Part 11: Adult Stroke
2010 American Heart Association Guidelines for Cardiopulmonary Resuscitation and Emergency Cardiovascular Care

Edward C. Jauch, Co-Chair*; Brett Cucchiara, Co-Chair*; Opeolu Adeoye; William Meurer; Jane Brice; Yvonne (Yu-Feng) Chan; Nina Gentile; Mary Fran Hazinski

Nearly 15 years of increased stroke education and organization has produced significant strides in public awareness and development of stroke systems of care. Despite these successes, though, each year 795,000 people suffer a new or repeat stroke, and stroke remains the third leading cause of death in the United States.1 Many advances have been made in stroke prevention, treatment, and rehabilitation, but arguably the greatest gains have been in the area of stroke systems of care. Integrating public education, 911 dispatch, prehospital detection and triage, hospital stroke system development, and stroke unit management have led to significant improvements in stroke care. Not only have the rates of appropriate fibrinolytic therapy increased over the past 5 years, but also overall stroke care has improved, in part through the creation of stroke centers.2 To achieve further improvement in reducing the burden of stroke, healthcare providers, hospitals, and communities must continue to develop systems to increase the efficiency and effectiveness of stroke care.3 The “D’s of Stroke Care” remain the major steps in diagnosis and treatment of stroke and identify the key points at which delays can occur.4,5

- Detection: Rapid recognition of stroke symptoms
- Dispatch: Early activation and dispatch of emergency medical services (EMS) system by calling 911
- Delivery: Rapid EMS identification, management, and transport
- Door: Appropriate triage to stroke center
- Data: Rapid triage, evaluation, and management within the emergency department (ED)
- Decision: Stroke expertise and therapy selection
- Drug: Fibrinolytic therapy, intra-arterial strategies
- Disposition: Rapid admission to stroke unit, critical-care unit

This chapter summarizes the early management of acute ischemic stroke in adult patients. It describes care from out-of-hospital therapy through the first hours of in-hospital therapy. For additional information about the management of acute ischemic stroke, see the American Heart Association (AHA)/American Stroke Association (ASA) guidelines for the management of acute ischemic stroke.3,6,7

Management Goals
The overall goal of stroke care is to minimize acute brain injury and maximize patient recovery. The time-sensitive nature of stroke care is central to the establishment of successful stroke systems, hence the commonly used refrain “Time is Brain.” The AHA and ASA have developed a community-oriented “Stroke Chain of Survival” that links specific actions to be taken by patients and family members with recommended actions by out-of-hospital healthcare responders, ED personnel, and in-hospital specialty services. These links, which are similar to those in the Adult Chain of Survival for victims of sudden cardiac arrest, include rapid recognition of stroke warning signs and activation of the emergency response system (call 911); rapid EMS dispatch, transport, andprehospital notification; triage to a stroke center; and rapid diagnosis, treatment, and disposition in the hospital.

The AHA ECC stroke guidelines focus on the initial out-of-hospital and ED assessment and management of the patient with acute stroke as depicted in the algorithm Goals for Management of Patients With Suspected Stroke (Figure). The time goals of the National Institute of Neurological Disorders and Stroke (NINDS)8 are illustrated on the left side of the algorithm as clocks. A sweep hand depicts the goal in minutes from ED arrival to task completion to remind the clinician of the time-sensitive nature of management of acute ischemic stroke.

The sections below summarize the principles and goals of stroke system development and emergency assessment and management, as well as highlight new recommendations and training issues. The text refers to the numbered boxes in the algorithm.

Stroke Systems of Care
The regionalization of stroke care was not widely considered in the era before availability of effective acute therapies. With the NINDS recombinant tissue plasminogen activator (rtPA) trial, the crucial need for local partnerships between academic medical centers and community hospitals became a reality.9
The time-sensitive nature of stroke requires such an approach, even in densely populated metropolitan centers. The idea of a “stroke-prepared” hospital emerged after the United States Food and Drug Administration (FDA) approved rtPA for stroke. In 2000 the Brain Attack Coalition provided a description of “primary stroke centers,” which would ensure that best practices for stroke care (acute and beyond) would be offered in an organized fashion. The logic of having a multitiered system such as that provided for trauma was evident. Therefore, in 2005 the Brain Attack Coalition followed the statement on primary stroke centers with recommendations for comprehensive stroke centers. Following the establishment of primary stroke centers and comprehensive stroke centers, the new concept of a stroke-prepared hospital has recently emerged. This stroke-prepared hospital can access stroke expertise via telemedicine. The comparison with a trauma system with Level 1, 2, and 3 centers is rational and quite intuitive to emergency care providers familiar with such configurations.

Substantial progress has been made toward regionalization of stroke care. Several states have passed legislation requiring prehospital providers to triage patients with suspected stroke to designated stroke centers. This is contingent on the accuracy of dispatch, an area where further improvement is
Stroke Warning Signs

Identifying clinical signs of possible stroke is important because recanalization strategies (intravenous [IV] fibrinolysis and intra-arterial/catheter-based approaches) must be provided within the first few hours from onset of symptoms.1-6 Most strokes occur at home, and just over half of all victims of acute stroke use EMS for transport to the hospital.1-4

Stroke knowledge among the lay public remains poor.5-6 Most strokes occur at home, and just over half of all victims of acute stroke use EMS for transport to the hospital.1-4

Stroke Warning Signs

Stroke Warning Signs

Table 1. The Cincinnati Prehospital Stroke Scale

<table>
<thead>
<tr>
<th>Symptom</th>
<th>Normal</th>
<th>Abnormal</th>
</tr>
</thead>
<tbody>
<tr>
<td>Facial droop (have patient show teeth or smile)</td>
<td>• Normal—both sides of face move equally</td>
<td>• Abnormal—one side of face does not move as well as the other side</td>
</tr>
<tr>
<td>Arm drift (patient closes eyes and holds both arms straight out for 10 seconds)</td>
<td>• Normal—both arms move the same or both arms do not move at all</td>
<td>• Abnormal—one arm does not move or one arm drifts down compared with the other</td>
</tr>
<tr>
<td>Abnormal speech (have the patient say “you can’t teach an old dog new tricks”)</td>
<td>• Normal—patient uses correct words with no slurring</td>
<td>• Abnormal—patient slurs words, uses the wrong words, or is unable to speak</td>
</tr>
</tbody>
</table>

Interpretation: If any 1 of these 3 signs is abnormal, the probability of a stroke is 72%.

911 and EMS Dispatch

EMS systems of care include both 911 emergency medical dispatch centers and EMS response personnel. It is imperative that the stroke system of care provide education and training to 911 and EMS personnel to minimize delays in prehospital dispatch, assessment, and transport. Emergency medical telecommunications must identify and provide high-priority dispatch to patients with stroke symptoms. Current literature suggests that 911 telecommunications do not recognize stroke well and that the use of scripted stroke-specific screens during a 911 call may be helpful.7,8 Studies are ongoing to investigate the effectiveness of such a stroke assessment tool for 911 telecommunications.9,10

In settings where ground transport to a stroke center is potentially long, air medical services may be used. Regional stroke resources work with EMS agencies to establish criteria for the use of air medical transport for patients with acute stroke and determine the most appropriate destination based on distance and the hospital’s stroke capability. As with

Prehospital Management and Triage (Box 2)

As with any other time-sensitive acute illness, prehospital providers must perform an initial assessment and intervene if necessary to provide cardiopulmonary support. In addition, for stroke, providers must clearly 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, the time of onset of symptoms is defined as the last time the patient was observed to be normal. EMS providers must be able to support cardiopulmonary function, perform rapid stroke assessment, establish time of onset of symptoms
Patients with acute stroke are at risk for respiratory compromise from aspiration, upper airway obstruction, hypventilation, and (rarely) neurogenic pulmonary edema. The combination of poor perfusion and hypoxemia will exacerbate and extend ischemic brain injury and has been associated with worse outcome from stroke. Both out-of-hospital and in-hospital medical personnel should administer supplemental oxygen to hypoxemic (i.e., oxygen saturation <94%) stroke patients (Class I, LOE C) or those with unknown oxygen saturation.

Although blood pressure management is a component of the ED care of stroke patients, there are no data to support initiation of hypertension intervention in the prehospital environment. Unless the patient is hypotensive (systolic blood pressure <90 mm Hg), prehospital intervention for blood pressure is not recommended (Class III, LOE C).

**Transport and Destination Hospital**

EMS providers should consider transporting a witness, family member, or caregiver with the patient to verify the time of stroke symptom onset. En route to the facility, providers should continue to support cardiopulmonary function, monitor neurologic status, check blood glucose if possible, and provide prehospital notification.

Prearrival hospital notification by the transporting EMS unit has been found to significantly increase the percentage of patients with acute stroke who receive fibrinolytic therapy. Bypass of community hospitals in favor of transporting patients directly to a stroke center has undergone investigations that merit attention. Investigators in New York, Canada, Italy, and Australia have performed before-and-after studies examining the difference in rates of rtPA administration after implementation of a hospital bypass protocol for EMS. All have found significantly larger percentages of patients with ischemic stroke treated with rtPA when patients are transported directly to stroke centers. Recently investigators have begun to examine the impact of direct activation of stroke teams by EMS.

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. Each receiving hospital should define its capability for treating patients with acute stroke using the definitions established for stroke-prepared hospitals, primary stroke centers, and comprehensive stroke centers and should communicate this information to the EMS system and the community. Although not every hospital is capable of organizing the necessary resources to safely administer fibrinolytic therapy, every hospital with an ED should have a written plan that is communicated to EMS systems describing how patients with acute stroke are to be managed in that institution. The plan should detail the roles of healthcare professionals in the care of patients with acute stroke and define which patients will be treated with fibrinolytic therapy at that facility and when transfer to another hospital with a dedicated stroke unit is appropriate.

The role of stroke centers and in particular stroke units continues to be defined, but a growing body of evidence indicates a favorable benefit from triage of stroke patients directly to designated stroke centers (Class I, LOE B). EMS systems should establish a stroke destination protocol to enable EMS providers to direct patients with acute stroke to appropriate facilities. When multiple stroke hospitals are within similar transport distances, EMS personnel should consider triage to the stroke center with the highest capability of stroke care.

Multiple randomized clinical trials and meta-analyses in adults document consistent improvement in 1-year survival rate, functional outcome, and quality of life when patients hospitalized with acute stroke are cared for in a dedicated stroke unit by a multidisciplinary team experienced in managing stroke. Although the studies reported were conducted outside the United States at in-hospital units that provided both acute care and rehabilitation, the improved outcomes were apparent very early in stroke care. These results should be relevant to the outcome of dedicated stroke units staffed with experienced multidisciplinary teams in the United States. When such a facility is available within a reasonable transport interval, stroke patients who require hospitalization should be admitted there (Class I, LOE B).

**In-Hospital Care**

**Initial ED Assessment and Stabilization (Box 3)**

Protocols should be used in the ED to minimize delay to definitive diagnosis and therapy: “Time is Brain.” As a goal, ED personnel should assess the patient with suspected stroke within 10 minutes of arrival in the ED. General care includes assessment, cardiopulmonary support (airway, breathing, circulation), and evaluation of baseline vital signs. Administration of oxygen to hypoxemic patients with stroke (oxygen saturation <94%) is recommended (Class I, LOE C).

On arrival ED personnel should establish or confirm IV access and obtain blood samples for baseline studies (e.g., complete blood count, coagulation studies, blood glucose). If not already identified in the prehospital setting, ED staff should promptly identify and treat hypoglycemia. The ED physician should perform a neurologic screening assessment, order an emergent computed tomography (CT) scan of the brain, and activate the stroke team or arrange for consultation with a stroke expert.

A 12-lead electrocardiogram (ECG) does not take priority over the CT scan but may identify a recent acute myocardial infarction or arrhythmias (e.g., atrial fibrillation) as the cause of an embolic stroke. If the patient is hemodynamically stable, treatment of other arrhythmias, including bradycardia, premature atrial or ventricular contractions, or asymptomatic atrioventricular conduction block, may not be necessary. There is general agreement to recommend cardiac monitoring during the first 24 hours of evaluation in patients with acute ischemic stroke to detect atrial fibrillation and potentially life-threatening arrhythmias.

**Assessment (Box 4)**

The treating physician should review the patient’s history and verify time of onset of symptoms. This may require interviewing out-of-hospital providers, witnesses, and family members to establish the time that the patient was last known to be normal. Neurologic assessment is performed, incorpo-
Table 2. Potential Approaches to Arterial Hypertension in Acute Ischemic Stroke Patients Who Are Potential Candidates for Acute Reperfusion Therapy

<table>
<thead>
<tr>
<th>Patient otherwise eligible for acute reperfusion therapy except that blood pressure is $&gt;185/110$ mm Hg</th>
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<tbody>
<tr>
<td>● Labetalol 10–20 mg IV over 1–2 minutes, may repeat $\times 1$, or</td>
</tr>
<tr>
<td>● Nicardipine IV 5 mg/hr, titrate up by 2.5 mg/hr every 5–15 minutes, maximum 15 mg/hr; when desired blood pressure reached, lower to 3 mg/hr, or</td>
</tr>
<tr>
<td>● Other agents (hydralazine, enalaprilat, etc) may be considered when appropriate</td>
</tr>
</tbody>
</table>

If blood pressure is not controlled or diastolic BP $>140$ mm Hg, consider sodium nitropresside.

Management of blood pressure during and after rtPA or other acute reperfusion therapy:

<table>
<thead>
<tr>
<th>Monitor blood pressure every 15 minutes for 2 hours from the start of rtPA therapy; then every 30 minutes for 6 hours; and then every hour for 16 hours</th>
</tr>
</thead>
<tbody>
<tr>
<td>If systolic BP $180–230$ mm Hg or diastolic BP $105–120$ mm Hg</td>
</tr>
<tr>
<td>● Labetalol 10 mg IV followed by continuous IV infusion 2–8 mg/min, or</td>
</tr>
<tr>
<td>● Nicardipine IV 5 mg/h, titrate up to desired effect by 2.5 mg/hr every 5–15 minutes, maximum 15 mg/h</td>
</tr>
</tbody>
</table>

If blood pressure not controlled or diastolic BP $>140$ mm Hg, consider sodium nitropresside.

Table 3. Approach to Arterial Hypertension in Acute Ischemic Stroke Patients Who Are Not Potential Candidates for Acute Reperfusion Therapy

<table>
<thead>
<tr>
<th>Consider lowering blood pressure in patients with acute ischemic stroke if systolic blood pressure $&gt;220$ mm Hg or diastolic blood pressure $&gt;120$ mm Hg</th>
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<tbody>
<tr>
<td>Consider blood pressure reduction as indicated for other concomitant organ system injury</td>
</tr>
<tr>
<td>● Acute myocardial infarction</td>
</tr>
<tr>
<td>● Congestive heart failure</td>
</tr>
<tr>
<td>● Acute aortic dissection</td>
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</tbody>
</table>

A reasonable target is to lower blood pressure by 15% to 25% within the first day.
outcome, although the degree of clinical benefit is smaller than that achieved with treatment within 3 hours.16,78 Data supporting treatment in this time window come from a large, randomized trial (ECASS-3) that specifically enrolled patients between 3 and 4.5 hours after symptom onset, as well as a meta-analysis of prior trials. Criteria for inclusion in ECASS-3 were similar to the NINDS criteria, except that ECASS-3 excluded patients older than 80 years of age, with a baseline NIHSS >25, taking oral anticoagulants, or who had a combination of diabetes and prior stroke. At present, use of IV rtPA within the 3- to 4.5-hour window has not yet been FDA approved, although it is recommended by a current AHA/ASA science advisory.78 Administration of IV rtPA to patients with acute ischemic stroke who meet the NINDS or ECASS-3 eligibility criteria is recommended if rtPA is administered to adult patients with acute ischemic stroke within 3 hours of onset of symptoms. These results are obtained when rtPA is administered by physicians in hospitals with a stroke protocol that rigorously adheres to the eligibility criteria and therapeutic regimen of the NINDS protocol. These results have been supported by a subsequent 1-year follow-up study,73 reanalysis of the NINDS data,74 and a meta-analysis.75 Evidence from prospective randomized studies2,15,74,76 in adults also documents a greater likelihood of benefit the earlier treatment is begun. Additional analyses of the original NINDS data by an independent group of investigators confirmed the validity of the results,74 verifying that improved outcomes in the rtPA treatment arm persist even when imbalances in the baseline stroke severity among treatment groups is corrected.77

Table 4. Inclusion and Exclusion Characteristics of Patients With Ischemic Stroke Who Could Be Treated With rtPA Within 3 Hours From Symptom Onset

<table>
<thead>
<tr>
<th>Inclusion criteria</th>
</tr>
</thead>
<tbody>
<tr>
<td>Diagnosis of ischemic stroke causing measurable neurologic deficit</td>
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<tr>
<td>Onset of symptoms &lt; 3 hours before beginning treatment</td>
</tr>
<tr>
<td>Age ≥ 18 years</td>
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<table>
<thead>
<tr>
<th>Exclusion criteria</th>
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<tbody>
<tr>
<td>History of previous intracranial hemorrhage</td>
</tr>
<tr>
<td>Arterial puncture at noncompressible site in previous 7 days</td>
</tr>
<tr>
<td>Elevation of blood pressure (systolic &gt; 185 mm Hg or diastolic &gt; 110 mm Hg)</td>
</tr>
<tr>
<td>Evidence of active bleeding on examination</td>
</tr>
<tr>
<td>Acute bleeding diathesis, including but not limited to</td>
</tr>
<tr>
<td>- Platelet count &lt; 100,000/mm³</td>
</tr>
<tr>
<td>- Heparin received within 48 hours, resulting in aPTT &gt; upper limit of normal</td>
</tr>
<tr>
<td>- Current use of anticoagulant with INR &gt; 1.7 or PT &gt; 15 seconds</td>
</tr>
<tr>
<td>Blood glucose concentration &lt; 50 mg/dL (2.7 mmol/L)</td>
</tr>
<tr>
<td>CT demonstrates multiple infarction (hypodensity &gt; 1/3 cerebral hemisphere)</td>
</tr>
</tbody>
</table>

Table 5. Additional Inclusion and Exclusion Characteristics of Patients With Ischemic Stroke Who Could Be Treated With rtPA From 3 to 4.5 Hours From Symptom Onset

<table>
<thead>
<tr>
<th>Inclusion criteria</th>
</tr>
</thead>
<tbody>
<tr>
<td>Diagnosis of ischemic stroke causing measurable neurologic deficit</td>
</tr>
<tr>
<td>Onset of symptoms 3 to 4.5 hours before beginning treatment</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Exclusion criteria</th>
</tr>
</thead>
<tbody>
<tr>
<td>Age &gt; 80 years</td>
</tr>
<tr>
<td>Severe stroke (NIHSS &gt; 25)</td>
</tr>
<tr>
<td>Taking an oral anticoagulant regardless of INR</td>
</tr>
<tr>
<td>History of both diabetes and prior ischemic stroke</td>
</tr>
</tbody>
</table>

Notes

- The checklist includes some FDA-approved indications and contraindications for administration of rtPA for acute ischemic stroke. Recent guideline revisions have modified the original FDA criteria. A physician with expertise in acute stroke care may modify this list.
- Onset time is either witnessed or last known normal.
- In patients without recent use of oral anticoagulants or heparin, treatment with rtPA can be initiated before availability of coagulation study results but should be discontinued if INR is > 1.7 or PT is elevated by local laboratory standards.
- In patients without history of thrombocytopenia, treatment with rtPA can be initiated before availability of platelet count but should be discontinued if platelet count is < 100,000/mm³.

rtPA indicates recombinant tissue plasminogen activator; NIHSS, National Institutes of Health Stroke Scale; INR, international normalized ratio; FDA, Food and Drug Administration; and PT, prothrombin time.
experience is an important factor in ensuring adherence to protocol. Adding a dedicated stroke team to a community hospital can increase the number of patients with acute stroke treated with fibrinolytic therapy and produce excellent clinical outcomes. There is also strong evidence to avoid all delays and treat patients as soon as possible. These findings show that it is important to have an institutional commitment to ensure optimal patient outcomes.

Evidence from 3 prospective randomized studies in adults and a meta-analysis have demonstrated improved outcome from intra-arterial fibrinolysis. Thus, for patients with acute ischemic stroke who are not candidates for standard IV fibrinolysis, administration of intra-arterial fibrinolysis is reasonable (Class I, LOE B). To date, intra-arterial administration of fibrinolytics has not been FDA approved. In carefully selected patients, catheter-based thrombectomy is being performed at centers where resources and expertise are available. The pending ASA acute ischemic stroke guidelines will provide greater detail about intra-arterial strategies.

**General Stroke Care**

Recent studies establish that stroke unit care is superior to care in general medical wards, and the positive effects of stroke unit care can persist for years. The benefits from treatment in a stroke unit are comparable to the effects achieved with IV rtPA. Patients should be admitted to a stroke unit (if available) for careful observation (Box 11), including monitoring of blood pressure and neurologic status and physiologic optimization. General stroke care, centered on physiologic optimization, includes prevention of hypoxia, management of hypertension, optimal glucose control, maintenance of euthermia, and nutritional support. Additional efforts center on prevention of complications associated with stroke (eg, aspiration pneumonia, deep venous thrombosis, urinary tract infections) and initiation of secondary stroke prevention.

Given the requirements for frequent neurologic assessment and vital sign measurements, especially after administration of IV rtPA, patients should be admitted as quickly as possible, ideally within 3 hours from arrival. If the patient’s neurologic status deteriorates, an emergent CT scan is required to determine if cerebral edema or hemorrhage is responsible for the deterioration. Treatment of hemorrhage or edema should be started immediately as indicated.

**Blood Pressure Management**

Blood pressure management varies depending on whether or not fibrinolytic or intra-arterial therapies were used. Current recommendations for control of blood pressure in patients who receive IV rtPA or intra-arterial recanalization therapies are shown in Table 2. In those patients for whom recanalization is not planned, more liberal acceptance of hypertension is recommended, provided no other comorbid conditions require intervention (Table 3). Normal saline, administered at a rate of approximately 75 to 100 mL/h, is used to maintain euvolemia as needed. In stroke patients who may be relatively hypovolemic, careful administration of IV normal saline boluses may be appropriate.

**Glycemic Control**

Hyperglycemia is associated with worse clinical outcome in patients with acute ischemic stroke, but there is no direct evidence that active glucose control improves clinical outcome. There is contradictory evidence for the benefit of insulin treatment of hyperglycemia in other critically ill patients. Current AHA/ASA recommendations call for the use of insulin when the serum glucose level is greater than 185 mg/dL in patients with acute stroke (Class IIa, LOE C); however, the utility of administration of IV or subcutaneous insulin to lower blood glucose in patients with acute ischemic stroke when serum glucose is $\leq$185 mg/dL remains uncertain.

**Temperature Control**

Hyperthermia in the setting of acute cerebral ischemia is associated with increased morbidity and mortality and should be managed aggressively (treat fever $>37.5^\circ$C [$99.5^\circ$F]). Hypothermia has been shown to improve survival and functional outcome in patients following resuscitation from ventricular fibrillation (VF) sudden cardiac arrest; however, there are limited data on the role of hypothermia specific to acute ischemic stroke. At this time there is insufficient scientific evidence to recommend for or against the use of hypothermia in the treatment of acute ischemic stroke (Class IIb, LOE C).

**Dysphagia Screening**

All patients with stroke should be screened for dysphagia before they are given anything by mouth. A simple bedside screening evaluation involves asking the patient to sip water from a cup. If the patient can sip and swallow without difficulty, the patient is asked to take a large gulp of water and swallow. If there are no signs of coughing or aspiration after 30 seconds, then it is safe for the patient to have a thickened diet until formally assessed by a speech pathologist. Medications may be given in applesauce or jam. Any patient who fails a swallow test may be given medications such as aspirin rectally or, if appropriate for the medication, intravenously, intramuscularly, or subcutaneously.

**Other Stroke Management**

Additional stroke care includes support of the airway, oxygenation and ventilation, and nutritional support. Seizure prophylaxis is not recommended, but for patients who experience a seizure, administration of anticonvulsants is recommended to prevent more seizures. In patients with severe stroke, posterior circulation stroke, and in younger patients, healthcare providers must observe for signs of increased intracranial pressure.

**Summary**

Advances in stroke care will have the greatest effect on stroke outcome if care is delivered within a regional stroke system designed to improve both efficiency and effectiveness. The ultimate goal of stroke care is to minimize ongoing injury, emergently recanalize acute vascular occlusions, and begin secondary measures to maximize functional recovery. These efforts will provide stroke patients with the greatest opportunity for a return to previous quality of life and decrease the overall societal burden of stroke.
## Disclosures

### Guidelines Part 11: Stroke: Writing Group Disclosures

<table>
<thead>
<tr>
<th>Writing Group Member</th>
<th>Employment</th>
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<th>Speakers' Bureau/ Honoraria</th>
<th>Ownership Interest</th>
<th>Consultant/ Advisory Board</th>
<th>Other</th>
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This table represents the relationships of writing group members that may be perceived as actual or reasonably perceived conflicts of interest as reported on the Disclosure Questionnaire, which all members of the writing group are required to complete and submit. A relationship is considered to be “significant” if (a) the person receives $10,000 or more during any 12-month period, or 5% or more of the person’s gross income; or (b) the person owns 5% or more of the voting stock or share of the entity, or owns $10,000 or more of the fair market value of the entity. A relationship is considered to be “modest” if it is less than “significant” under the preceding definition.

*Modest.
†Significant.
References


78. Del Zoppo GJ, Saver JL, Jauch EC, Adams HP Jr. Expansion of the time window for treatment of acute ischemic stroke with intravenous tissue...


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In the article by Jauch et al, “Part 11: Adult Stroke: 2010 American Heart Association Guidelines for Cardiopulmonary Resuscitation and Emergency Cardiovascular Care,” which published ahead of print on October 18, 2010, and appeared with the November 2, 2010, issue of the journal Circulation (2010;122[suppl 3]:S818–S828), the following corrections were needed:

1. On page S823, the Table 4 footnote read, “rtPA indicates . . . and PT, partial thromboplastin time.” It has been changed to read, “rtPA indicates . . . and PT, prothrombin time.”

2. On page S823, the Table 5 footnote read, “rtPA indicates . . . and PT, partial thromboplastin time.” It has been changed to read, “rtPA indicates . . . and PT, prothrombin time.”

These corrections have been made to the current online version of the article, which is available at http://circ.ahajournals.org/cgi/content/full/122/18_suppl_3/S818.

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