

Prehospital Management of Adults with Ischemic Stroke

A stroke is an emergency. It happens when the blood supply to part of the brain is cut off, which causes brain damage. That's why some doctors call a stroke a brain attack. In most people having a stroke, the blood supply to the brain is blocked by a blood clot (ischemic stroke). But a stroke can also happen when a blood vessel in the brain bursts (hemorrhagic stroke). Strokes affect people in different ways. Some of them may not be able to move one side of his body, or may have difficulty speaking or swallowing. They may black out (lose consciousness) for a while. Or the symptoms may be mild: they may feel dizzy and have blurred vision for a few minutes. In all cases they need medical help immediately.

The present document is a comprehensive guideline statement on the management of patients with acute ischemic stroke. These guidelines have been developed by a panel of physicians with a broad range of expertise, including vascular neurology, neurocritical care, emergency medicine, neurosurgery, and interventional neuroradiology/endovascular neurosurgery. The intended audience includes physicians, emergency medical services (EMS) personnel, and other medical personnel who deal with the emergency diagnosis and treatment of patients with suspected ischemic stroke. The goal of these guidelines is to provide updated recommendations that may be used by EMS personnel and for hospitals. The emphasis of these guidelines is the diagnosis and emergency treatment of patients with acute ischemic stroke.

Recent data indicate that 29% to 65% of patients with signs or symptoms of acute stroke access their initial medical care via local EMS, which confirms the role of EMS in the chain of survival. EMS activation appears to be a function primarily of individuals other than the patient, with one report indicating that a family member, paid caregiver, coworker, or other bystander accounted for 62% to 95% of 9-1-1 activation calls. In addition to bystander recognition of a problem, other reported predictors of EMS use by stroke patients include stroke severity, presence of intracranial hemorrhage, age, sense of urgency, unemployment, and race (black).

The benefits of EMS activation by patients with stroke symptoms appear to occur in both the prehospital and in-hospital settings. Hospital arrival is faster for patients who use EMS/9-1-1 as their initial medical contact than for those who contact their primary physician or hospital directly or a primary care site. Not surprisingly, EMS use is strongly associated with shorter time periods from symptom onset to hospital arrival, although this may reflect a greater sense of urgency on the patient's or bystander's part rather than reduced transport time. Similarly, EMS use is strongly associated with decreased time to initial physician examination, initial computed tomography (CT) imaging, and neurological evaluation. On the basis of the aforementioned information, communities should encourage 9-1-1 activation and use for patients with symptoms of acute stroke.

A. EMS Assessment

Most strokes occur at home, and only half of all victims of acute stroke use EMS for transport to the hospital. In addition, stroke victims often deny or rationalize their symptoms. This can delay EMS access and treatment and result in increased morbidity and mortality. Even high-risk patients fail to recognize the signs of a stroke. The signs and symptoms of a stroke may be subtle. They include sudden weakness or numbness of the face, arm, or leg, especially on one side of the body; sudden confusion, trouble speaking or understanding; sudden trouble seeing in one or both eyes; sudden trouble walking, dizziness, loss of balance or coordination; or sudden severe headache with no known cause.

EMS systems must provide education and training to minimize delays in prehospital dispatch, assessment, and transport. Emergency medical dispatchers must identify potential stroke victims and provide high-priority dispatch to patients with possible stroke. EMS providers must be able to support cardiopulmonary function, perform rapid stroke assessment, establish time of onset of symptoms (or last time the patient was known to be normal), triage and transport the patient, and provide prearrival notification to the receiving hospital.

After ambulance arrival on the scene, EMS providers should obtain a focused history and patient assessment, provide necessary stabilization and treatment, and transport immediately to the closest, most appropriate facility. The word *appropriate* is key because it means that an ambulance may bypass a hospital that does not have the resources or institutional commitment to treat patients with stroke if a more appropriate hospital is available within a reasonable transport interval. Advance notice to the receiving emergency department (ED) of the impending arrival of a potential stroke patient, along with information on comorbid conditions and estimated time of symptom onset, will speed the subsequent ED assessment.

Critical elements of the patient's history must include information on time of symptom onset. This may require obtaining information from bystanders or, preferably, transporting witnesses with the patient. Similarly, next of kin, if available, may be needed for information or consent and should travel to the receiving hospital concurrently. Telephone numbers, including cellular telephone numbers, of witnesses or relatives may help the ED to clarify the history or seek consent for treatment. A list of the patient's medications, or the medication containers themselves, should be sought, with particular attention paid to identifying anticoagulant (both oral and injectable), antiplatelet, and antihypertensive drug use.

After the patient's airway, breathing, and circulation (ABCs) are assessed and stabilized, common presenting signs of stroke should be sought and a focused examination completed. Prehospital stroke assessment tools have proved effective in identifying stroke patients in the field. EMS providers can identify stroke patients with reasonable sensitivity and specificity, using abbreviated out-of-hospital tools such as the Los Angeles Prehospital Stroke Screen (LAPSS) or the Cincinnati Prehospital Stroke Scale (CPSS).

The LAPSS uses patient history, physical findings, and finger stick glucose determination to identify stroke patients. It requires the examiner to rule out other causes of altered level of consciousness (eg, history of seizures, hypoglycemia) and then identify asymmetry in any of 3 examination categories: facial smile or grimace, grip, and arm strength. The LAPSS has a sensitivity of 93% and specificity of 97%. The CPSS is an alternative instrument with fewer data elements, requiring only 30 to 60 seconds to complete. It is based on physical examination only. The EMS provider checks for 3 physical findings: facial droop, arm weakness, and speech abnormalities. The presence of a single abnormality on the CPSS has a sensitivity of 59% and a specificity of 89%. Once EMS providers suspect the diagnosis of stroke, they should establish the time of onset of symptoms. This time represents time zero for the patient. If the patient wakes from sleep or is found with symptoms of a stroke, time zero is the last time the patient was observed to be normal. EMS providers must rapidly deliver the patient to a medical facility capable of providing acute stroke care and provide prearrival notification to the receiving facility.

B. EMS Management

After initial stabilization, it is recommended that patient transport commence as soon as possible, with cardiac monitoring and intravenous access established during transport, if possible. Isotonic crystalloids (most commonly normal saline solution) are recommended for resuscitation, if needed. Dextrose-containing fluids should be avoided unless hypoglycemia is present or strongly suspected because excessive glucose may be injurious to stroke patients. It is well recognized that hypoglycemic patients may have symptoms that mimic an acute stroke, manifesting focal symptoms, altered speech, and/or cognitive changes, and therefore EMS assessment of blood glucose has been a routine practice for many years. At present, checking blood glucose concentrations in most patients with stroke is a prudent step, even among patients without a history of diabetes mellitus or use of insulin.

Finally, it is recommended to identify hospitals capable of providing acute stroke care and creating a transport system to these centers based on patient location. Such systems require advanced planning and frequent updating and should incorporate EMS representatives, community leaders, hospitals, and physicians to ensure clear guidance for EMS providers with regard to patient destination.

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