



Stroke Severity Screening Guide

MINNESOTA STROKE PROGRAM

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Introduction

Emergency Medical Services (EMS) is frequently the first contact with a suspected stroke patient in the community. The rapid triage, assessment, and identification of a suspected stroke and stroke severity in the field is crucial as stroke treatment options are time sensitive. Studies have shown that patients who receive treatment recover faster. There are two main treatment options for ischemic strokes; IV thrombolytic therapy and endovascular thrombectomy (EVT) also known as mechanical thrombectomy, for strokes caused by large vessel occlusion (LVO). LVO strokes are a type of ischemic stroke caused by an occlusion of any major artery of the brain. The arteries impacted could be the internal carotid arteries, middle cerebral arteries, anterior cerebral arteries, basilar artery, and posterior cerebral arteries. Currently EVT is the standard of care for LVO ischemic strokes. EVT is a minimal invasive surgical procedure that involves specialty providers and equipment to remove the blood clot from the blocked artery in the brain, which can restore blood flow, minimizing brain damage. Not all hospitals are equipped to provide these services, but you should be familiar with what hospitals within your region can. For a full list of designated stroke centers participating in the Minnesota Stroke System (Acute Stroke Ready Hospitals, Primary Stroke Centers (*Thrombectomy-capable Stroke Centers/PSC+, and Comprehensive stroke centers) please visit [MDH Stroke System Designated Hospitals \(www.health.state.mn.us/diseases/cardiovascular/stroke/designationlist.html\)](http://www.health.state.mn.us/diseases/cardiovascular/stroke/designationlist.html).

Each EMS agency should continue to use their screening tool and consider the addition of a severity tool for use to aide in the identification of large vessel occlusive strokes, helping to communicate the severity of an incoming stroke patient and ensure eligible patients are transferred expeditiously to receive specialized care. This guide is intended to provide background information, tools, and resources with an appendix full of samples to reference to help your EMS agency and/or your EMS partners take the next step in stroke care by implementing a stroke severity screening tool to identify large vessel occlusions in addition to your stroke identification scale.

Background

The landscape for stroke treatment changed abruptly in early 2015 when endovascular trial data was released demonstrating efficacy of endovascular thrombectomy (EVT), also known as mechanical thrombectomy, for acute ischemic stroke patients receiving treatment within six hours of symptom onset. A few years later, the 2018 American Heart Association/American Stroke Association Guidelines for the Early Management of Patients with Acute Ischemic Stroke were updated to reflect the results from clinical trials demonstrating select patients with acute ischemic stroke could benefit from EVT beyond six hours from symptom onset and up to 24 hours for select patients.

Oftentimes EMS personnel have first contact with suspected stroke patients. Identification of stroke symptoms and pre-notification to the hospital expedites care and facilitates timely treatment of stroke. Eligible stroke patients may receive thrombolytic therapy if presentation to the hospital is within 4.5

hours of last known well and may receive mechanical thrombectomy if presentation is within 24 hours of last known well.

In working to ensure expedited care, stroke severity screening tools were developed to identify potential LVOs in the pre-hospital setting. Benefits of severity screening may include direct transport to the most appropriate stroke center. Other benefits include earlier mobilization of resources and expedited imaging, treatment, and transfer. The American Heart Association and the American Stroke Association's Recommendations for Regional Stroke Destination Plans in Rural, Suburban, and Urban Communities from the Prehospital Stroke System of Care Consensus statement supports utilization of a stroke severity tool to aid in transport decisions for suspected large vessel occlusions. However, distance to a thrombectomy-capable stroke centers remain the limiting factor. Given the geographical landscape of Minnesota with many stroke centers located in rural areas re-routing may not be a factor. Implementation of a stroke severity screening tool should still be considered to aide in identifying the need for rapid interfacility transport.

The Minnesota Department of Health and the American Stroke Association encourage EMS agencies to adopt a stroke severity tool for use into their stroke protocol. In Minnesota there are three stroke severity scales that are commonly used: Rapid Arterial Occlusion Evaluation Scale (RACE), Field Assessment Stroke Triage for Emergency Destination (FAST-ED), and Vision Aphasia Neglect (VAN). Presently, one scale has not been shown to be superior to the others. EMS agencies should communicate protocol changes to hospitals they transport to. This guide will go into further detail providing examples of those tools and included in the appendix are examples from Minnesota EMS agencies.

Stroke protocols

Creating and maintaining a stroke protocol is important for your EMS agency and is an important starting place when considering adding stroke severity screening to your operations. Having a clear pathway to follow when a suspected stroke is identified can expediate care and timely treatment. If you do not have a protocol established yet, these are the recommended components to be included in a pre-hospital stroke protocol:

- Documentation of a time discovered
- Documentation of a last known well time
- Stroke scale performed (such as Cincinnati Prehospital Stroke scale)
- *Stroke severity screening performed*
- Blood glucose level check
- Recommended scene time of less than 15 minutes
- Early notification to the receiving hospital, identifying a suspected stroke is en route
- Work with hospital partners to develop consistent terminology for communication of a stroke code/stroke alert activation
- Transport to the closest designated stroke hospital

Stroke scales

As listed above, performing a stroke scale to identify a potential stroke is the first step in providing quality stroke care. There are several stroke identification tools/scales that are available and endorsed by the American Heart Association (AHA). They are designed to be a fast diagnostic tool so that suspected stroke patients are quickly identified and rapidly transferred to the closest designated stroke hospital for care. Listed below are two examples of stroke scales:

Cincinnati Prehospital Stroke Scale:

Positive Cincinnati Prehospital Stroke Scale (2 out of the 3 at minimum):

- **Difficulty speaking**
- **Arm weakness**
- **Facial droop**

Los Angeles Prehospital Stroke Scale (LAPSS)

Screening Criteria	Yes	No
1. Age over 45		
2. No prior history of seizure disorder		
3. New onset of neurologic symptoms in the past 24 hours		
4. Patient was ambulatory at baseline		
5. Blood glucose between 60 and 400		
6. On exam patient only has unilateral weakness (not bilateral)		
7. If Yes or unknown to all items above LAPSS screening criteria met:		
8. If LAPSS criteria for stroke met, call receiving hospital with "Code Stroke"		

Stroke severity screening tools

After identifying a suspected stroke, determining whether the stroke is due to a large vessel occlusion is essential to reduce the time to endovascular treatment. There are numerous stroke severity tools currently in use by EMS agencies throughout the state of Minnesota. Highlighted in this section are the ones most used in Minnesota. Neither the Minnesota Department of Health (MDH) nor the AHA endorse one tool over another as no one tool has been shown to be superior in field testing. The three stroke severity scales included are: Field Assessment Stroke Triage for Emergency Destination (FAST-ED), Rapid Arterial Occlusion Evaluation Scale (RACE), and Vision, Aphasia, Neglect (VAN).

Field Assessment Stroke Triage for Emergency Destination (FAST-ED)

Field Assessment Stroke Triage for Emergency Destination is an AHA approved scale. It measures facial palsy, arm weakness, speech changes, eye deviation, denial, or neglect. Each category is measured on a zero to one or two scale based on absent, mild, or severe symptoms and the total is summed in a predicted value is given. In this diagram you see there's also a comparison to the National Institutes of Health Stroke Scale (NIHSS) so you can see how they compare. A systematic review published in 2019 in BMC Emergency Medicine found that the sensitivity of the scale at 71% and a specificity at 78% with a positive predictive value at 62%. Sensitivity is a tests ability to identify a person having a large vessel occlusion stroke; a highly sensitive test means it is less likely to have false negatives. Whereas specificity is the ability of the test to determine who is not having a LVO stroke; a highly specific test means it is less likely to have false positive. Positive predictive value is the ratio of patients truly found to be having a large vessel occlusion stroke to all those who initially tested positive.

Item	FAST-ED Score
Facial Palsy	
Normal or minor paralysis	0
Partial or complete paralysis	1
Arm Weakness	
No drift	0
Drift or some effort against gravity	1
No effort against gravity or no movement	2
Speech Changes	
Absent	0
Mild to moderate	1
Severe, global aphasia or mute	2
Eye deviation	
Absent	0
Partial	1
Forced deviation	2
Denial/Neglect	
Absent	0

Item	FAST-ED Score
Extinction to bilateral stimulation in only one sensory modality	1
Does not recognize own hand or orients only to one side of the body	2

FAST-ED >3 - Antipova et al. BMC Emer Med 2019; 19:49

Rapid Arterial Occlusion Evaluation Scale (RACE)

The Rapid Arterial Occlusion Evaluation scale also known as RACE is another stroke severity scale used throughout Minnesota. In this scale facial palsy, arm drift, leg drift, gaze deviation, aphasia, agnosia are all measured with a scale of either zero to one or two as well based on whether they are mild or moderate in severity. The scales are then totaled on a 0 to 9 scale, with the higher the number the more likely a large vessel occlusion is present. This diagram also shows the comparison to the NIHSS. According to the same systematic review it found that sensitivity of the RACE scale to be 74% with a specificity of 80% and a positive predictive value of 85%.

Item	RACE Score
Facial Palsy	
Absent (symmetrical movement)	0
Mild (slightly asymmetrical)	1
Moderate to severe (completely asymmetrical)	2
Arm Motor Function	
Normal (limb held up more than 10 seconds)	0
Moderate (limb held up less than 10 seconds)	1
Severe (patient did not rise the arm against gravity)	2
Leg Motor Function	
Normal to mild (limb held up more than 5 seconds)	0
Moderate (limb held up less than 5 seconds)	1
Severe (patient did not rise the arm against gravity)	2
Head and Gaze Deviation	
Absent	0
Present	1
Aphasia (if right hemiparesis)	

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Item	RACE Score
Normal (performs 2 orders correctly)	0
Moderate (performs 1 order correctly)	1
Severe (performs neither order)	2
Agnosia (if left hemiparesis) – ask them who’s arm it is (asomatognosia) and to move their arm (anosognosia)	
Normal	0
Moderate (asomatognosia or anosognosia)	1
Severe (both of them)	2
RACE Score Total	0-9

*Antipova et al. BMC Emer Mde 2019; 19:49

Vision, Aphasia, Neglect (VAN)

This scale measures arm drift, visual disturbance, aphasia, neglect. The key to the VAN scale is that the patient must have arm drift before proceeding with the rest of the assessment. As you move through the scale, like the Cincinnati stroke scale, it is either positive or negative for large vessel occlusion. There is nothing to calculate or checklists to complete. The sensitivity is said to be 95% however the specificity is only 56% with a positive predictive value of 23%. This scale is fast for providers to perform but may need to be further studied as to its accuracy in predicting large vessel occlusions.

Stroke VAN

How weak is the patient?	
	Mild (minor drift)
	Moderate (severe drift)
	Severe (flaccid or no antigravity)
	Patient show no weakness. Patient is VAN negative
Visual disturbance	
	Field cut (which side)
	Double vision
	Blind new onset
	None
Aphasia	
	Expressive (inability to speak or paraphasic errors)
	Receptive (not understanding or following commands)
	Mixed
	None
Neglect	
	Forced gaze or inability to track to one side

How weak is the patient?	
	Unable to feel both sides at the same time, or unable to identify own arm
	Ignoring one side
	None

*Antipova et al. BMC Emer Med 2019; 19:49

Conclusion

Detecting a stroke in the field is imperative for decreasing the time to treatment and improving stroke outcomes. Large Vessel Occlusion strokes require special treatment that isn't available at every hospital. We encourage your agency to work with your local hospital and medical director to adopt a stroke severity tool into your already established stroke protocol. Incorporating a stroke severity tool can help to improve identification and communication of large vessel occlusion strokes to the closest designated stroke hospital. Alerting the receiving hospital can allow them to activate their resources and prepare for possible transfer to a higher level of care.

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Appendix:

Appendix A: Evidence-based strategies for stroke identification in the pre-hospital setting with use of a stroke severity tool.

The Minnesota Department of Health, American Stroke Association, and the MN Stroke Advisory Group advocates these strategies for triage and assessment of suspected stroke in the pre-hospital setting. EMS agencies are encouraged to adopt a stroke severity tool for use into their stroke protocol. In Minnesota there are three stroke severity scales that are commonly used: Rapid Arterial Occlusion Evaluation Scale (RACE), Field Assessment Stroke Triage for Emergency Destination (FAST-ED), and Vision Aphasia Neglect (VAN). Presently, one scale has not been shown to be superior to the others. EMS agencies should communicate protocol changes to hospitals they transport to.

1. **Limit on-scene time:** Obtain vitals and provide ABC interventions. Interview witnesses and obtain phone numbers. EMS personnel should strive to be on scene for ≤ 15 minutes.
2. **Assessment:** perform physical exam, obtain POC blood glucose and perform validated prehospital stroke screen such as Cincinnati Stroke Scale etc.), document Last Known Well (LKW) and symptom discovery as clock time.
3. **Initiate stroke protocol:** perform validated stroke severity tool assessing for potential large vessel occlusion (LVO)

Stroke severity tools are a numerical scale used to determine the severity of the neurological deficits once a stroke is suspected. This may help to identify patients with large vessel occlusions that may be candidates for endovascular thrombectomy. Note there are multiple tools currently in use, yet no single tool has been shown to be superior. The following three scales are commonly used by EMS agencies throughout Minnesota:

- Rapid Arterial Occlusion Evaluation Scale (RACE)
 - Field Assessment Stroke Triage for Emergency Destination (FAST-ED)
 - Vision Aphasia Neglect (VAN)
4. **Pre-hospital notification and transport:** pre-notify hospital of assessment and findings and transport to most appropriate designated stroke center.
 - a. **LKW < 4.5 hours:** potential thrombolytic candidate, transport to closest designated stroke center, pre-notify with findings
 - b. **Suspected LVO & < 24 hours from LKW:**
 - i. Transport time to CSC or TSC < 30 minutes: consider direct transport, pre-notify with findings
 - ii. Transport time to CSC or TSC > 30 minutes: transport to closest designated stroke center, pre-notify with findings to support rapid interfacility transport
 - c. **Wake-up with symptoms:** IV thrombolytics may be considered for some patients who awake with stroke symptoms and have an unclear time of onset. Advanced Imaging will be used to guide treatment options. Transport to most appropriate designated stroke center.

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

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

Prehospital Stroke Screening Tools

According to the Recommendations for the Establishment of Stroke Systems of Care: A 2019 Update A Policy Statement from the American Stroke Association prehospital stroke screening tools remain an important aspect of stroke care. In an Italian study of 18,231 EMS dispatches for stroke-like symptoms, the positive predictive value of the dispatch stroke/TIA symptoms being confirmed on scene by EMS providers was 34.3% (95% CI, 33.7%–35.0%; 6262 of 18 231), and the sensitivity was 64.0% (95% CI, 63.0%–64.9%; 6262 of 9791). Centers that used the Cincinnati Prehospital Stroke Scale (CPSS) more often (i.e., >10% of cases) had higher sensitivity (71% [95% CI, 87%–89%] vs 52% [95% CI, 51%–54%]). In a systematic review of prehospital stroke scales performed by EMS providers in the field, both the CPSS (area under the curve, 0.813) and the Los Angeles Prehospital Stroke Screen (area under the curve, 0.964) showed better performance than five other field stroke recognition scales. The Los Angeles Prehospital Stroke Screen performed more consistently, but the CPSS had similar diagnostic capability. Of 184 179 US EMS transports with primary impressions of stroke, only 46% met the recommended on-scene time of <15 minutes. Furthermore, hospital prenotification occurs in only 67% of EMS transports. Stroke systems of care should endeavor to enhance recognition of stroke symptoms by dispatch and EMS providers, to reduce on-scene time in transported patients, and to improve prenotification of the receiving hospital.

Prehospital Stroke Severity Scales and Rerouting of Patients

The Stroke Systems of Care: A 2019 Update further recommends with the advent of thrombectomy for acute ischemic stroke with large vessel occlusion (LVO) of the internal carotid artery and middle cerebral artery stem (M1) and worse outcomes with delays to thrombectomy, ensuring that EMS providers transport patients with acute neurologic deficits to the right hospital for the best treatment as quickly as possible is increasingly critical. At least six stroke severity scales targeted at the recognition of LVO in the prehospital setting to facilitate transfer to thrombectomy centers have been published. However, all the scales were initially derived from data sets of confirmed stroke cases or selected prehospital cases. Three of the current scales have been tested in the prehospital setting in a limited fashion and without head-to-head comparisons. The Cincinnati Stroke Triage Assessment Tool, Rapid Arterial Occlusion Evaluation, Los Angeles Motor Scale, and Field Assessment Stroke Triage for Emergency Destination are specifically named on the AHA Mission: Lifeline severity-based stroke triage algorithm for EMS.

For prehospital patients with suspected LVO by a stroke severity scale, the Mission: Lifeline algorithm recommends direct transport to a CSC if the travel time to the CSC is <15 additional minutes compared with the travel time to the closest PSC or ASRH. At this time, there is insufficient evidence to recommend one scale over the other or whether the proposed 15-minute specific threshold of additional travel time for bypass of a PSC or ASRH is optimal. Given the known impact on outcomes of

every 15-minute delay of intravenous alteplase the known impact of delays to thrombectomy and the anticipated delays in transport for thrombectomy in eligible patients originally triaged to a non-endovascular capable center, the Mission: Lifeline algorithm is a reasonable approach. Further research is warranted, and prehospital algorithms will need to be updated periodically as new evidence emerges.”

Recommendations

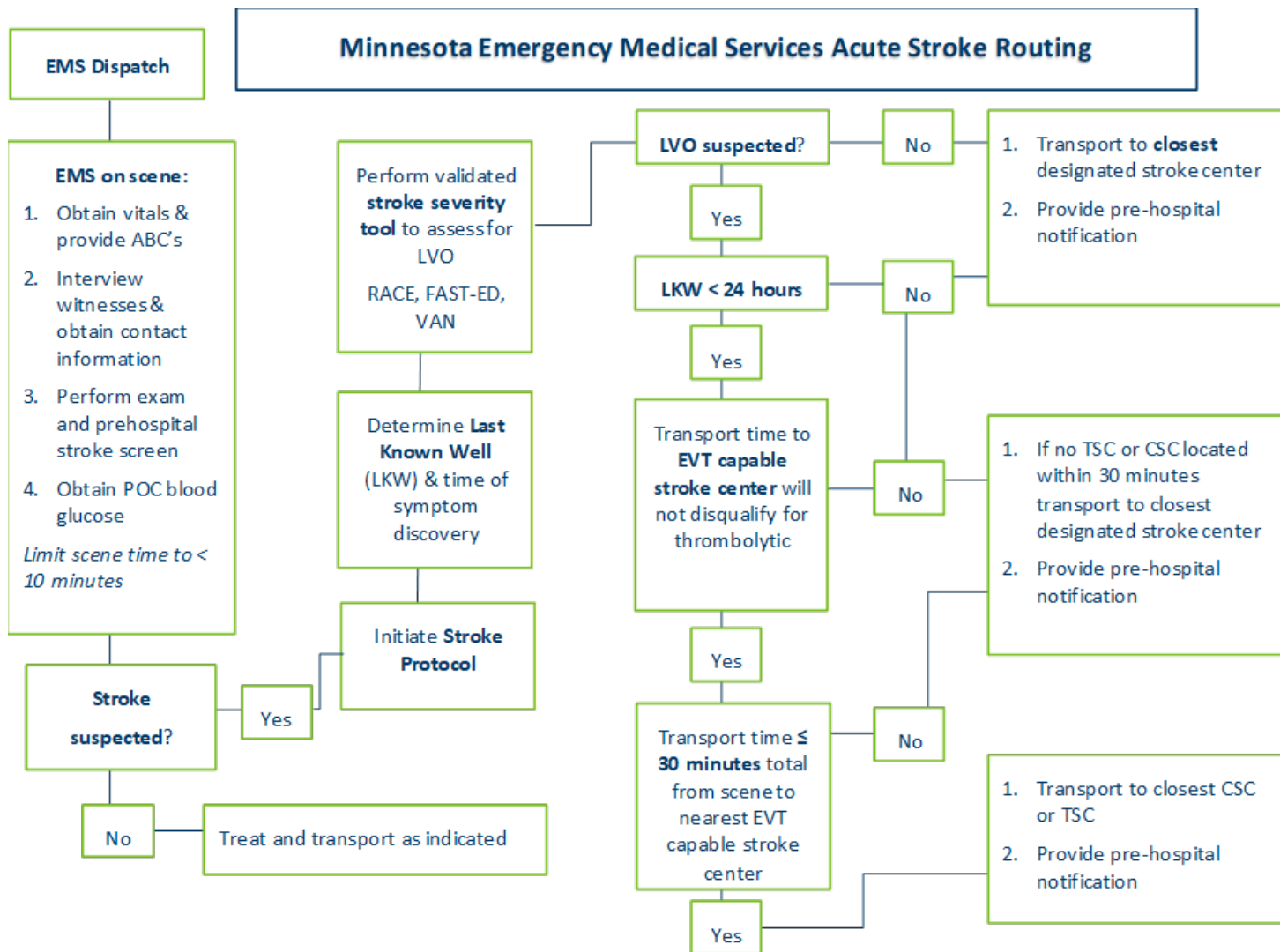
1. Public health leaders along with medical professionals and others should design and implement public education programs focused on stroke systems and the need to seek emergency care (by calling 9-1-1) in a rapid manner. These programs should be repetitive and designed to reach diverse populations. Further research is needed to establish the most effective programs for diverse populations. (2019 New Recommendation)
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. (2019 Revised Recommendation)
 - a. In prehospital patients who screen positive for suspected stroke, a standard prehospital stroke severity assessment tool (e.g., 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. (2019 New Recommendation)
 - 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. (2019 New Recommendation)
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. (2019 New Recommendation)
 - a. Protocols that include prearrival notification by EMS that a stroke patient is en route should be used in all cases. (2019 New Recommendation)

Source: Adeoye O, Nystrom KV, Yavagal DR, Luciano J, Nogueira RG, Zorowitz RD, Khalessi AA, Bushnell C, Barsan WG, Panagos P, et al. Recommendations for the Establishment of Stroke Systems of Care: A 2019 Update. Stroke. 2019;50:e187-e210. <https://doi.org/10.1161/STR.000000000000173>

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Characteristics	ASRH	PSC	TSC	CSC
Location	Typically Rural	Often Urban/suburban	Often Urban/suburban	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 (CTA, 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. Stroke Volume 52, Issue 5, May 2021; Pages e133-e152 <https://doi.org/10.1161/STROKEAHA.120.033228>



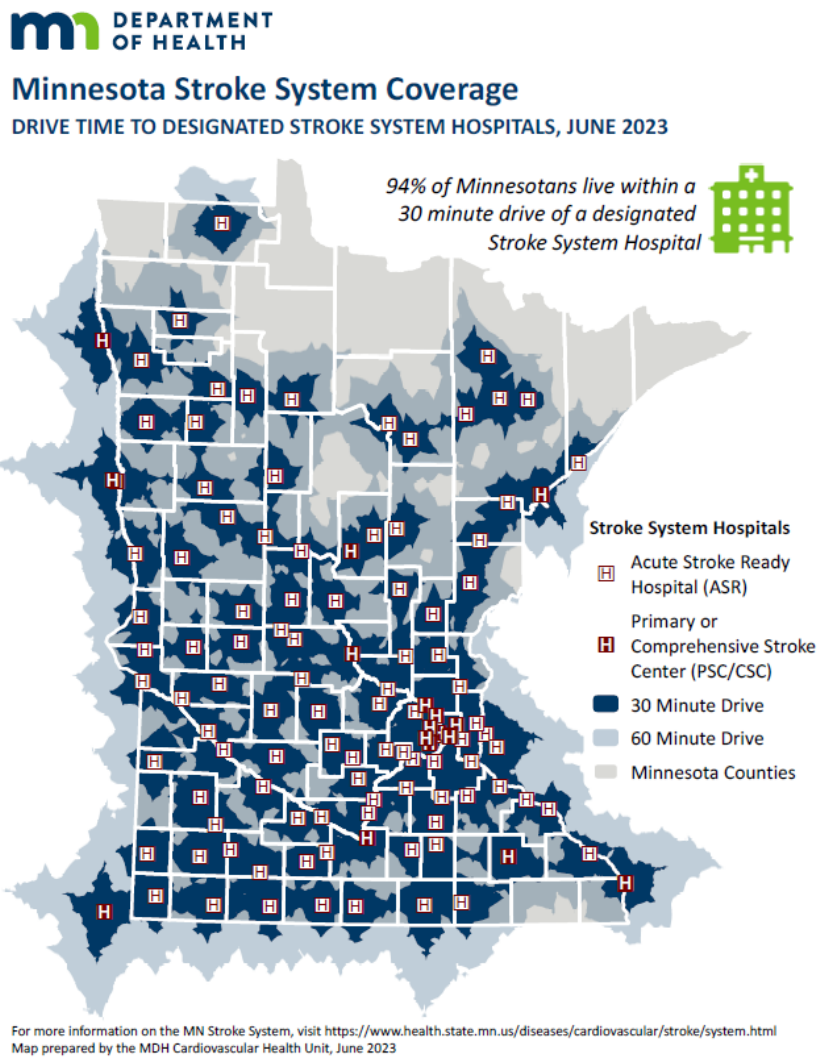
Appendix A1: Minnesota emergency medical services acute stroke routing narrative

1. EMS Dispatch
2. EMS on scene:
 - a. Obtain vitals & provide ABC's
 - b. Interview witness & obtain contact information
 - c. Perform exam and prehospital stroke screen
 - d. Obtain POC blood glucose
 - i. *Limit scene time to <10 minutes*
3. Is a stroke suspected?
 - a. If no, treat and transported as indicated.
 - b. If yes, proceed to step #4.
4. Initiate stroke protocol
5. Determine Last Known Well (LKW) & time of symptom discovery
6. Perform validated stroke severity scale to assess for LVO (ex. RACE, FAST-ED, VAN)
7. LVO suspected?
 - a. If no, proceed to step #12
 - b. If yes, proceed to step #8
8. Last Known Well < 24 hours
 - a. If no, proceed to step #12
 - b. If yes, proceed to step #9
9. Transport time to EVT capable stroke center will not disqualify for thrombolytic
 - a. If no, proceed to step #13
 - b. If yes, proceed to step #10
10. Transport time \leq 30 minutes total from scene to nearest EVT capable stroke center
 - a. If no, proceed to step #12
 - b. If yes, proceed to step #11
11. Transport to closest CSC or TSC and provide pre-hospital notification
12. Transport to closest designated stroke center and provide prehospital notification
13. If no TSC or CSC located within 30 minutes, transport to closest designated stroke center. Provide prehospital notification.

Appendix B: Stroke statutes in Minnesota

Minnesota stroke statutes

The Stroke System of Care was enacted in 2013. The Minnesota Stroke System is a coordinated statewide system of care that ensures hospitals statewide are equipped and ready to treat stroke quickly. Since 2015, the overall number of patients treated with these time sensitive medications for stroke has increased by 25%. The Stroke System has grown exponentially over the last decade from 19 stroke hospitals to now include 119 designated stroke hospitals. The percentage of Minnesotans living within 30 minutes of a designated stroke hospital has grown from 66% in 2013 to 94% in 2023 resulting in an additional 1.9 million residents now having better access to emergency stroke care.



Hospital statutes:

In 2013 the Minnesota Department of Health (MDH) became authorized to designate hospitals as Acute Stroke Ready Hospitals, Primary Stroke Centers, and Comprehensive Stroke Centers.

144.493 CRITERIA.

Subdivision 1. Comprehensive stroke center. A hospital meets the criteria for a comprehensive stroke center if the hospital has been certified as a comprehensive stroke center by the joint commission or another nationally recognized accreditation entity and the hospital participates in the Minnesota stroke registry program.

Subd. 2. Primary stroke center. A hospital meets the criteria for a primary stroke center if the hospital has been certified as a primary stroke center by the joint commission or another nationally recognized accreditation entity and the hospital participates in the Minnesota stroke registry program.

Subd. 3. Acute stroke ready hospital. A hospital meets the criteria for an acute stroke ready hospital

if the hospital has the following elements of an acute stroke ready hospital:

- (1) an acute stroke team available or on call 24 hours a day, seven days a week;
- (2) written stroke protocols, including triage, stabilization of vital functions, initial diagnostic tests, and use of medications;
- (3) a written plan and letter of cooperation with emergency medical services regarding triage and communication that are consistent with regional patient care procedures;
- (4) emergency department personnel who are trained in diagnosing and treating acute stroke;
- (5) the capacity to complete basic laboratory tests, electrocardiograms, and chest x-rays 24 hours a day, seven days a week;
- (6) the capacity to perform and interpret brain injury imaging studies 24 hours a day, seven days a week;
- (7) written protocols that detail available emergent therapies and reflect current treatment guidelines, which include performance measures and are revised at least annually;
- (8) a neurosurgery coverage plan, call schedule, and a triage and transportation plan;
- (9) transfer protocols and agreements for stroke patients; and
- (10) a designated medical director with experience and expertise in acute stroke care

144.494 Designation Stroke Centers and Stroke Hospitals

Subd. 1 Naming privileges

Unless it has been designated as a stroke center or stroke hospital pursuant to section 144.493, no hospital shall use the term “stroke center or “stroke hospital” in its name or its advertising or shall otherwise indicate it has stroke treatment capabilities.

Subd. 2. Designation

A hospital that voluntarily meets the criteria for a comprehensive stroke center, primary stroke center, or acute stroke ready hospital may apply to the commissioner for designation, and upon the commissioner's review and approval of the application, shall be designated as a comprehensive stroke center, a primary stroke center, or an acute stroke ready hospital for a three-year period. If a hospital loses its certification as a comprehensive stroke center or primary stroke center from the joint commission or other nationally recognized accreditation entity, or no longer participates in the Minnesota stroke registry program, its Minnesota designation shall be immediately withdrawn. Prior to expiration of the three-year designation, a hospital seeking to remain part of the voluntary acute stroke system may reapply to the commissioner for designation.

Emergency Medical Services statute

Minnesota has statutes for stroke care for Emergency Medical Services to improve prehospital identification of suspected stroke through the use of triage protocols with an additional transport component to ensure suspected stroke patients are transferred to the most appropriate designated stroke hospital.

144E.16 Subd. 7.

Stroke transport protocols. *Regional emergency medical services programs and any ambulance service licensed under this chapter must develop stroke transport protocols. The protocols must include standards of care for triage and transport of acute stroke patients within a specific time frame from symptom onset until transport to the most appropriate designated acute stroke ready hospital, primary stroke center, or comprehensive stroke center.*

Appendix C: Sample protocols

Glacial Ridge Ambulance service protocol

Suspect Stroke/TIA

***CALL HOSPITAL WITH A STROKE ALERT AS SOON AS YOU HAVE A POSSIBLE STROKE!**

1. Do initial assessment.
 - o Cincinnati Stroke Test:
 - B**-Balance
 - E**-Sudden loss of vision one or both Eyes
 - F**-Facial Droop
 - A**-Arm Drift
 - S**- Speech
 - T**- Time last know well <4.5 Hour If greater than, >4.5 hours complete a VAN assessment.
2. Call for intercept out of Glenwood, if not already en-route.
3. Get SAMPLE and vitals. Including a Blood Sugar.
4. Airway control: Oxygen Sat.>90% give 2L/NC/O2,if Oxygen Sat.<90% give 10L/NRB/O2, suction, and ventilate as needed.
5. Re-assess airway and level of consciousness frequently. Observe change in neurological status. Perform detailed physical exam and ongoing assessment.

Paramedic and EMT-Advanced

1. After the BLS tasks are finished continue with...
 - a. IV access and Blood Draw
 - i. 1 successful IV with a blood draw than proceed to obtain a second IV access!
 - ii. 1 successful IV and NO blood draw, than STOP!

*Preferably a 18 gage in the right antecubital first, if unsuccessful on first try than STOP, do not attempt a second. Continued attempts for blood draw and IV's will be performed in the E.R.

Essentia Health protocol



Emergency Medical Services- Deer River/Sandstone

A8. PATIENT DISPOSITION – STROKE/TIA

ALL PROVIDERS (BLS) (ALS) (STP)
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1. Inclusion criteria:

A. Positive Cincinnati Prehospital Stroke Scale:

- Difficulty speaking.
- Arm weakness
- Facial droop.

OR

B. Any of the following additional findings:

- Numbness or weakness in the face, arms or legs, particularly on one side of the body
- Confusion with aphasia (expressive and / or receptive)
- Difficulty speaking or understanding what others are saying
- Difficulty walking, loss of balance or coordination
- Severe headache that does not have obvious or known cause
- Nonspecific visual complaints with Partial, Complete or Bilateral visual field loss or double vision
- Sudden onset of continuous vertigo **AND** any of the following conditions:
 - 1) 65 years of age or older
 - 2) Younger than 65 with risk factors (i.e. Smoking, diabetes, HTN, etc.)
 - 3) Posterior neck pain in setting of recent manipulation or injury (suggesting dissection).

3. Transport directly the closest **Acute Stroke Ready Hospital, Primary Stroke Center, or Comprehensive Stroke Center** for treatment if last known well time was **< 24 hours**.
4. Advise pre-notification of “**Stroke Alert**” if patient meets the onset criteria of **<24 hours** for re-perfusion therapy.
5. Consider requesting aeromedical transport, direct aircraft to land at closest **Acute Stroke Ready Hospital** for patient transport.



E. NEUROLOGICAL

E1. CVA - TIA

Patient care goals

1. Detect neurological deficits.
2. Determine eligibility for transport to a Stroke Center

Inclusion Criteria

1. Patient has signs and symptoms consistent with stroke or transient ischemic attack (TIA).

Exclusion criteria

1. If glucose is <60mg/dl refer to [Hypoglycemia Protocol](#).
2. If trauma and GCS <13, refer to [Head Injury](#) and [General Trauma Management Protocol](#)

ALL PROVIDERS (BLS) (ALS) (STP)

ADULT PATIENTS

1. Initial assessment and care should be provided according to the [Universal Care and Assessment Protocol \(B.1\)](#), which may include: **Oxygen, Monitoring, and IV access.**
2. Perform Cincinnati Pre-Hospital Stroke Scale.
 - A. Difficulty speaking.
 - B. Arm weakness
 - C. Facial droop.
 - D. In addition to Cincinnati Prehospital Stroke Scale, assess for a sudden onset of any of the following:
 - Numbness or weakness in the face, arms or legs, particularly on one side of the body
 - Confusion with aphasia (expressive and / or receptive)
 - Difficulty speaking or understanding what others are saying
 - Difficulty walking, loss of balance or coordination
 - Severe headache that does not have obvious or known cause
 - Nonspecific visual complaints with Partial, Complete or Bilateral visual field loss or double vision
 - Sudden onset of continuous vertigo and any of the following conditions:
 - 1) 65 years of age or older
 - 2) Younger than 65 with risk factors (i.e. Smoking, diabetes, HTN, etc.)
 - 3) Posterior neck pain in setting of recent manipulation or injury (suggesting



dissection).

3. Document "last known well time clock time."
4. If BLS ambulance on scene and providing care, and patient is showing any signs of clinical deterioration: begin rapid transport to ALS level care, Intercept, or hospital whichever is closer.
 - A. Manage all other care and start IV en route (18 gauge is preferred in right AC). One attempt while en route unless the patient is hemodynamically unstable.
5. Obtain blood glucose and treat if the blood sugar is **<60 mg/dl** per [Hypoglycemia Protocol](#).
6. Transport directly the closest **Acute Stroke Ready Hospital, Primary Stroke Center, or Comprehensive Stroke Center** for treatment if last known well time was **< 24 hours**.
7. Contact medical control for further orders.
(Pre-notification of "Stroke Alert" if patient meets the onset criteria of **<24 hours** for re-perfusion therapy).
8. Consider requesting aeromedical transport, direct aircraft to land at closest **Acute Stroke Ready Hospital** for patient transport.

ADVANCED LIFE SUPPORT (ALS) (STP)

ADULT PATIENTS

8. Start IV of normal saline (TKO) or saline lock (18ga preferred in right AC). One attempt while en route unless hemodynamically unstable.
9. Monitor cardiac rhythm for A-fib and consider 12- lead if time permits while en route.
10. Transport directly the closest **Acute Stroke Ready Hospital, Primary Stroke Center, or Comprehensive Stroke Center** for treatment.
11. Contact medical control for further orders.

SPECIALY TRAINED PARAMEDIC (STP)

ADULT PATIENTS

CNS Emergencies: Stroke/Bleed

12. If the patient is hypertensive:

Target Blood Pressures: 1. Patients not receiving Alteplase or not a candidate for Alteplase should

These Patient care guidelines were developed within a peer review committee and therefore are considered to be privileged and confidential material of the Essentia Health EMS peer review committee.

not be treated for Hypertension **unless** Systolic is >220 and/or Diastolic is >120mmHg

2. Intracerebral Hemorrhage: 140/80 or physician's orders.

3. Ischemic Stroke **and** candidate for Alteplase:

-BEFORE Alteplase administration: Systolic <185/110

-DURING and AFTER Alteplase administration: Maintain at or below 180/105 (**See post Alteplase guidelines below #16**)

Caution: Review precautions and contraindications carefully prior to administration of any antihypertensive medications.

Medical control must be consulted prior to administration of Labetalol on 911 calls. Refer to [Hypertensive crisis protocol \(B12\)](#) for details.

A. Labetalol given by repeated IV injection **10-20 mg IV slowly over 2 minutes**. Repeat injections every 10 minutes until desired result. Monitor blood pressure closely, every 5 minutes during and after administration.

OR

B. Nicardipine infusion 5mg/hr, titrate by **2.5 mg/hr every 5-15 min**, maximum dose of **15mg/hr**.

OR

C. Hydralazine Bolus: 10mg bolus over 2 min, may repeat in 10 min if no response, max dose 20mg.

13. If the patient sustains a drop in blood pressure to <90mmHg.

A. Refer to [Shock Guideline](#)

14. Monitor for any lateralizing neurological signs including posturing, blown pupils, and or paralysis. Increased ICP (intracranial pressure), Midline shift or herniation may be present. If observed:

A. Ventilate the intubated patient to maintain an ETCO₂ level 35-45 mm/hg.

B. Consider **Hypertonic Saline 3% 150 ml over 15 min** or **Mannitol** infusion at **1 Gm/kg** over 1 hour (*or as prescribed per physician orders*) if patient is not hypotensive.