



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

Together to End Stroke®

SUMMARY

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.

3 THINGS TO KNOW

1. The proven benefit of endovascular therapy (EVT) for patients with large vessel occlusion (LVO) has created the need for more specific guidance for updating regional stroke systems of care (SSOC) plans. The recommendations can help ensure that acute stroke patients are triaged to the right place in the right amount of time for the most appropriate intervention, including intravenous thrombolysis and EVT. Selected patients with suspected stroke due to LVO should be preferentially triaged to the nearest EVT-capable stroke center.
2. With varying levels of stroke center certifications and unique regional and geographic considerations, local public health agencies are the organizations best suited to determine the most appropriate acute stroke destination plans that are simple, balanced and actionable.
3. When a stroke facility with a lower certification level is closest, there is uncertainty concerning the acceptable additional transport time to a more comprehensive stroke facility. This paper provides local and regional Emergency Medical Services (EMS) agencies and stroke advisory committees with guiding principles and recommendations for how to integrate the elements of a stroke system of care in three key regional settings: urban, suburban and rural settings.

[Stroke.org/stroketransportplans](https://www.stroke.org/stroketransportplans)

“ With the advent of new treatments for stroke such as thrombectomy, the American Stroke Association recognized the need for a national consensus approach to acute stroke prehospital triage that considers differences in regional plans in urban, suburban and rural environments. In time-critical conditions, the capabilities of the first destination hospital can strongly influence clinical outcomes, so it is vital to integrate both speed of transport with level of stroke care required for definitive treatment. This new statement, developed through consensus of leading professional organizations focused on stroke, provides needed recommendations to local communities and regions to improve their stroke systems of care. **”**

– Lee H. Schwamm, MD

Chair, American Stroke Association Advisory Committee

BACKGROUND

In 2015, studies of EVT in selected patients with acute ischemic stroke demonstrated significant benefit. As a result, in 2019 the American Heart Association and American Stroke Association (AHA/ASA) released an update of its 2005 recommendations for stroke systems of care, reiterating the importance of delivering intravenous thrombolysis to all eligible patients, providing access to EVT, and reflecting the full range of stroke center certifications. However, there remains uncertainty concerning the optimal acceptable additional transport time to a Comprehensive Stroke Center (CSC) or Thrombectomy-capable Stroke Center (TSC). A multidisciplinary committee of acute stroke experts was convened to develop a set of consensus recommendations for prehospital destination plans tailored to specific population environments. The committee identified the need for regional customization of stroke systems of care (SSOC) to address differences in resources, hospital certifications, geography, and population density, and to educate providers on new models of acute stroke care and how they impact SSOC. This statement summarizes the Prehospital SSOC Consensus Conference recommendations.

IMPACT

This statement will help to maximize patient access to evidence-based acute stroke therapies by providing state and regional policymakers, EMS agencies, and stroke advisory committees with recommendations for stroke systems of care tailored to population density, geography, health care resources and other considerations. More specifically, the statement:

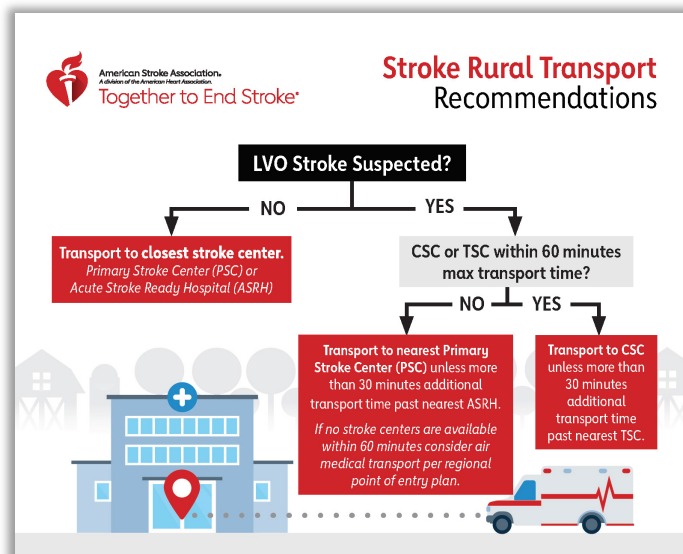
- Provides common definitions of rural, suburban and urban environments leveraging the widely used US Census Bureau's rural-urban commuting area (RUCA) code system;
- Identifies a common set of principles that should apply to all SSOCs, regardless of geographic classification; and
- Recommends modifications to SSOCs for rural, suburban, and urban environments. Most notably, the statement includes recommendations for identifying the most appropriate first hospital transport destination depending on the type of stroke suspected, degree of severity based on validated scales and availability of specific levels of certified stroke centers.

RECOMMENDATIONS

RURAL STROKE SYSTEMS OF CARE (Figure 1)

1. Rural hospitals should work with area stakeholders to develop prehospital response and destination plans with consideration for long transport times and the potential role of air medical transport.
2. Patients with suspected LVO should be routed directly to a CSC if the additional transport time past the nearest TSC does not exceed 30 minutes, and the maximum total transport time from scene to CSC does not exceed 60 minutes.

If no CSC is within 60 minutes, then EMS should go directly to a TSC if the additional transport time past the nearest PSC or ASRH does not exceed 30 minutes, and the maximum total transport time from scene to TSC does not exceed 60



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minutes. If no TSC or CSC exists within 60 minutes total travel time, or if additional transport time to an EVT-capable stroke center will disqualify a patient for thrombolytic therapy, then EMS should go to the nearest Primary Stroke Center (PSC) or Acute Stroke Ready Hospital (ASRH). If patients are medically unstable or unsafe for prolonged transport, EMS should follow local protocols to determine appropriate destinations.

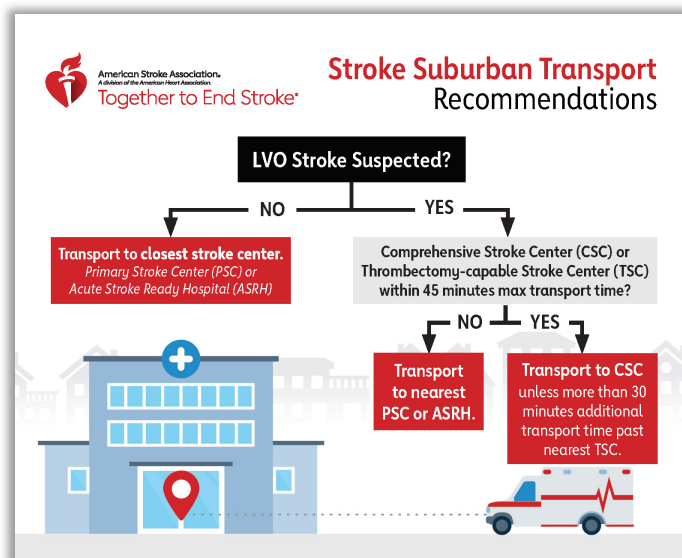
3. When no CSC or TSC is available within 60 minutes ground transport time, SSOC should include air medical transport options, define maximum allowable transport times, and consider implementing advanced brain imaging options at rural community hospitals to identify eligible candidates for EVT in order to keep the costs and potential harms of over-triage to a minimum during interfacility transfer to a distantly located TSC or CSC.
4. EMS destination plans should prioritize rural hospitals (or free-standing EDs if no rural hospital is available) that have formal collaboration agreements with regional CSCs (or TSCs) for access to expert stroke consultation, often via telestroke.
5. EMS providers in rural areas without access to EVT centers within 60 minutes transport time should transport suspected stroke patients to the nearest ASRH or PSC, especially for patients within the IV thrombolysis treatment window.
6. EMS should bypass a nearby rural hospital and use direct transport to access a higher level of acute care only when in accordance with local EMS system acute stroke triage algorithms and restrictions on maximum allowable travel out of the service area.
7. EMS destination plans should prioritize rural hospitals that identify and support internal hospital stroke resources, including a dedicated stroke coordinator, and that seek to become certified as an ASRH to track their performance on evidence-based stroke care.
8. Stakeholders should work with regional resources to establish rapid interfacility transport mechanisms for patients requiring EVT or a higher level of acute care. In rural areas, interfacility transfer will likely require local EMS for transport so the impact on service should be considered.
9. EMS destination plans should prioritize rural hospitals that participate in a regional stroke quality improvement program.
10. Stroke centers in rural areas should seek to partner with their regional CSC to provide access to stroke research and quality improvement opportunities when feasible and commensurate with their capabilities.

SUBURBAN SYSTEMS OF CARE

1. Like all geographic regions, suburban communities should establish a SSOC to maximize treatment opportunities for patients eligible for reperfusion strategies.

In suburban communities with more than one destination option, patients with suspected LVO should be routed directly to a CSC if the additional transport time past the nearest TSC does not exceed 30 minutes, and the maximum total transport time from scene to CSC does not exceed 45 minutes.

If no CSC is within 45 minutes, then EMS should go directly to a TSC if the additional transport time past the nearest PSC or ASRH does not exceed 30 minutes, and the maximum total transport time from scene to TSC does not exceed 45 minutes. If no TSC or CSC exists within 45 minutes total travel time, or if additional transport time to an EVT-capable stroke center will disqualify a patient for thrombolytic therapy, then EMS should go to the nearest ASRH or PSC. If patients are medically unstable or unsafe for prolonged transport, EMS should follow local protocols to determine most appropriate destination.



2. All suburban hospitals should have established protocols in place to care for stroke patients rapidly and efficiently, whether or not they chose to seek certification.
3. If the suburban hospital is a certified PSC, then it is appropriate for most stroke patients to be admitted at the PSC for post-stroke care.
4. Hospitals should have recurring stroke education for their staff and QI programs to optimize patient care processes, especially the ability to minimize “door-in door-out” (DIDO) time for patients needing transfer for EVT.
5. EMS providers in suburban areas without access to EVT centers within 45 minutes transport time should transport suspected stroke patients to the nearest PSC or ASRH, especially for patients within the IV thrombolysis treatment window since many patients with suspected stroke due to LVO may not be candidates for EVT after comprehensive evaluation.
6. EMS destination protocols should prioritize suburban hospitals that participate in a regional stroke QI program.

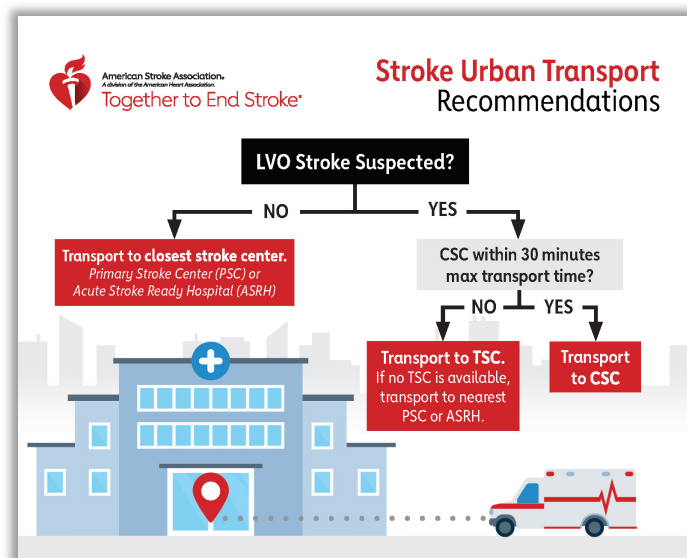
Recommendations for Regional Stroke Destination Plans in Rural, Suburban, and Urban Communities from the Prehospital Stroke System of Care Consensus Conference

7. PSCs, TSCs and CSCs in suburban areas should seek to partner with their regional CSC to provide access to stroke research and quality improvement opportunities when feasible and commensurate with their capabilities.

URBAN SYSTEMS OF CARE (Figure 3)

1. EMS agencies should implement simplified and actionable destination plans that prioritize CSCs over other nearby centers for patients with suspected LVO within 24 hours of last known well, given recent evidence that patients may benefit from EVT in the 6-24 hour window.
2. In urban communities with more than one destination option, patients with suspected LVO should be triaged directly to a CSC if the maximum total transport time from scene to CSC does not exceed 30 minutes.

If no CSC is within 30 minutes transport time, then EMS should go directly to a TSC if the total transport time from scene to TSC does not exceed 30 minutes. If no TSC or CSC exists within 30 minutes total travel time, or if additional transport time to an EVT-capable stroke center will disqualify a patient for thrombolytic therapy, then EMS should go to the nearest PSC or ASRH.



3. Urban communities that have limited healthcare resources, and no TSCs or CSCs within 45 minutes transport times from the majority of scene departures, should consider adopting the recommendations for suburban communities.
4. Urban areas are often served by multiple EMS agencies and vehicles, including Mobile Stroke Units, so integration of all these service into a cohesive SSOC is essential.
5. Urban tertiary care facilities within a SSOC should serve as a source for best practices, assist referring hospitals with in-house and transfer protocols, and provide overall continuing education opportunities for regional partners.
6. Urban tertiary care facilities within a SSOC should provide patient-specific and systems level feedback to patient referral sites as part of ongoing quality improvement projects.

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7. Stroke experts, typically found at CSCs in urban areas, should be included in local/state Departments of Health and governmental organization efforts to create legislative or regulatory priorities for stroke care and the enabling regulations for tiered SSOC.
8. PSCs, TSCs and CSCs in urban centers should provide access to clinical trial opportunities for patients with stroke commensurate with their capabilities.

DEFINITIONS

ENVIRONMENT	DEFINITION (US CENSUS BUREAU)
RURAL	<ul style="list-style-type: none">• Low population density (<50k residents) and limited local general healthcare resources• Few nearby ASRH/PSC within 60 min transport times by ground EMS
SUBURBAN	<ul style="list-style-type: none">• Larger community adjacent to urban core with population density closer to urban core• Access to both local ASRH/PSC or TSC/CSC within 30-60 min time by air or ground EMS
URBAN	<ul style="list-style-type: none">• High population density (\geq 50k residents)• Abundant healthcare resources with access to TSC/CSC within 30 min ground EMS

www.census.gov/content/dam/Census/library/publications/2019/acs/ACS_rural_handbook_2019_ch01.pdf

ABBREVIATIONS

ASRH, Acute Stroke Ready Hospital

CSC, Comprehensive Stroke Center

DIDO, Door-In Door-Out

EMS, Emergency Medical Services

EVT, Endovascular Therapy

LVO, Large Vessel Occlusion

PSC, Primary Stroke Center

RUCA, Rural-Urban Commuting Area

SSOC, Stroke System of Care

TSC, Thrombectomy-capable Stroke Center

REFERENCES

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2. 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.