

ABOUT THE SEVERITY-BASED STROKE TRIAGE ALGORITHM FOR EMS

Since the release of the endovascular trials in early 2015 demonstrating the efficacy of endovascular thrombectomy (EVT), many healthcare providers and health systems have requested guidance on developing an updated pre-hospital point-of-care triage algorithm for patients with suspected large vessel occlusion (LVO) within current stroke systems of care. In June 2015, the article “Endovascular Clot Retrieval Therapy Implications for the Organization of Stroke Systems of Care in North America” was published in the journal *Stroke*. The paper recommended the development or revision of EMS and interfacility transfer protocols. Since then, a variety of strategies have emerged, ranging from case-by-case decision-making to EMS policies diverting all suspected acute stroke patients regardless of severity to Comprehensive Stroke Centers (CSC).

The American Heart Association and American Stroke Association (AHA/ASA) requested that its Mission: Lifeline Stroke Committee craft a consensus algorithm that was subsequently reviewed by numerous stroke committees within the organization. This algorithm seeks to balance the benefits of rapid, early access to EVT for patients with suspected LVO with the potential harm of delayed initiation of IV alteplase. Since most patients with stroke will not be candidates for EVT, and because a robust Primary Stroke Center (PSC) network is a vital part of an effective stroke system of care, the algorithm may require tailoring to the needs of the communities that implement it, the population and hospital density, and the available healthcare resources. In addition, overcrowding is a challenge at many current urban CSCs, and the costs of care are often higher at CSCs compared to PSCs. Furthermore, the CSC criteria address many aspects of hemorrhagic stroke care that are beyond the capabilities of even a large PSC, and in some regions it may make sense for a PSC with EVT capability to be a preferred destination among all PSCs if no CSC is available nearby.

No randomized trial data exist to support a firm recommendation on the acceptable delay in arrival at a stroke center when considering re-routing a patient to a CSC. Therefore, the committee felt it was best to err on the side of caution and initially set the additional transport delay to 15 minutes. This relatively short period of time will support the implementation of the algorithm with minimal disruption to the current flow of patients, while giving time for EMS systems to become proficient in the collection and reporting of stroke screens and severity scores, capture of relevant time intervals, and reporting of re-routing cases to permit quality assurance activities and case review. As more data accumulate on the benefits and risks of specific time delay cut points, this algorithm will be updated to reflect the best evidence. In the absence of new evidence, the known decrease in good outcomes with each 15 minute delay in access to IV alteplase serves as the anchor. In rural communities or those where large distances separate stroke centers, longer delays of up to 20 - 30 additional minutes may be reasonable.

A thorough review of current guidelines and studies was conducted to help develop the algorithm. All attempts were made to base each step on current available evidence. Where clear scientific guidance was not available, consensus expert opinion and current practice were used. As with any algorithm, it should augment but not replace clinician judgment. The following section clarifies key terms used in the algorithm:

- The term “Last Known Well” refers to the time that the patient or a witness can confirm the patient was at their baseline. The term “Time of Symptom Discovery” refers to the time at which the symptoms were first noticed. These two terms are often inappropriately used interchangeably, and so explicit capture of both will avoid confusion. Among patients with a witnessed stroke onset, these two times will be the same.
- The term Stroke Screening Tool refers to a simple screening method, usually less than 4 steps, that generates a binary result of positive (stroke suspected) or negative (stroke not suspected). Many patients with another cause for neurologic disability (e.g., seizure) may have a positive screen. Many EMS agencies mandate a point-of-care blood glucose test as part of stroke screening and this should be included except when prohibited by regulation.
- The term Stroke Severity Scale or Tool refers to a numerical scale used to determine the severity of the neurologic deficits once a stroke is suspected in order to identify patients with severe symptoms due to LVO that may benefit from EVT. There are several available tools and no single tool has been shown to be superior. Each EMS region should choose a single screening tool and severity tool for use across all EMS providers. The following are the most popular tools available:

STROKE SCREENING TOOLS

CINCINNATI PRE-HOSPITAL
STROKE SCALE (CPSS)

LOS ANGELES PRE-HOSPITAL
STROKE SCALE (LAPSS)

STROKE SEVERITY TOOLS

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)