

LVO Screening: EMS and Hospital Collaboration

Maj. Matthew Manning, Paramedic and LeighAnn Persondek, APRN



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Disclosures

- Major Matthew Manning
- LeighAnn Persondek

Title: LVO Screening: EMS and Hospital Collaboration

No relevant financial relationships exist for either speaker.

Objectives

- Discuss EMS' role in acute stroke care
- Review stroke and large vessel occlusion (LVO) screening tools
- Explore collaboration techniques between EMS and Hospitals to improve door to needle and door to reperfusion times
- Discuss effective communication techniques hospitals can implement to include local EMS in stroke systems of care

SPECIAL REPORT

Recommendations for Regional Stroke Destination Plans in Rural, Suburban, and Urban Communities From the Prehospital Stroke System of Care Consensus Conference

A Consensus Statement From the American Academy of Neurology, American Heart Association/American Stroke Association, American Society of Neuroradiology, National Association of EMS Physicians, National Association of State EMS Officials, Society of NeuroInterventional Surgery, and Society of Vascular and Interventional Neurology: Endorsed by the Neurocritical Care Society

Levels of Capabilities of Hospital Stroke Certifications

Table 1. Levels and Capabilities of Hospital Stroke Certifications

Characteristics	ASRH	PSC	TSC	CSC
Location	Typically rural	Often urban/sub-urban	Often urban/sub-urban	Typically urban
Stroke team accessible/available 24/7	Yes	Yes	Yes	Yes
Noncontrast CT available 24/7	Yes	Yes	Yes	Yes
Advanced imaging available 24/7 (eg, CTA/CTP/MRI/MRA/MRP)	No	Possibly	Yes	Yes
Intravenous thrombolysis capable 24/7	Yes	Yes	Yes	Yes
Thrombectomy capable 24/7	No	Possibly	Yes	Yes
Diagnose stroke etiology and manage poststroke complications	Unlikely	Yes, routine	Yes, complex	Yes, complex
Admit hemorrhagic stroke	No	Possibly	Possibly	Yes
Clip/coil ruptured intracranial aneurysms	No	Unlikely	Possibly	Yes
Dedicated stroke unit	No	Yes	Yes	Yes
Neurocritical care unit and expertise	No	Possibly	Possibly*	Yes
Clinical stroke research performed	Unlikely	Possibly	Possibly	Yes

Source: American Heart Association, Inc.⁵ ASRH indicates acute stroke-ready hospital; CSC, comprehensive stroke center; CT, computed tomography; CTA, computed tomography angiography; CTP, computed tomography perfusion; MRA, magnetic resonance angiography; MRI, magnetic resonance imaging; MRP, magnetic resonance perfusion; PSC, primary stroke center; and TSC, thrombectomy-capable stroke center.

*Access to neurocritical care expertise required and may be provided by telemedicine.

Best Practices for EMS

Region should harmonize & adopt consistent stroke management **protocols**, evidence-based **stroke screening tools** and **severity scales** for identifying possible LVO

Stroke Management education (in conjunction with hospital partners and local EMS) should be done every year and integrated as a core care competency and should include information about interfacility transport (including of drip and ship patients)

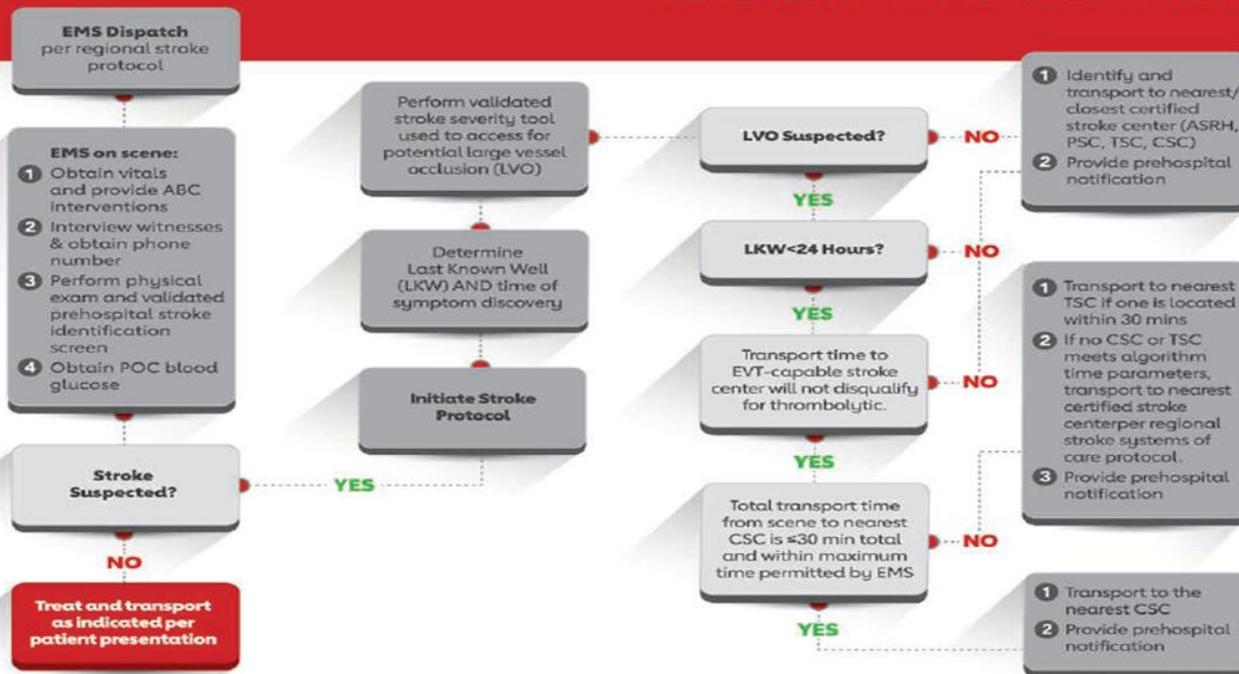
EMS agencies should develop and utilize **stroke destination plans** based on hospital locations & capabilities, transport times, and patient acuity

EMS should develop uniform **prehospital stroke notification protocols** with receiving stroke hospitals and direct CT transport should be encouraged



American Heart Association.
Mission: Lifeline[®]
Stroke

EMERGENCY MEDICAL SERVICES ACUTE STROKE ROUTING



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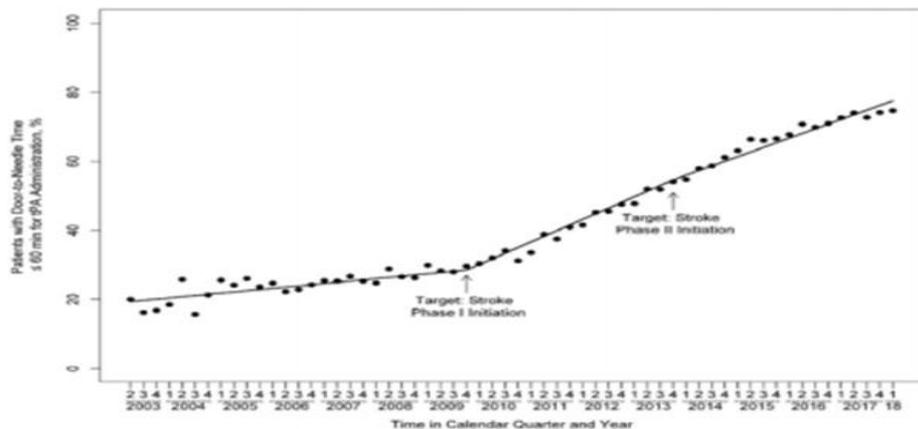
Figure 1. Mission: Lifeline Stroke Emergency Medical Services (EMS) Acute Stroke Routing Algorithm.

ABC indicates airway, breathing and circulation; ASRH, acute stroke-ready hospital; CSC, comprehensive stroke center; EVT, endovascular therapy; LKW, last known well; LVO, large vessel occlusion; POC, point of care; PSC, primary stroke center; and TSC, thrombectomy-capable stroke center. Reprinted from the American Heart Association with permission. Copyright ©2021.

Target Timelines

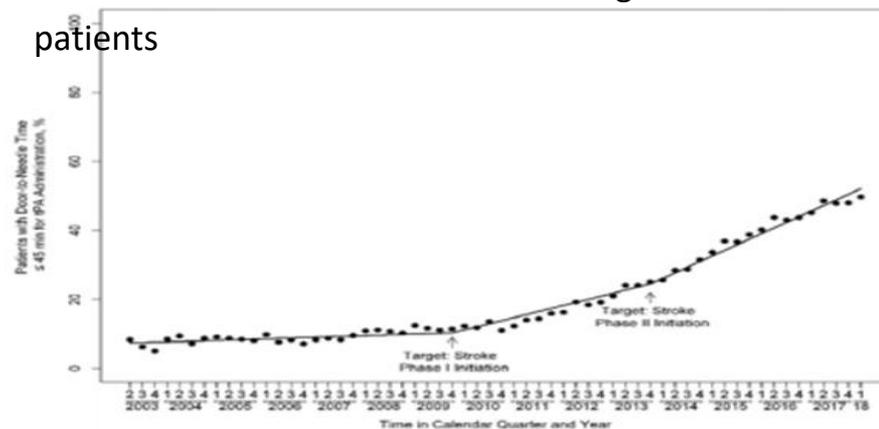
- Target Stroke: Phase I (2010)
 - DTN within 60 min in 50% of eligible patients

DTN ≤ 60 Minutes



- Target Stroke: Phase II (2014)
 - DTN within 60 min ≥ 75% of eligible patients
 - DTN within 45 min ≥ 50% of eligible patients

DTN ≤ 45 Minutes



Are We Harming People by Treating Faster?

Outcome	Pre-Target: Stroke (n=24,365)	Post-Target: Stroke Phase I (n=44,257)	Post-Target: Stroke Phase II (74,447)	P value	Adjusted OR 95% CI (Phase I vs Pre Target: Stroke)	Adjusted OR 95% CI (Phase II vs Pre Target: Stroke)
In-Hospital Mortality	10.0%	8.2%	6.2%	<0.0001	0.85 (0.80-0.91)	0.72 (0.67-0.77)
Discharge Home	35.8%	41.5%	49.0%	<0.0001	1.21 (1.16-1.27)	1.35 (1.27-1.45)
Ambulatory Status Independent	41.5%	44.6%	52.7%	<0.0001	1.05 (0.99-1.22)	1.35 (1.27-1.45)
Symptomatic ICH within 36 Hours	5.7%	4.5%	3.6%	<0.0001	0.79 (0.72-0.86)	0.67 (0.61-0.73)

Evaluation of Best practice Target: Stroke Phase III

- *Launched in 2019*

- **PRIMARY GOALS:**

- DTN (*IV thrombolytic*) within 60 min \geq 85% eligible cases
- Door-to-device times (*arrival to first pass of thrombectomy device*) \geq 50% eligible patients:
 - \leq 90 minutes for ED arrivals
 - \leq 60 minutes for transfers

- **SECONDARY GOALS:**

- DTN within 45 min \geq 75% eligible patients
- DTN within 30 minutes \geq 50% eligible patients

Door In Door Out (DIDO) Data Collection

- Brain Attack Coalition (BAC) recommended transfer within 2 hours in 2013 (Alberts, 2013)
- Reporting to TJC began Jan 1, 2019 discharges
 - Tracking of:
 - Door to transfer
 - STK-OP-1b- Hemorrhagic transfer
 - STK-OP-1c- AIS: Alteplase Drip and Ship Only
 - STK-OP-1d- AIS: +LVO, eligible for EVT
 - STK-OP-1e- AIS: +LVO, NOT eligible for EVT
 - STK-OP-1f- AIS: No alteplase, -LVO, not eligible for EVT
 - Hoping to get a DIDO recommendation from AHA

DIDO Research

Stroke

Volume 50, Issue 10, October 2019, Pages 2829-2834
<https://doi.org/10.1161/STROKEAHA.119.025838>



CLINICAL SCIENCES

Door-in-Door-Out Time of 60 Minutes for Stroke With Emergent Large Vessel Occlusion at a Primary Stroke Center

Philip M.C. Choi, FRACP, Andrew H. Tsoi, MD, Alun L. Pope, PhD, Shelton Leung, MD, Tanya Frost, RN, Poh-Sien Loh, FRACP, Ronil V. Chandra, FRANZCR, Henry Ma, PhD, Mark Parsons, PhD, Peter Mitchell, FRANZCR, and Helen M. Dewey, PhD

Conclusion: A median DIDO time of < 60 minutes can be achieved at a primary stroke center.

(Choi et al., 2019)

AHA 2019 Stroke Guidelines

CLASS I (STRONG) Benefit >>> Risk	LEVEL (QUALITY) OF EVIDENCE‡
<p>Suggested phrases for writing recommendations:</p> <ul style="list-style-type: none"> ■ Is recommended ■ Is indicated/useful/effective/beneficial ■ Should be performed/administered/other ■ Comparative-Effectiveness Phrases†: <ul style="list-style-type: none"> ○ Treatment/strategy A is recommended/indicated in preference to treatment B ○ Treatment A should be chosen over treatment B 	<p>LEVEL A</p> <ul style="list-style-type: none"> ■ High-quality evidence‡ from more than 1 RCT ■ Meta-analyses of high-quality RCTs ■ One or more RCTs corroborated by high-quality registry studies
<p>CLASS IIa (MODERATE) Benefit >> Risk</p> <p>Suggested phrases for writing recommendations:</p> <ul style="list-style-type: none"> ■ Is reasonable ■ Can be useful/effective/beneficial ■ Comparative-Effectiveness Phrases†: <ul style="list-style-type: none"> ○ Treatment/strategy A is probably recommended/indicated in preference to treatment B ○ It is reasonable to choose treatment A over treatment B 	<p>LEVEL B-R (Randomized)</p> <ul style="list-style-type: none"> ■ Moderate-quality evidence‡ from 1 or more RCTs ■ Meta-analyses of moderate-quality RCTs
<p>CLASS IIb (WEAK) Benefit ≥ Risk</p> <p>Suggested phrases for writing recommendations:</p> <ul style="list-style-type: none"> ■ May/might be reasonable ■ May/might be considered ■ Usefulness/effectiveness is unknown/unclear/uncertain or not well established 	<p>LEVEL B-NR (Nonrandomized)</p> <ul style="list-style-type: none"> ■ Moderate-quality evidence‡ from 1 or more well-designed, well-executed nonrandomized studies, observational studies, or registry studies ■ Meta-analyses of such studies
	<p>LEVEL C-LD (Limited Data)</p> <ul style="list-style-type: none"> ■ Randomized or nonrandomized observational or registry studies with limitations of design or execution ■ Meta-analyses of such studies ■ Physiological or mechanistic studies in human subjects
	<p>LEVEL C-EO (Expert Opinion)</p> <p>Consensus of expert opinion based on clinical experience</p>

(Powers et al., 2019)

AHA 2019 Stroke Guidelines

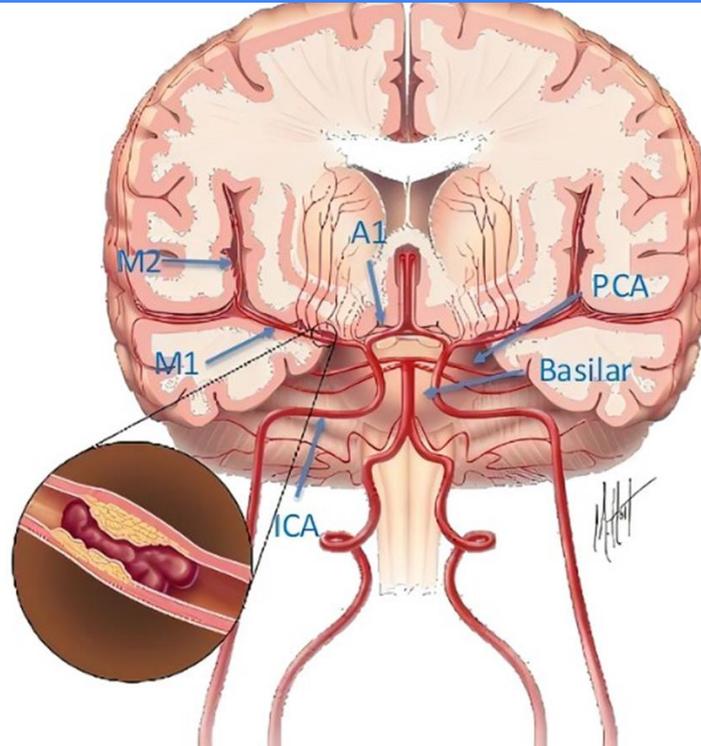
<p>3. Patients with a positive stroke screen or who are strongly suspected to have a stroke should be transported rapidly to the closest healthcare facilities that are able to administer IV alteplase.</p>	<p>I</p>	<p>B-NR</p>	<p>Recommendation reworded for clarity from 2013 AIS Guidelines. See Table XCV in online Data Supplement 1 for original wording.</p>
<p>The 2013 recommendation referred to initial emergency care as described elsewhere in the guidelines, which specified administration of IV alteplase as part of this care. The current recommendation is unchanged in intent but reworded to make this clear.</p>			
<p>4. When several IV alteplase-capable hospital options exist within a defined geographic region, the benefit of bypassing the closest to bring the patient to one that offers a higher level of stroke care, including mechanical thrombectomy, is uncertain.</p>	<p>IIb</p>	<p>B-NR</p>	<p>New recommendation.</p>
<p>5. Effective prehospital procedures to identify patients who are ineligible for IV thrombolysis and have a strong probability of large vessel occlusion (LVO) stroke should be developed to facilitate rapid transport of patients potentially eligible for thrombectomy to the closest healthcare facilities that are able to perform mechanical thrombectomy.</p>	<p>IIb</p>	<p>C-EO</p>	<p>New recommendation.</p>

(Powers et al., 2019)

What is an LVO?

Main Vessels
Treated with
Thrombectomy

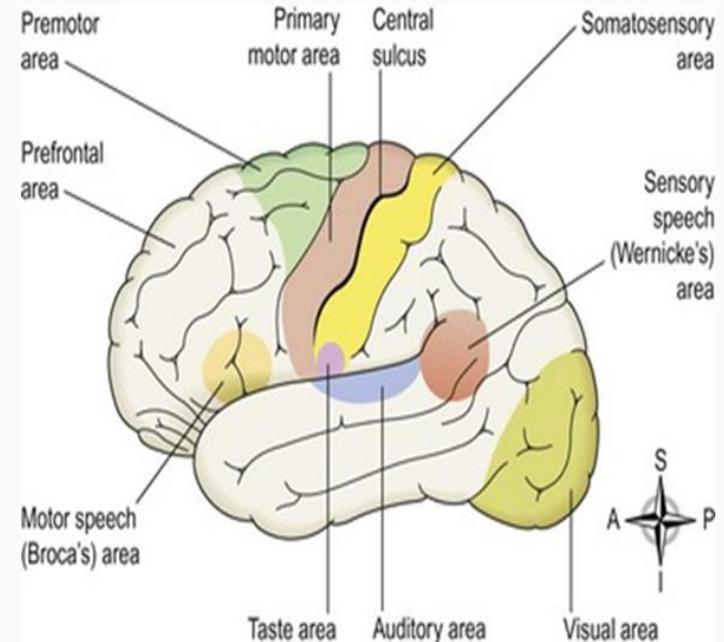
- MCA – M1
& M2
- ACA (A1)
- ICA
- Basilar
- PCA



Large Vessel Occlusions (LVO) Screening Tools

- Multiple validated LVO screening tool
 - These look for large vessel deficits (AKA **cortical findings**)
 - Gaze, Aphasia, Paralysis, Neglect, Vision

(Teleb et al., 2016)

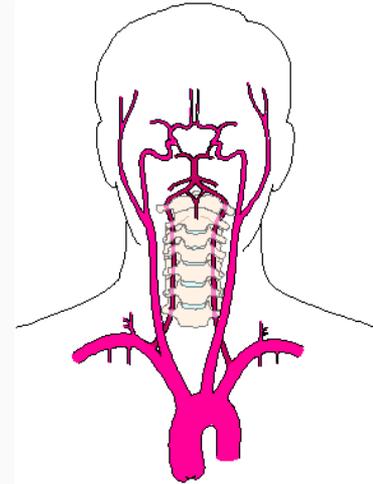


Large Vessel Ischemic Strokes

- 30-40% of Ischemic strokes are large vessel strokes
- If left untreated, prognosis is poor

Vessel	Mortality
ICA	53%
MCA	27%
Vertebral/Basilar	89-90%

(Furlan A et al.1999)



EMS Role in Acute Stroke Care

- General impression of the patient, ascertain last seen normal time or last known well. Wake-up stroke?
- Assess vital signs, perform Cincinnati stroke scale, assess RACE or other LVO screening tools to identify the big 'ol strokes. Recognize and identify early.
- Assess Blood Glucose Level!
- Early notification system with comprehensive stroke center(s)
- Measure GCS, obtain 12-lead ECG, vascular access, and supportive care as indicated
- Patient contact to transport time of 15 minutes or less
- Patients suspected to be suffering from LVO strokes to be transported to a comprehensive stroke center with Endovascular therapy (EVT) capabilities.

Cincinnati Stroke Scale

- Facial Droop - Have the patient smile, or show you their teeth
 - Normal - Both sides of the face move equally
 - Abnormal - One side of the face does not move or does not move as well as the other
- Arm Drift - Have the patient hold both arms straight in front of them with their eyes closed for 10 seconds
 - Normal - Both arms held equally
 - Abnormal - One arm unable to be held straight out or it drifts
- Speech - Have the patient repeat a phrase (An example would be “You can’t teach an old dog new tricks”)
 - Normal - Patient uses correct words, no slurring noted
 - Abnormal - Slurred words, inappropriate words, or unable to speak

Large Vessel Occlusion Stroke Scales

- Large vessel occlusion (LVO) screening tools
 - RACE
 - VAN
 - FAST-ED
 - CSTAT
 - LAMS
 - NIHSS for the hospitals

How Do You Choose A Scale?

- Keep it simple!
- Validated tool in pre-hospital setting
- High Accuracy
- High Interrater Reliability

“The specific scale chosen may be less important than the paradigm that *some* field severity score assessment should be done to screen for possible (E)LVO.”

(Jayaraman et al., 2016)

RACE Scoring

**Rapid Arterial occlusion Evaluation
(RACE)**

RACE Scoring

- RACE ≥ 5
- Sensitivity 66%
- Specificity 72%
- PPV 29%
- NPV 93%

(Dickson et al., 2019)

RACE Scoring

Perform Rapid Arterial Occlusion Evaluation (RACE) Assessment			
Item	Instruction	Results	Score
Facial Palsy	Ask the patient to show their teeth (smile)	Absent: symmetrical movement	0
		Mild: slightly asymmetrical	1
		Severe: completely asymmetrical	2
Arm Function	Extend the arm of the patient 90° (sitting) or 45° (if supine)	Mild: upheld more than 10 seconds	0
		Moderate: upheld less than 10 seconds	1
		Severe: cannot lift arm against gravity	2
Leg Function	Extend the leg of the patient 30° (supine)	Mild: upheld more than 5 seconds	0
		Moderate: upheld less than 5 seconds	1
		Severe: cannot lift leg against gravity	2
Head & Gaze Deviation	Observe eyes and head deviation to one side	Absent: no head deviation OR eye movements to both sides possible	0
		Present: eyes AND head deviated to one side observed	1
Receptive Aphasia (Right side)	Ask patient to follow two commands: 1. Close your eyes 2. Make a fist	Normal: performs tasks correctly	0
		Moderate: performs one task correctly	1
		Severe: Cannot perform either task	2
Agnosia (Left side)	Ask patient: 1. "Whose arm is this?" (while showing affected arm) 2. "Can you move your arm?"	Normal: recognizes and attempts to move arm	0
		Moderate: does not recognize OR is unaware of arm	1
		Severe: does not recognize AND is unaware of arm	2
Is total RACE high (5-9) or low (0-4)?			TOTAL SCORE

ALWAYS ASSESS THESE FOUR AREAS

ONLY ASSESS ONE OF THESE TWO AREAS

High RACE is 5-9; high likelihood of being a LVO

Low RACE is 0-4; lower likelihood of being a LVO

RACE Scoring

Facial Palsy *Ask the patient to show their teeth or to smile*

0	Absent: symmetrical movement
1	Mild: slightly asymmetrical
2	Severe: completely asymmetrical



Photo courtesy of David Hom, MD

RACE Scoring

Arm Function *Extend the arms of the patient 90° if they are sitting, or 45° if they are supine (laying down)*

0	Normal: upheld more than 10 seconds
1	Moderate: upheld less than 10 seconds
2	Severe: cannot lift arm against gravity



RACE Scoring

Leg Function *Extend the leg of the patient 30° (sitting or supine)*

0	Normal: upheld more than 5 seconds
1	Moderate: upheld less than 5 seconds
2	Severe: cannot lift leg against gravity



RACE Scoring

Head & Eye Gaze Deviation

Assess for eye and head deviation to one side

0	Absent: no head deviation OR eye movements to either side
1	Present: eyes AND head deviated to one side



RACE Scoring



Receptive Aphasia (Right side)	Ask patient to follow two commands: 1. Close your eyes 2. Make a fist	Normal: performs tasks correctly Moderate: performs one task correctly Severe: Cannot perform either task	0 1 2	ONLY ASSESS ONE OF THESE TWO AREAS
Agnosia (Left side)	Ask patient: 1. "Whose arm is this?" (while showing affected arm) 2. "Can you move your arm?"	Normal: recognizes and attempts to move arm Moderate: does not recognize OR is unaware of arm Severe: does not recognize AND is unaware of arm	0 1 2	
Is total RACE high (5-9) or low (0-4)?		TOTAL SCORE		

RACE Scoring

Receptive Aphasia *(RIGHT SIDE AFFECTED)*

“Aphasia is a language disorder that affects your ability to communicate.”
American Heart Association

Ask the patient to follow two commands:

- 1. “Close your eyes”*
- 2. “Make a fist”*

0	Normal: performs tasks correctly
1	Moderate: performs one task correctly
2	Severe: cannot perform either task

RACE Video



Facial palsy - 1

Receptive Aphasia - 0

Arm Function - 2

RACE Score = 5

Leg Function - 2

LVO? Yes

Possible CVA? Yes

Head & Gaze
Deviation - 0

(Special thanks to Paramedic Malachi Winters and Dr. Kanaan)

RACE Video



Facial palsy - 2

Receptive Aphasia - 2

Arm Function - 2

RACE Score = 8

Leg Function - 2

LVO? Yes

Possible CVA? Yes

Head & Gaze
Deviation - 0

(Special thanks to Paramedic Malachi Winters and Dr. Kanaan)

RACE Scoring

Agnosia *(Left Side) Ask the patient:*

1. *“Whose arm is this?” While showing them their own affected arm)*
2. *“Can you move your arm?”*

0	Normal: Recognizes and attempts to move arm
1	Moderate: does not recognize OR is unaware of the arm
2	Severe: does not recognize AND is unaware of the arm

“Agnosia is a neurological disorder characterized by an inability to recognize and identify objects or persons using one or more of the senses.”

According to the National Institute of Neurological Disorders and Stroke

RACE Video



Facial palsy - 2

Agnosia - 0

Arm Function - 1

RACE Score = 3

Leg Function - 0

LVO? No

Possible CVA? Yes

Head & Gaze
Deviation - 0

(Special thanks to Paramedic Malachi Winters and Dr. Kanaan)

Fast-ED

Facial Weakness/**A**symmetry *Ask the patient to smile or show teeth, or gums*

0	Facial movement is symmetrical
1	Unequal smile or grimace, obvious asymmetry

Fast-ED

Arm Weakness *Ask the patient to close eyes and lift the patient's arms together with palms up to 90 degrees if sitting and 45 degrees if supine. Ask them to hold the position for 10 seconds, then let go.*

0	Normal: Both arms remain up >10 seconds or slowly drift down equally
1	Mild: One arm drifts down in <10 seconds but has antigravity strength
2	Moderate/Severe: Cannot maintain the arm against gravity and drops immediately

Fast-ED

Speech Content *Ask the patient to say a common phrase such as “You can’t teach an old dog new tricks.” Have the patient name 3 common items*

0	Normal - Speech content normal and names 2-3 items correctly
1	Abnormal - Speech content clearly abnormal or names only 0-1 items correctly

Fast-ED

Speech Comprehension *Ask the patient, "Show me two fingers"*

0	Normal - Patient shows two fingers
1	Abnormal - Patient cannot/does not show two fingers

Fast-ED

Eye Deviation *Ask the patient to follow your finger, or pen, while holding their head still*

0	Absent: No deviation, eyes move to both sides equally
1	Partial - Patient has clear difficulty when looking to one side
2	Forced deviation - Eyes are deviated to one side and do not move to the other side

Fast-ED

Denial/Neglect-Weakness *Ask the patient “Are you weak anywhere?”*

0	Normal - The patient recognizes that they are weak
1	Abnormal - The patient is weak but does not recognize they are weak

Fast-ED

Denial/Neglect *Hold the patient's weak arm, ask the patient, "Whose arm is this?"*

0	Normal - Patient recognizes their arm
1	Abnormal - Patient does not recognize the weak arm belongs to them

VAN Assessment

- Visual Disturbance - Double vision, loss of vision?
- Aphasia - Difficulty forming words? Can the patient recognize two objects correctly?
- Neglect - This assesses gaze, or the patient's senses. Is there a conjugate gaze or a palsy? Are they eyes able to track to both sides? Does the patient have feeling in both arms and legs when eyes are closed?

Stroke Golden Hour



Suspected stroke patient arrives to ED

Initiate provider evaluation

Notify Stroke Team and NIH completion

Initiate CT scan

Interpret CT scan, review labs and review eligibility for alteplase

Administer IV thrombolytic

0 min
min

<10 min

≤15 min

≤20 min

≤30 min

≤ 45

Endovascular Times

- Clot Engagement
 - AHA goal door to...Clot Engagement
 - Transfers ≤ 60 min
 - ED Arrivals ≤ 90 min
 - Total of combined cases should exceed 50% meeting the goal
- Revascularization
 - TJC goal door to...Revascularization
 - CSTK-11 within 120 minutes (≥ 0 min. and ≤ 150 min)
- Total procedure time
 - TJC goal arterial access to...Revascularization
 - CSTK-12 achieve TICI 2B or higher less than ($<$) or equal to 60 minutes

Stroke Response Team

- With pre notification team can be immediately available
- Direct to CT, report from EMS concurrently
- NIHSS completion prior to or immediately after CTH completed
- Decision to treat with IV thrombolytics
- CTA/CTP and decision if patient needs to go for EVT

Collaboration Techniques Between EMS and Hospitals to Improve Door to Needle and Door to Reperfusion Times

- Paging different levels of stroke alerts pre- hospital from EMS to hospital dispatch to indicate what teams may or may not be needed
 - Single call activation for entire team
- Pre Notifications of + LVO screen
- EMS directly to CT scanner-handoff in CT with stroke team, ED providers and nurses, lab or techs etc.
- Tracking sheets to keep all information in one location and reminders of what need to be done

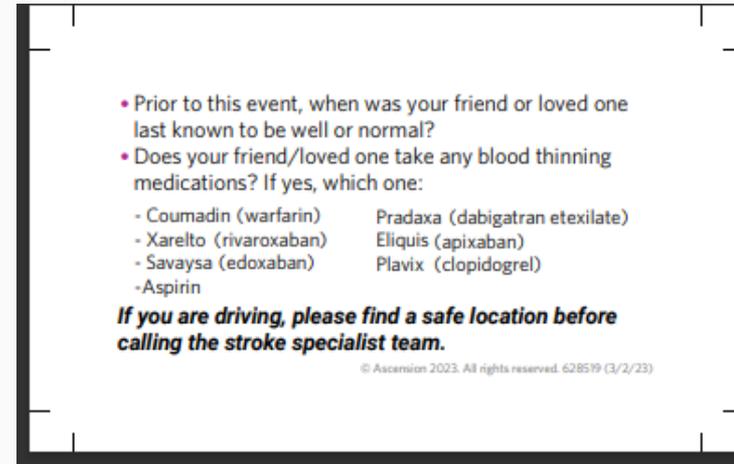
Interdisciplinary Team Approach

- Including EMS in your hospital based process improvement plans
 - Such as meetings to provide input from both teams, shape continuum of care, choose CPGs, discuss things that are working well and things that can be improved
 - Identifying the needs of both teams for a smoother transition from EMS arrival on scene to hospital care
- Providing data to your teams, internally and externally, that includes prenotification times, acute treatments and outcomes including times from arrival to treatment
 - Feedback of individual cases to the EMS crew and organization that brought the patient in
 - “ Best times recognition”
 - Posting times where your teams can see them in the ED
- Partnering together for staff and community education
 - KEMSA conferences
 - Lunch and learns
 - In house stroke education offerings, and communication regarding continuing education opportunities

Interdisciplinary Team Approach

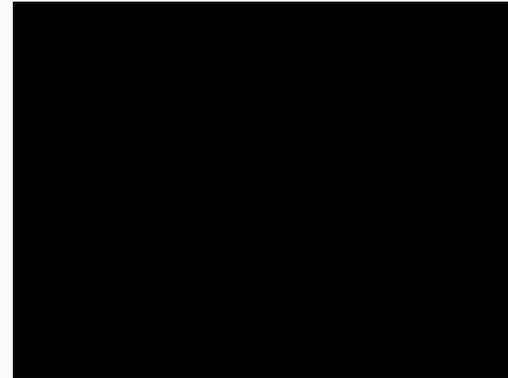
- Calling cards

- Information can be given to the stroke team even prior to arrival
- Family communication can occur before the patient has arrived to help improve treatment times by having pertinent information even prior to the patient's arrival
- Beneficial if transport time is significant or in patients nearing the end of a treatment window.



Case Studies: 69 y/o F via EMS with Pre-Arrival LVO Stroke Alert

- EMS Times and assessments:
- Call Received: 14:58
- Dispatched: 14:59
- En Route: 14:59
- On Scene: 15:03
- Patient Contact: 15:07 - Delayed due to distance to patient inside building
- Cincinnati Stroke Scale: 15:08
- RACE Scoring: 15:11
- Pre-arrival notification called to dispatch: 15:19
- Left Scene: 15:22 - 15 minutes from patient contact
- At Destination: 15:41
- Transfer to CT Scanner: 15:49



Case Studies: 69 y/o F via EMS with Pre-Arrival LVO Stroke Alert

On EMS arrival to the parking lot of the scene, there was a slight delay getting to the patient due to the facility being a Doctor's office. The patient was found sitting in a wheelchair with staff. Staff advised that the patient came into the facility for a routine check-up. The patient checked in and 20 minutes later when they called her name to take her back, she didn't respond to them. They described how the patient looked at them, but did not speak. They also recognized right sided facial droop. They called 911 immediately.

The patient's history includes Diabetes, Atrial fibrillation, and hypothyroidism. The patient takes levothyroxine, atorvastatin, sotalol and aspirin. There were no known allergies.

Case Studies: 69 y/o F via EMS with Pre-Arrival LVO Stroke Alert

Initial assessment by EMS:

Initial Vital signs:

BP: 212/120 by auscultation

BGL: 118

Pulse: 120, irregular

SPO2: 97%

GCS: 11

Cincinnati Stroke Scale: Positive for weakness and arm drift to right side. Unable to speak or form words. Facial droop noted to right side of face.

Case Studies: 69 y/o F via EMS with Pre-Arrival LVO Stroke Alert

Initial assessment by EMS (cont...):

Patient was noted to have a right sided facial droop. The patient was noted to have RIGHT arm drift and right sided weakness with an occasional non-purposeful movement in her right arm. Right leg was very weak and she had an unsteady gait. She was alert and able to follow some commands, but not able to speak with aphasia noted. Patient has a strong, regular pulse rate. Patient blood pressure is noted to be hypertensive. Patient appeared to try following specific commands but was unable to complete most tasks.

Case Studies: 69 y/o F via EMS with Pre-Arrival LVO Stroke Alert

Initial assessment by EMS (cont.):

Pupils are round, equal, and reactive to light. Patient would have spontaneous eye movement and would look at EMS when she was asked a question, but did not respond. Patient was able to say the occasional yes or no, but no purposeful sentences were able to be conveyed. Chest rises and falls equally, bilaterally. Patient is breathing at a normal rate, no retractions or use of accessory muscles. Lung sounds are clear bilaterally when auscultated. 4-lead showed atrial fibrillation and 12-lead showed atrial fibrillation with no ST elevation noted. Further ongoing assessments were performed throughout incident.

Case Studies: 69 y/o F via EMS with Pre-Arrival LVO Stroke Alert

RACE Scoring of this patient

Perform Rapid Arterial Occlusion Evaluation (RACE) Assessment			
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		Moderate: performs one task correctly	1
		Severe: Cannot perform either task	2
Agnosia (Left side)	Ask patient: 1. "Whose arm is this?" (while showing affected arm) 2. "Can you move your arm?"	Normal: recognizes and attempts to move arm	0
		Moderate: does not recognize OR is unaware of arm	1
		Severe: does not recognize AND is unaware of arm	2
Is total RACE high (5-9) or low (0-4)?			8

ALWAYS ASSESS THESE FOUR AREAS

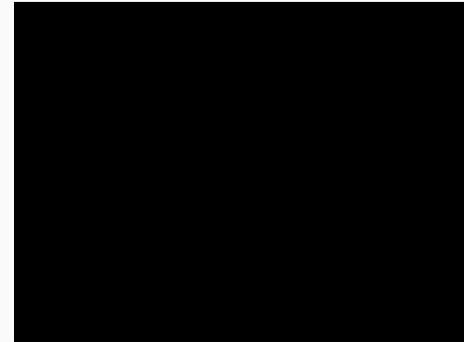
ONLY ASSESS ONE OF THESE TWO AREAS



Case Studies: 69 y/o F via EMS with Pre-Arrival LVO Stroke Alert

Outcome:

Race score noted to be 8. LVO Stroke alert was called as a pre-arrival notification to the hospital through 911 dispatch. Vascular access is obtained via large-bore IV. Ondansetron was administered due to patient vomiting and the airway was suctioned. Vital signs were reassessed with little to no change, remained hypertensive. Upon completion of transport, the patient was wheeled by stretcher directly to the CT Scanner exam room. All EMS monitoring equipment was left on the patient after they were lifted from the stretcher to the CT bed as CT was performed. Patient care was transferred to Stroke Team.

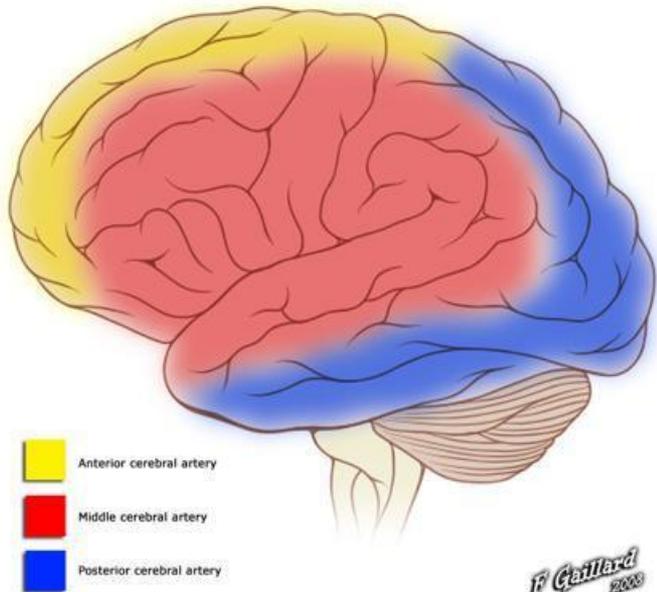


Case Studies: 69 y/o F via EMS with Pre-Alert

- PMH: HTN, HLD, Afib-no OAC, hypothyroidism
- LKW: 2/23: 1430, was at Dr.'s office.
- ASRT paged: 1520
- ASRT Arrival: 1535
- ED arrival: 1542
- NIHSS 1545: 22-Decreased LOC, not oriented, unable to follow commands, left gaze preference, visual field loss, facial droop, right hemiparesis, decreased sensory, mute, neglect
- PmRS: 0
- CTH started: 1545
- CTH resulted 1549: Possible hyperdense left MCA
- IV thrombolytic decision: 1553
- CTA started: 1556
- IV thrombolytic given: 1600 (DTN 18 minutes) (AHA Target Stroke DTN \leq 30min for at least 50% of cases)
- CTA resulted: 1602-M1 segment of the left MCA Occlusion

Case Studies: 69 y/o F via EMS with Pre-Arrival LVO Stroke Alert

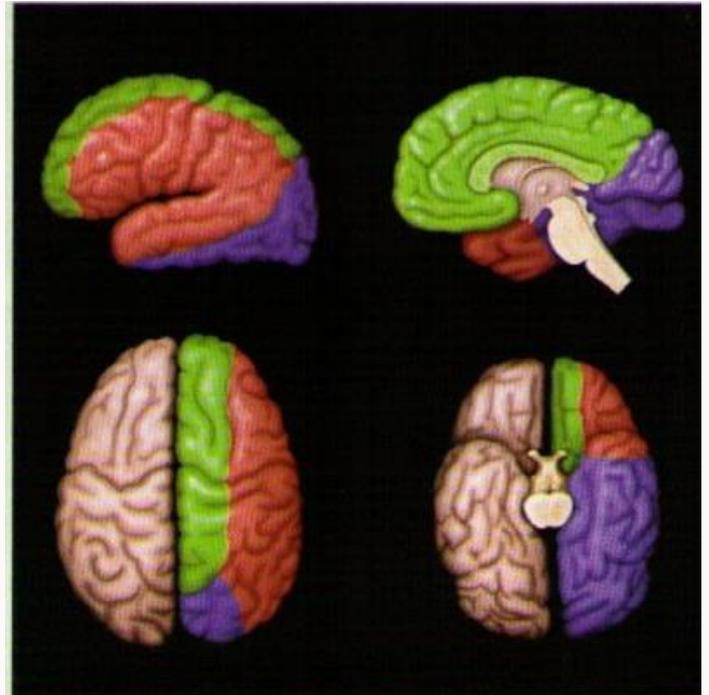
Cortical vascular territories



F. Gaillard
2008

© Radtopedia.org

Line drawing of brain by Patrick Lynch (patricklynch.net)

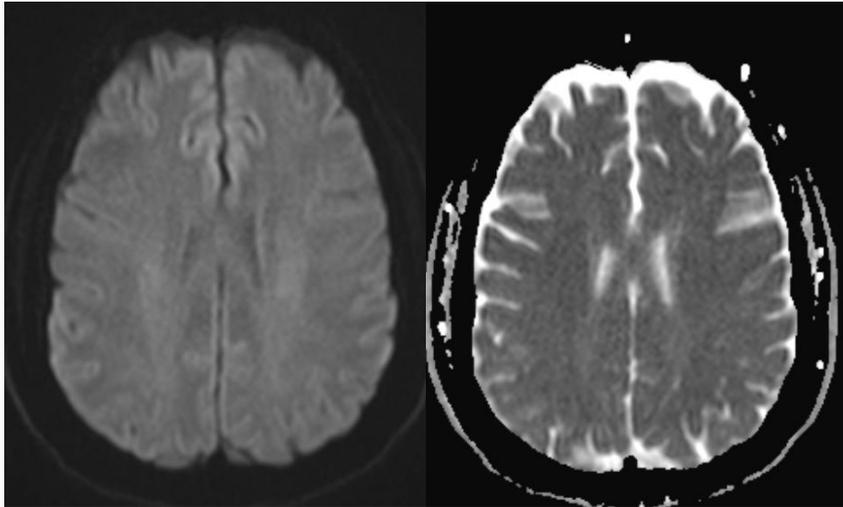


Case Studies: 69 y/o F via EMS with Pre-Alert

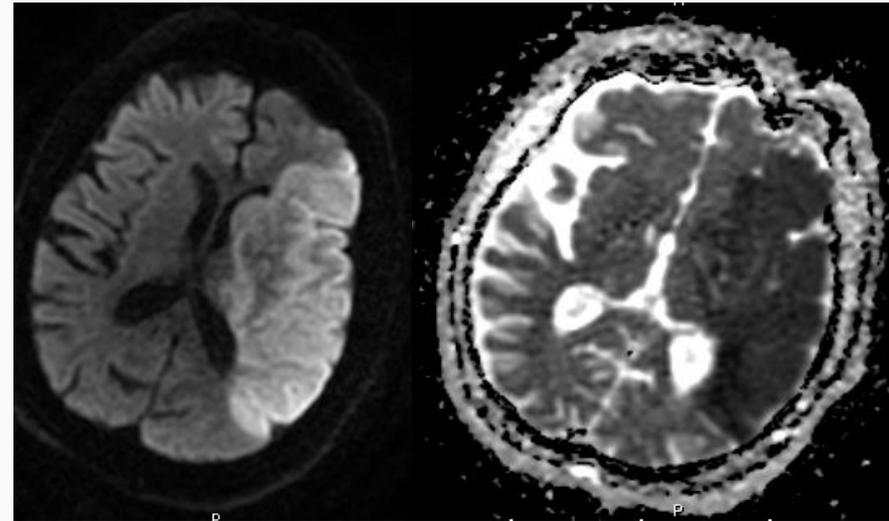
- EVT decision: 1602
- Arrival to EVT: 1615
- Groin puncture: 1626
- Clot engagement: 1640
- Clot retrieval: 1649
- (Door to Clot Engagement): 58 minutes. **AHA target time DTE <90 minutes 50% of the time**
- TICl score: 3
- Post procedure NIH: 0 (at baseline has mild word finding issues)
- MRI: negative
- LOS: 3 days
- Discharged to home 2/24: NIHSS 0
- F/u in stroke clinic 4/18: Mild LLE weakness, back to work

Case Studies: 69 y/o F via EMS with Pre Alert

Without timely identification, transport, assessments and quick interventions, this patients outcomes could have been drastically different!



Patients MRI



Left MCA AIS on MRI

Case Studies: 69 y/o F via EMS with Pre-Alert

Summary of Times

Event:	Minutes from arrival:	Time:	
ASRT paged:		1520	
PTA			
ASRT arrival:		1535	
PTA			
Arrived to ED:		1542	
0			
ED physician seen:	1542		0
CTH scout:		1545	
3			
NIHSS:		1545	
3			

Case Study-69 y/o M. Private vehicle with IV TNkase

- PMH: CAD, HTN, HLD, TIA
- LKW: 1430
- Arrived to ED: 1505
- ASRT paged: 1508
- ASRT arrival: 1512
- CTH scout: 1514
- NIHSS 1516: 4-mild left sided weakness, mild sensory loss, facial droop
- pmRs: 0
- CTH resulted 1518: negative
- CTA scout: 1522
- CTA resulted: 1530
- Vital signs: 1532
- IV lytic decision: 1535
- IV lytic given: 1538

Case Study-69 y/o M. Private vehicle with IV TNkase

- MRI: negative
- LOS: 2
- Discharge NIH: 2 for facial droop and sensory loss
- Discharge Disposition: Home with outpatient OT
- Stroke clinic f/u 2 months later: left hand fine motor difficulties and left hand weakness, off balance at times

Case Study-69 y/o M. Private vehicle with IV TNkase

Event:	Minutes from arrival:	Time:
Arrived to ED		1505
	0	
ASRT paged:		1508
	3	
ED physician seen:	1508	
	3	
CTH scout:		1514
	9	
NIHSS:		1516
	11	
CTH result:		1518
	14	
CTA scout:		1522

Case Studies-Time Comparison of Pre Alert vs POV

Pre-Notification

Walk In

Event:	Time:	Event:	Time:
	Minutes from arrival:		Minutes from arrival:
ASRT paged:	PTA	Arrived to ED:	0
ASRT arrival:	1520	ASRT paged:	1505
	PTA	Arrived	1508
to ED:	1535	ED physician seen:	3
0	1542	CTH scout:	1508
ED physician seen:	1542	NIHSS:	3
0	1545	CTH result:	1514
CTH scout:	NIHSS:	CTA scout:	9
3	1545		1516
	CTH		11
3	1549		1518
result:			14
0			1522
			18

Questions?



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