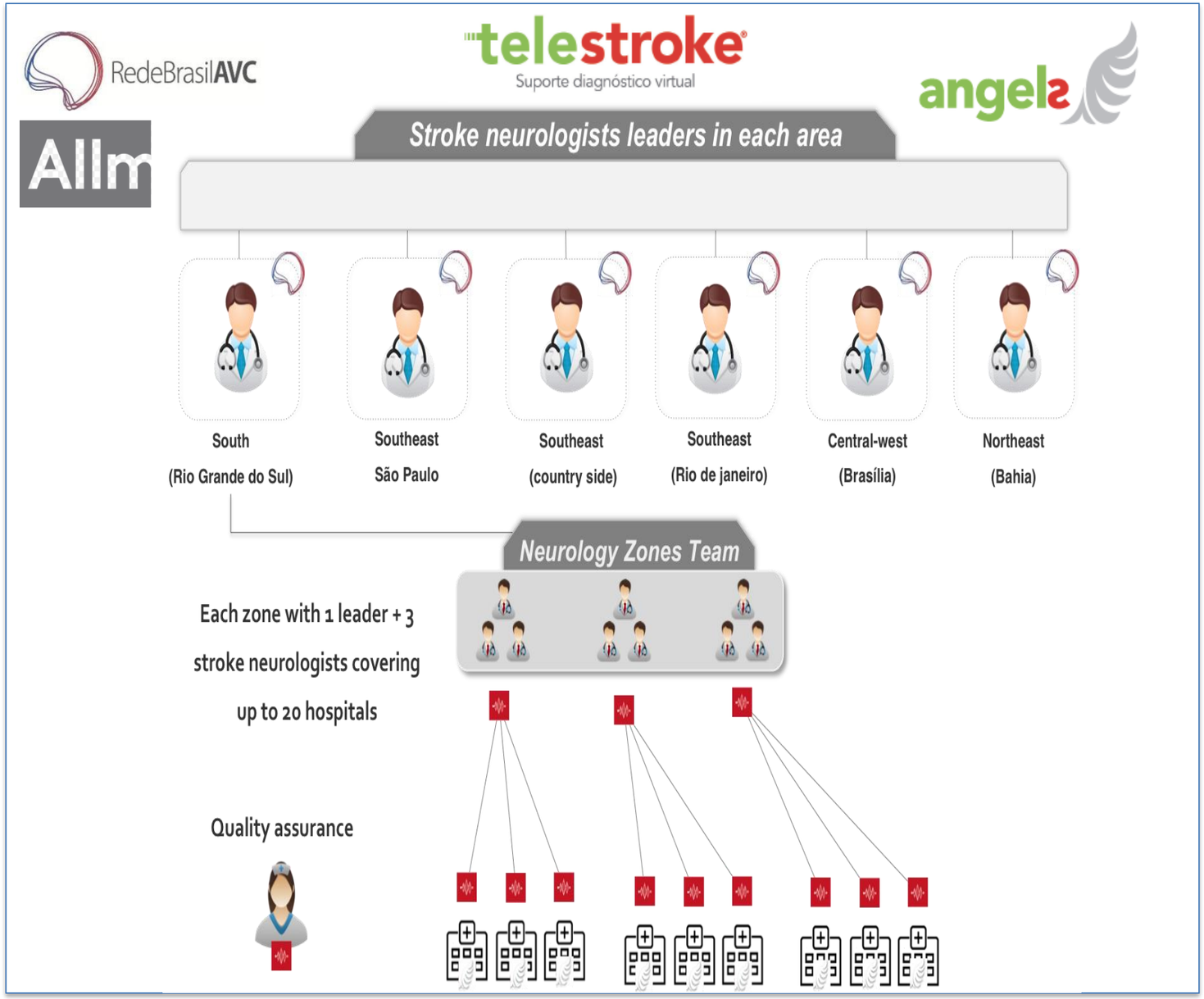
Raul Nogueira, Emory University

Patient Assisted in House




09:51
CENTROS MÉDICOS
OK
SANTANA
ZENHA
JARDIM BOTÂNICO
SANTO ANTÔNIO
PARTENON
HOSPITAL SÃO LUCAS DA PUCRS
AV. IPIRANGA 6690 IPIRANGA, RS
16 MIN. 8,7 KM
TSC TPA CSC
HOSPITAL DE CLINICAS DE PORTO ALEGRE
RUA RAMIRO BARCELOS 2350 SANTA CECILIA, RS
20 MIN. 8,8 KM
TSC TPA CSC


09:50
AVALIAÇÃO
Pontuação
4
Probabilidade de oclusão de grandes vasos ~60-85%
Crítico. A Avaliacao Indica que O Paciente Deve Ser Levado ao Hospital De alta Complexidade em AVC mais próximo.
LISTE OS CENTROS MAIS PRÓXIMOS


RedeBrasilAVC
telestroke
Suporte diagnóstico virtual
angels
AIIm
Stroke neurologists leaders in each area
South
(Rio Grande do Sul)
Southeast
São Paulo
Southeast
(country side)
Southeast
(Rio de janeiro)
Central-west
(Brasília)
Northeast
(Bahia)
Neurology Zones Team
Each zone with 1 leader + 3
stroke neurologists covering
up to 20 hospitals
Quality assurance

Conclusion

- Major differences in stroke care in Latin American countries
- Limited funding by government
- Several cost-effective strategies implemented (only in 2 countries in country level)
- A lot of local initiatives
- Stroke Awareness campaigns increasing in the region
- Several countries without a pre-hospital organization for stroke – it is a fundamental part of stroke care and still a huge gap in several countries

Panel Discussion

Audience Q & A

To Ask a Question

Upcoming Opportunities

- On-demand viewing

- Remainder of *International Perspectives on Stroke Triage, Diagnosis and Treatment* series
  - Episode 2: Diagnosis – Imaging and Resource Utilization (October 14)
  - Episode 3: Treatment with IV Lytics (October 21)
  - Episode 4: Treatment with Thrombectomy (October 28)

- One CycleNation on World Stroke Day (October 29)

- AHA Scientific Sessions (November 13 – 17)

- SVIN Annual Conference (November 18 – 21)

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Thank You.

The opinions expressed during this webinar are those of the speakers and do not necessarily reflect the opinions, recommendations or guidance of American Stroke Association or Society of Vascular and Interventional Neurology.