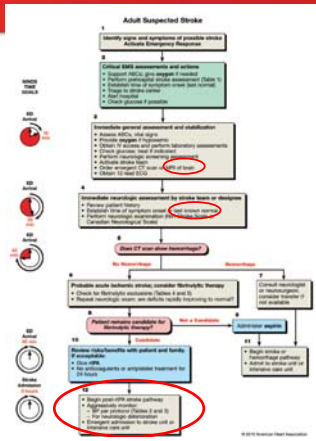
TARGET:
STROKE℠
TIME LOST IS BRAIN LOST.

STROKEASSOCIATION.ORG/TARGETSTROKE



Target: Stroke

A national quality improvement initiative of the American Heart Association/American Stroke Association to improve the care of stroke

Building on Success

- GWTG-Stroke
- Brain Attack Coalition
- Mission: Lifeline

Improving Stroke Outcomes

Current guidelines for the management of patients with acute ischemic stroke published by the AHA/ASA include specific recommendations for the administration of IV rt-PA

Despite its effectiveness in improving neurological outcomes, many patients with ischemic stroke are not treated with rt-PA, because they arrive late or because of delays in assessment/administration of IV rt-PA

Earlier administration of IV rtPA after the onset of stroke symptoms is associated with greater functional recovery

One of the potential approaches to increase treatment opportunities and improve stroke outcomes is to provide this treatment in a more timely fashion after patient arrival (reduce the door to needle time for IV rt-PA)

AHA/ASA Guideline Recommendations

Intravenous rt-PA is recommended for selected patients who may be treated within 3 hours of onset of ischemic stroke (Class I Recommendation, Level of Evidence A).

Patients who are eligible for treatment with rt-PA within 3 hours of onset of stroke should be treated as recommended in the 2007 Guidelines.

Although a longer time window for treatment with rt-PA has been tested formally, delays in evaluation and initiation of therapy should be avoided, because the opportunity for improvement is greater with earlier treatment.

rt-PA should be administered to eligible patients who can be treated in the time period of 3 to 4.5 hours after stroke (Class I Recommendation, Level of Evidence B).

AHA/ASA Guideline Recommendations

EDs should establish standard operating procedures and protocols to triage stroke patients expeditiously (Class I, Level of Evidence B).

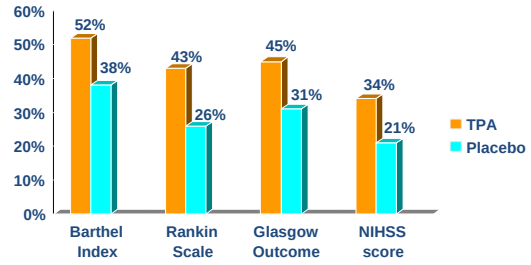
Standard procedures and protocols should be established for benchmarking time to evaluate and treat eligible stroke patients with rt-PA expeditiously (Class I, Level of Evidence B).

Target treatment with rt-PA should be within 1 hour of the patient's arrival in the ED (Class I, Level of Evidence A).

Comprehensive overview of nursing and interdisciplinary care of the acute ischemic stroke patient: a scientific statement from the American Heart. Association. *Stroke* 2009;40;2911-2944

NINDS TPA Stroke Trial

Excellent outcome at 3 months on all scales



Global outcome statistic: OR=1.7, 50% v. 38%= 12% benefit

N Engl J Med 1995;333:1581-7

Number Needed to Treat to Benefit from IV TPA Across Full Range of Functional Outcomes

Outcome	NNT
Normal/Near Normal	8.3
Improved	3.1

For every 100 patients treated with tPA, 32 benefit, 3 harmed

Stroke 2007; 38:2279-2283

Time to Treatment in Ischemic Stroke

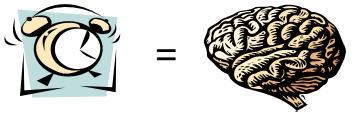
Pooled data from 6 randomized placebo-controlled trials of IV rt-PA. Treatment was started within 360 min of onset of stroke in 2775 patients randomly allocated to rt-PA or placebo

Odds of a favorable 3-month outcome increased as onset to treatment decreased (p=0.005). Odds were 2.8 (95% CI 1.8-4.5) for 0-90 min, 1.6 (1.1-2.2) for 91-180 min, 1.4 (1.1-1.9) for 181-270 min, and 1.2 (0.9-1.5) for 271-360 min in favor of the rt-PA group.

The sooner that rt-PA is given to stroke patients, the greater the benefit, especially if started within 90 minutes of symptom onset

Hacke, W., G. Donnan, et al. Association of outcome with early stroke treatment: pooled analysis of ATLANTIS, ECASS, and NINDS rt-PA stroke trials. Lancet 2004;363:768-74.

Time is Brain

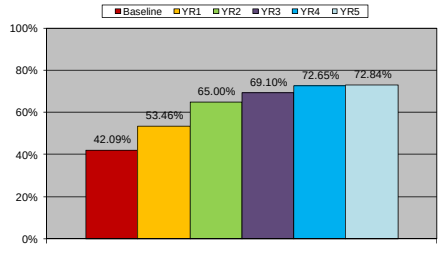


Stroke Onset to IV TPA ≤ 3 hours or ≤ 4.5 hours

Door to IV TPA Goal ≤ 60 Minutes

- STARS Registry
  - 38 community, 18 academic hospitals, 389 IV TPA pts
  - Median door to needle time: 96 minutes
- CDC 4 State Pilot Acute Stroke Registry
  - 98 hospitals, 6867 acute patients, 118 IV TPA
  - Treatment within target 60 minutes: 14.4%

Improvement Over Time in GWTG-Stroke in the Use of IV rt-PA in Eligible Patients

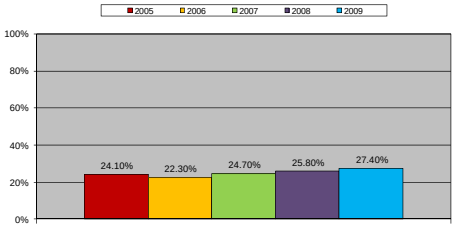


IV rt-PA 2 Hour

Schwamm LH et al. Circulation 2009;119:107-115

Substantial Opportunity to Improve Timeliness of IV rt-PA in Ischemic Stroke

Door-to-IV rt-PA within 60 minutes



DTN within 60 min

GWTG-Stroke Database, data on file DCRI

Launch Campaign

Provide IV tPA to eligible patients with acute ischemic stroke in a timely fashion

Goal

Achieve a Door to Needle (DTN) Time within 60 minutes in at least 50% of ischemic stroke patients treated with IV tPA

Target Stroke Core Concepts

1. **Organize stroke team with focused goal to improve portion of eligible ischemic stroke patients receiving IV rt-PA in a timely fashion (DTN ≤ 60 minutes)**
2. **Implement Target: Stroke Best Practice Strategies**
3. **Utilize GWTG-Stroke clinical decision support tools and evidence based strategies for IV rt-PA**
4. **Participate in the Target: Stroke community of hospitals**
5. **Track progress to goal using GWTG-Stroke PMT quality measures**

Target: Stroke Resources

- **Target: Stroke Best Practice Strategies**
- **Customizable implementation tools, strategies and systems**
- **Guideline based algorithms, order sets, dosing charts**
- **Educational programs via webinar series**
- **Get With The Guidelines-Stroke community of hospitals**
- **Online exchange forums to share best practices, challenges, and successes**

Acute Stroke Evaluation and Treatment: 60 Minute or Less Protocol

- Door to MD ≤ 10 minutes: Patient complaint, vital signs, ECG
- ED Physician ≤ 15 minutes: Focused history and physical exam, laboratories, stroke team activation, transport for CT Scan (stroke protocol) *Vital sign monitoring, neurologic checks, seizure and aspiration precautions*
- CT Scan and Stroke Neurology Consult ≤ 20 minutes: Review history, physical exam, interpret CT Scan
- Treatment Decision and Initiate IV rt-PA infusion ≤15 minutes: per guideline based protocol

Thrombolytic Therapy Checklist

- >18 years of age with ischemic stroke < 3 hours
- Stroke deficit assessment
  - --Deficit found to be potentially disabling
  - --Severity quantified with NIH stroke scale (0 - 42 scale)

(stroke scale training available at: www.asatrainingcampus.org)

- Coagulation status
  - No evidence of coagulopathy, if tested: INR < 1.8 and normal PTT If taking warfarin, INR < 1.8
  - Platelets > 100,000
- Blood Pressure SBP < 185 mm Hg, DBP < 110 mm Hg
- Glucose > 50 mg/dL

Updated from Adams HP, et al. ASA Stroke Council. *Stroke*. 2003;34:1056-1083.

Best Practice Strategies

1. Advance Hospital Notification by EMS: EMS providers should, when feasible, provide early notification to the receiving hospital when stroke is recognized in the field. Advance notification of patient arrival by EMS can shorten time to CT and improve the timeliness of treatment with thrombolysis.

2. Rapid Triage Protocol and Stroke Team Notification: Acute triage protocols facilitate the timely recognition of stroke and reduce time to treatment. Acute stroke teams enhance stroke care and should be activated as soon as the stroke patient is identified in the emergency department or after notification from pre-hospital personnel.

3. Single Call Activation System: A single call should activate the entire stroke team. A single-call activation system for the stroke team is defined here as a system in which the emergency department calls a central page operator, who then simultaneously pages the entire stroke team, including notification for stroke protocol imaging.

Best Practice Strategies

4. Stroke Tools: A Stroke Toolkit containing clinical decision support, stroke specific order sets, guidelines, hospital specific algorithms, critical pathways, NIH Stroke Scale, and other stroke tools should be available and utilized for each patient.

5. Rapid Acquisition and Interpretation of Brain Imaging: It is essential to initiate a CT scan (or MRI) within 25 minutes of arrival and complete interpretation of the CT scan within 45 minutes of arrival to exclude intracranial hemorrhage prior to administration of IV rt-PA.

6. Rapid Laboratory Testing (Including point of Care Testing if indicated): For patients in whom coagulation parameters should be assessed because of suspicion of coagulopathy, INR/PTT results should be available as quickly as possible and no later than 45 minutes after ED arrival. If standard STAT laboratory turnaround times cannot meet this target, point of care INR testing in the Emergency Department can provide the data in the needed timeframe.

Best Practice Strategies

7. Mix rt-PA Medication Ahead of Time: A useful strategy is to mix drug and set up the bolus dose and one hour infusion pump as soon as a patient is recognized as a possible rt-PA candidate, even before brain imaging. Early preparation allows rt-PA infusion to begin as soon as the medical decision to treat is made. Some drug manufacturers have policies to replace, free of charge, medications that are mixed but not given in time-critical emergency situations like this. Check with your hospital pharmacy for the proper procedures to allow you to use this strategy to shorten time to treatment without financial risk.

8. Rapid Access to Intravenous rt-PA: Once eligibility has been determined and intracranial hemorrhage has been excluded, IV rt-PA should be promptly administered. tPA should be readily available in the emergency department or CT scanner (if CT scanner is not located in the ED). Dosing charts and standardized order sets can also facilitate timely administration.

Best Practice Strategies

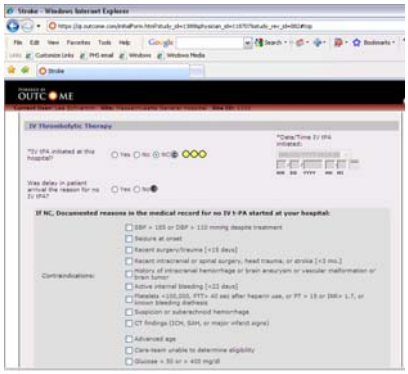
9. Team-Based Approach: The team approach based on standardized stroke pathways and protocols has proven to be effective in reducing time to treatment in stroke. An interdisciplinary collaborative team is also essential for successful stroke performance improvement efforts. The team should frequently meet to review your hospital's process and make recommendations for improvement.

10. Prompt Data Feedback: Accurately measuring and tracking your hospital's door-to-needle times equips the stroke team to identify areas for improvement and take appropriate action. A data monitoring and feedback system includes the use of the GWTG-Stroke PMT and creating a process for providing timely feedback on a case by case basis and in hospital aggregate. This system helps identify specific delays, set targets, and monitor progress on a case by case basis.

Time Interval Goals

1. **Perform an initial patient evaluation within 10 minutes of arrival in the emergency department**
2. **Notify the stroke team within 15 minutes of arrival**
3. **Initiate a CT scan within 25 minutes of arrival**
4. **Interpret the CT scan within 45 minutes of arrival**
5. **Ensure a door-to-needle time for IV rt-PA within 60 minutes from arrival.**

The GWTG-Stroke PMT facilitates the tracking of eligible patients, key time intervals, quality measures, and progress towards the Target: Stroke goal



Expectations of Target: Stroke Hospitals

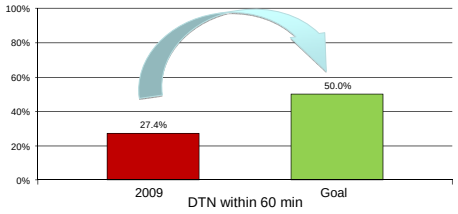
- **Active participation to achieve the Target: Stroke goal**
- **Assemble dedicated Target: Stroke Improvement Team**
- **Implement Target: Stroke Improvement Best Practices**
- **Utilize Target: Stroke tools**
- **Track progress to achieving the Target: Stroke Goal using the GWTG-Stroke PMT reporting functions**
- **Share insights, experiences, and success**

Benefits to Target: Stroke Participants

- **Access to world-class experts and a curriculum on timely and effective acute stroke care**
- **Access to best practice strategies and successful efforts to improve acute stroke care and meet goals**
- **Online forums to exchange knowledge and improve performance**
- **Customizable strategies and tools**
- **Recognition for your hospital's stroke care**

Target: Stroke The Time is Now

Door-to-IV rt-PA within 60 minutes



GWTG-Stroke Database, data on file DCRI

2012/2013 Guidelines

- **Prehospital**
  - To increase both the number of patients who are treated and the quality of care, educational stroke programs for physicians, hospital personnel, and EMS personnel are recommended (*Class I; Level of Evidence B*). (Unchanged from the previous guideline)

2012/2013 Guidelines

- **Prehospital**
  - Activation of the 911 system by patients or other members of the public is strongly recommended (*Class I; Level of Evidence B*). 911 Dispatchers should make stroke a priority dispatch, and transport times should be minimized. (Unchanged from the previous guideline)

2012/2013 Guidelines

- **Prehospital**
  - Prehospital care providers should use prehospital stroke assessment tools, such as the Los Angeles Prehospital Stroke Screen or Cincinnati Prehospital Stroke Scale *(Class I; Level of Evidence B)*. (Unchanged from the previous guideline)

2012/2013 Guidelines

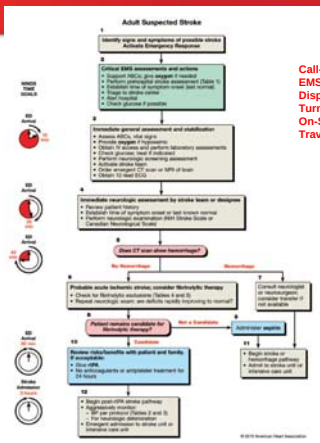
- **Prehospital**
  - EMS personnel should begin the initial management of stroke in the field, as outlined in Table 4 in the full text of the guideline *(Class I; Level of Evidence B)*. Development of a stroke protocol to be used by EMS personnel is strongly encouraged. (Unchanged from the previous guideline)

2012/2013 Guidelines

- **Prehospital**
  - Patients should be transported rapidly to the closest available certified primary stroke center or comprehensive stroke center or, if no such centers exist, the most appropriate institution that provides emergency stroke care as described in the statement *(Class I; Level of Evidence A)*. In some instances, this may involve air medical transport and hospital bypass. (Revised from the previous guideline)

2012/2013 Guidelines

- **Prehospital**
  - EMS personnel should provide prehospital notification to the receiving hospital that a potential stroke patient is en route so that the appropriate hospital resources may be mobilized before patient arrival *(Class I; Level of Evidence B)*. (Revised from the previous guideline)



2012/2013 Guidelines

- **Stroke Center and QC**
  - The creation of primary stroke centers is recommended *(Class I; Level of Evidence B)*. The organization of such resources will depend on local resources. The stroke system design of regional acute stroke-ready hospitals and primary stroke centers that provide emergency care and that are closely associated with a comprehensive stroke center, which provides more extensive care, has considerable appeal. (Unchanged from the previous guideline)

2012/2013 Guidelines

- **Stroke Center and QC**
  - Certification of stroke centers by an independent external body, such as The Joint Commission or state health department, is recommended *(Class I; Level of Evidence B)*. Additional medical centers should seek such certification. (Revised from the previous guideline)

2012/2013 Guidelines

- **Stroke Center and QC**
  - Healthcare institutions should organize a multidisciplinary quality improvement committee to review and monitor stroke care quality benchmarks, indicators, evidence-based practices, and outcomes (*Class I; Level of Evidence B*). The formation of a clinical process improvement team and the establishment of a stroke care data bank are helpful for such quality of care assurances.
  - The data repository can be used to identify the gaps or disparities in quality stroke care. Once the gaps have been identified, specific interventions can be initiated to address these gaps or disparities. (New recommendation)

2012/2013 Guidelines

- **Stroke Center and QC**
  - For patients with suspected stroke, EMS should bypass hospitals that do not have resources to treat stroke and go to the closest facility most capable of treating acute stroke (*Class I; Level of Evidence B*). (Unchanged from the previous guideline)

2012/2013 Guidelines

- **Stroke Center and QC**
  - For sites without in-house imaging interpretation expertise, teleradiology systems approved by the Food and Drug Administration (or equivalent organization) are recommended for timely review of brain computed tomography (CT) and magnetic resonance imaging (MRI) scans in patients with suspected acute stroke (*Class I; Level of Evidence B*). (New recommendation)

2012/2013 Guidelines

- **Stroke Center and QC**
  - When implemented within a telestroke network, teleradiology systems approved by the Food and Drug Administration (or equivalent organization) are useful in supporting rapid imaging interpretation in time for fibrinolysis decision making *(Class I; Level of Evidence B)*. (New recommendation)

2012/2013 Guidelines

- **Stroke Center and QC**
  - The development of comprehensive stroke centers is recommended *(Class I; Level of Evidence C)*. (Unchanged from the previous guideline)

2012/2013 Guidelines

- **Stroke Center and QC**
  - Implementation of telestroke consultation in conjunction with stroke education and training for healthcare providers can be useful in increasing the use of intravenous recombinant tissue-type plasminogen activator (rtPA) at community hospitals without access to adequate onsite stroke expertise (*Class IIa; Level of Evidence B*). (New recommendation)

2012/2013 Guidelines

- **Stroke Center and QC**
  - The creation of acute stroke-ready hospitals can be useful (*Class IIa; Level of Evidence C*). As with primary stroke centers, the organization of such resources will depend on local resources. The stroke system design of regional acute stroke-ready hospitals and primary stroke centers that provide emergency care and that are closely associated with a comprehensive stroke center, which provides more extensive care, has considerable appeal. (New recommendation)

2012/2013 Guidelines

- **Emergency Evaluation and Diagnosis**
  - An organized protocol for the emergency evaluation of patients with suspected stroke is recommended *(Class I; Level of Evidence B)*. The goal is to complete an evaluation and to begin fibrinolytic treatment within 60 minutes of the patient's arrival in an emergency department.
  - Designation of an acute stroke team that includes physicians, nurses, and laboratory/radiology personnel is encouraged. Patients with stroke should have a careful clinical assessment, including neurological examination. (Unchanged from the previous guideline)

2012/2013 Guidelines

- **Emergency Evaluation and Diagnosis**
  - The use of a stroke rating scale, preferably the National Institutes of Health Stroke Scale (NIHSS), is recommended *(Class I; Level of Evidence B)*. (Unchanged from the previous guideline)

2012/2013 Guidelines

- **Emergency Evaluation and Diagnosis**
  - A limited number of hematologic, coagulation, and biochemistry tests are recommended during the initial emergency evaluation, and only the assessment of blood glucose must precede the initiation of intravenous rtPA (Table 8 in the full text of the guideline) *(Class I; Level of Evidence B)*. (Revised from the previous guideline)

2012/2013 Guidelines

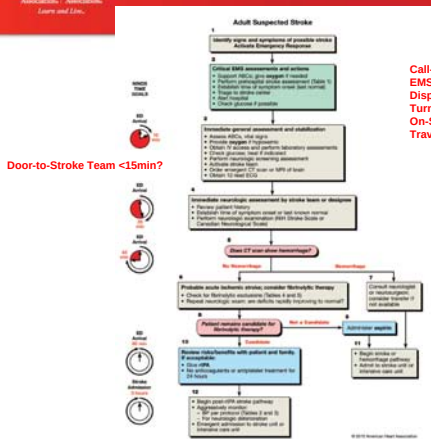
- **Emergency Evaluation and Diagnosis**
  - Baseline electrocardiogram assessment is recommended in patients presenting with acute ischemic stroke but should not delay initiation of intravenous rtPA *(Class I; Level of Evidence B)*. (Revised from the previous guideline)

2012/2013 Guidelines

- **Emergency Evaluation and Diagnosis**
  - Baseline troponin assessment is recommended in patients presenting with acute ischemic stroke but should not delay initiation of intravenous rtPA *(Class I; Level of Evidence C)*. (Revised from the previous guideline)

2012/2013 Guidelines

- **Emergency Evaluation and Diagnosis**
  - The usefulness of chest radiographs in the hyperacute stroke setting in the absence of evidence of acute pulmonary, cardiac, or pulmonary vascular disease is unclear.
  - If obtained, they should not unnecessarily delay administration of fibrinolysis *(Class IIb; Level of Evidence B)*. (Revised from the previous guideline)



- Features of clinical Situations Mimicking Stroke
  - Psychogenic
  - Seizures
  - Hypoglycemia
  - Migraine with aura (complicated migraine)
  - Hypertensive encephalopathy
  - Wernicke's encephalopathy
  - CNS abscess
  - CNS tumor
  - Drug toxicity: Lithium, Phenytoin, Carbamazepine

2012/2013 Guidelines

- **Emergency Evaluation and Diagnosis**
  - The usefulness of chest radiographs in the hyperacute stroke setting in the absence of evidence of acute pulmonary, cardiac, or pulmonary vascular disease is unclear.
  - If obtained, they should not unnecessarily delay administration of fibrinolysis *(Class IIb; Level of Evidence B)*. (Revised from the previous guideline)

2012/2013 Guidelines

NOT Resolved

- **Early Diagnosis: Brain/Vascular Imaging**
  - Emergency imaging of the brain is recommended before initiating any specific therapy to treat acute ischemic stroke *(Class I; Level of Evidence A)*. In most instances, non–contrast-enhanced CT will provide the necessary information to make decisions about emergency management. (Unchanged from the previous guideline)

2012/2013 Guidelines

NOT Resolved

- **Early Diagnosis: Brain/Vascular Imaging**
  - Either non–contrast-enhanced CT or MRI is recommended before intravenous rtPA administration to exclude intracerebral hemorrhage (absolute contraindication) and to determine whether CT hypodensity or MRI hyperintensity of ischemia is present *(Class I; Level of Evidence A)*. (Revised from the 2009 imaging scientific statement)

2012/2013 Guidelines

NOT Resolved

- **Early Diagnosis: Brain/Vascular Imaging**
  - Intravenous fibrinolytic therapy is recommended in the setting of early ischemic changes (other than frank hypodensity) on CT, regardless of their extent *(Class I; Level of Evidence A)*. (Revised from the 2009 imaging scientific statement)

2012/2013 Guidelines

- **Early Diagnosis: Brain/Vascular Imaging**
  - A noninvasive intracranial vascular study is strongly recommended during the initial imaging evaluation of the acute stroke patient if either intra-arterial fibrinolysis or mechanical thrombectomy is contemplated for management but should not delay intravenous rtPA if indicated *(Class I; Level of Evidence A)*. (Revised from the 2009 imaging scientific statement)

2012/2013 Guidelines

NOT Resolved

- **Early Diagnosis: Brain/Vascular Imaging**
  - In intravenous fibrinolysis candidates, the brain imaging study should be interpreted within 45 minutes of patient arrival in the emergency department by a physician with expertise in reading CT and MRI studies of the brain parenchyma *(Class I; Level of Evidence C)*. (Revised from the previous guideline)

2012/2013 Guidelines

NOT Resolved

- **Early Diagnosis: Brain/Vascular Imaging**
  - CT perfusion and MRI perfusion and diffusion imaging, including measures of infarct core and penumbra, may be considered for the selection of patients for acute reperfusion therapy beyond the time windows for intravenous fibrinolysis. These techniques provide additional information that may improve diagnosis, mechanism, and severity of ischemic stroke and allow more informed clinical decision making *(Class IIb; Level of Evidence B)*. (Revised from the 2009 imaging scientific statement)

2012/2013 Guidelines

NOT Resolved

- **Early Diagnosis: Brain/Vascular Imaging**
  - Frank hypodensity on non–contrast-enhanced CT may increase the risk of hemorrhage with fibrinolysis and should be considered in treatment decisions. If frank hypodensity involves more than one third of the middle cerebral artery territory, intravenous rtPA treatment should be withheld *(Class III; Level of Evidence A)*. (Revised from the 2009 imaging scientific statement)

2012/2013 Guidelines

Resolved

- **Early Diagnosis: Brain/Vascular Imaging**
  - Noninvasive imaging of the cervical vessels should be performed routinely as part of the evaluation of patients with suspected TIAs *(Class I; Level of Evidence A)*. (Unchanged from the 2009 TIA scientific statement)

2012/2013 Guidelines

Resolved

- **Early Diagnosis: Brain/Vascular Imaging**
  - Noninvasive imaging by means of CT angiography or magnetic resonance angiography of the intracranial vasculature is recommended to exclude the presence of proximal intracranial stenosis and/or occlusion *(Class I; Level of Evidence A)* and should be obtained when knowledge of intracranial steno-occlusive disease will alter management.
  - Reliable diagnosis of the presence and degree of intracranial stenosis requires the performance of catheter angiography to confirm abnormalities detected with noninvasive testing. (Revised from the 2009 TIA scientific statement)

2012/2013 Guidelines

Resolved

- **Early Diagnosis: Brain/Vascular Imaging**
  - Patients with transient ischemic neurological symptoms should undergo neuroimaging evaluation within 24 hours of symptom onset or as soon as possible in patients with delayed presentations. MRI, including diffusion-weighted imaging, is the preferred brain diagnostic imaging modality. If MRI is not available, head CT should be performed *(Class I; Level of Evidence B)*. (Revised from the 2009 TIA scientific statement)

2012/2013 Guidelines

- **General Care and Treatment of Complications**
  - Cardiac monitoring is recommended to screen for atrial fibrillation and other potentially serious cardiac arrhythmias that would necessitate emergency cardiac interventions. Cardiac monitoring should be performed for at least the first 24 hours *(Class I; Level of Evidence B)*. (Revised from the previous guideline)

2012/2013 Guidelines

- **General Care and Treatment of Complications**
  - Patients who have elevated blood pressure and are otherwise eligible for treatment with intravenous rtPA should have their blood pressure carefully lowered so that their systolic blood pressure is <185 mm Hg and their diastolic blood pressure is <110 mm Hg *(Class I; Level of Evidence B)* before fibrinolytic therapy is initiated. If medications are given to lower blood pressure, the clinician should be sure that the blood pressure is stabilized at the lower level before beginning treatment with intravenous rtPA and maintained below 180/105 mm Hg for at least the first 24 hours after intravenous rtPA treatment. (Unchanged from the previous guideline)

2012/2013 Guidelines

- **General Care and Treatment of Complications**
  - Airway support and ventilatory assistance are recommended for the treatment of patients with acute stroke who have decreased consciousness or who have bulbar dysfunction that causes compromise of the airway (*Class I; Level of Evidence C*). (Unchanged from the previous guideline)

2012/2013 Guidelines

- **General Care and Treatment of Complications**
  - Supplemental oxygen should be provided to maintain oxygen saturation >94% *(Class I; Level of Evidence C)*. (Revised from the previous guideline)

2012/2013 Guidelines

- **General Care and Treatment of Complications**
  - Sources of hyperthermia (temperature >38° C) should be identified and treated, and antipyretic medications should be administered to lower temperature in hyperthermic patients with stroke *(Class I; Level of Evidence C)*. (Unchanged from the previous guideline)

2012/2013 Guidelines

- **General Care and Treatment of Complications**
  - Until other data become available, consensus exists that the previously described blood pressure recommendations should be followed in patients undergoing other acute interventions to recanalize occluded vessels, including intra-arterial fibrinolysis *(Class I; Level of Evidence C)*. (Unchanged from the previous guideline)

2012/2013 Guidelines

- **General Care and Treatment of Complications**
  - In patients with markedly elevated blood pressure who do not receive fibrinolysis, a reasonable goal is to lower blood pressure by 15% during the first 24 hours after onset of stroke. The level of blood pressure that would mandate such treatment is not known, but consensus exists that medications should be withheld unless the systolic blood pressure is >220 mm Hg or the diastolic blood pressure is >120 mm Hg *(Class I; Level of Evidence C)*. (Revised from the previous guideline)

Patient otherwise eligible for acute reperfusion therapy except that BP is >185/110 mm Hg:

Labetalol 10–20 mg IV over 1–2 minutes, may repeat 1 time; or

Nicardipine 5 mg/h IV, titrate up by 2.5 mg/h every 5–15 minutes, maximum 15 mg/h; when desired BP reached, adjust to maintain proper BP limits; or

Other agents (hydralazine, enalaprilat, etc) may be considered when appropriate

If BP is not maintained at or below 185/110 mm Hg, do not administer rtPA

Management of BP during and after rtPA or other acute reperfusion therapy to maintain BP at or below 180/105 mm Hg:

Monitor BP 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

If systolic BP >180–230 mm Hg or diastolic BP >105–120 mm Hg:

Labetalol 10 mg IV followed by continuous IV infusion 2–8 mg/min; or

Nicardipine 5 mg/h IV, titrate up to desired effect by 2.5 mg/h every 5–15 minutes, maximum 15 mg/h

If BP not controlled or diastolic BP >140 mm Hg, consider IV sodium nitroprusside

BP indicates blood pressure; IV, intravenously; and rtPA, recombinant tissue-type plasminogen activator.

2012/2013 Guidelines

- **General Care and Treatment of Complications**
  - Hypovolemia should be corrected with intravenous normal saline, and cardiac arrhythmias that might be reducing cardiac output should be corrected *(Class I; Level of Evidence C)*. (Revised from the previous guideline)

2012/2013 Guidelines

- **General Care and Treatment of Complications**
  - Hypoglycemia (blood glucose <60 mg/dL) should be treated in patients with acute ischemic stroke *(Class I; Level of Evidence C)*. The goal is to achieve normoglycemia. (Revised from the previous guideline)

2012/2013 Guidelines

- **General Care and Treatment of Complications**
  - Evidence from one clinical trial indicates that initiation of antihypertensive therapy within 24 hours of stroke is relatively safe. Restarting antihypertensive medications is reasonable after the first 24 hours for patients who have preexisting hypertension and are neurologically stable unless a specific contraindication to restarting treatment is known *(Class IIa; Level of Evidence B)*. (Revised from the previous guideline)

2012/2013 Guidelines

- **General Care and Treatment of Complications**
  - No data are available to guide selection of medications for the lowering of blood pressure in the setting of acute ischemic stroke. The antihypertensive medications and doses included in Table of the guideline are reasonable choices based on general consensus *(Class IIa; Level of Evidence C)*. (Revised from the previous guideline)

2012/2013 Guidelines

- **General Care and Treatment of Complications**
  - Evidence indicates that persistent in-hospital hyperglycemia during the first 24 hours after stroke is associated with worse outcomes than normoglycemia, and thus, it is reasonable to treat hyperglycemia to achieve blood glucose levels in a range of 140 to 180 mg/dL and to closely monitor to prevent hypoglycemia in patients with acute ischemic stroke *(Class IIa; Level of Evidence C)*. (Revised from the previous guideline)

2012/2013 Guidelines

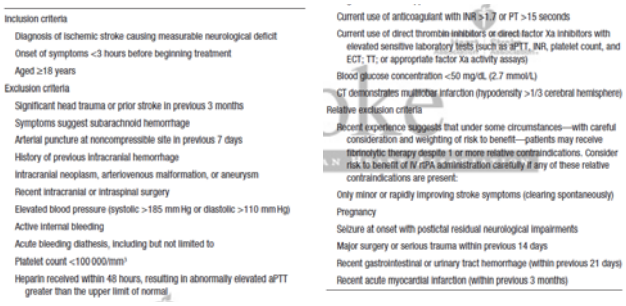
- **General Care and Treatment of Complications**
  - The management of arterial hypertension in patients not undergoing reperfusion strategies remains challenging. Data to guide recommendations for treatment are inconclusive or conflicting. Many patients have spontaneous declines in blood pressure during the first 24 hours after onset of stroke. Until more definitive data are available, the benefit of treating arterial hypertension in the setting of acute ischemic stroke is not well established *(Class IIb; Level of Evidence C)*. Patients who have malignant hypertension or other medical indications for aggressive treatment of blood pressure should be treated accordingly. (Revised from the previous guideline)

2012/2013 Guidelines

- **General Care and Treatment of Complications**
  - Supplemental oxygen is not recommended in nonhypoxic patients with acute ischemic stroke *(Class III; Level of Evidence B)*. (Unchanged from the previous guideline)

2012/2013 Guidelines

- **Intravenous Fibrinolysis**
  - Intravenous rtPA (0.9 mg/kg, maximum dose 90 mg) is recommended for selected patients who may be treated within 3 hours of onset of ischemic stroke *(Class I; Level of Evidence A)*. Physicians should review the criteria outlined in Tables 10 and 11 in the full text of the guideline (which are modeled on those used in the National Institute of Neurologic Disorders and Stroke rt-PA Stroke Study) to determine the eligibility of the patient. A recommended regimen for observation and treatment of patients who receive intravenous rtPA is described in Table 12 in the full text of the guideline. (Unchanged from the previous guideline)



Inclusion criteria
- Diagnosis of ischemic stroke causing measurable neurological deficit
- Onset of symptoms <3 hours before beginning treatment
- Aged ≥18 years

Exclusion criteria
- Significant head trauma or prior stroke in previous 3 months
- Symptoms suggest subarachnoid hemorrhage
- Arterial puncture at noncompressible site in previous 7 days
- History of previous intracranial hemorrhage
- Intracranial neoplasm, arteriovenous malformation, or aneurysm
- Recent intracranial or intraspinal surgery
- Elevated blood pressure (systolic >185 mm Hg or diastolic >110 mm Hg)
- Active internal bleeding
- Acute bleeding diathesis, including but not limited to
- Platelet count <100 000/mm³
- Heparin received within 48 hours, resulting in abnormally elevated aPTT greater than the upper limit of normal
- Current use of anticoagulant with INR >1.7 or PT >15 seconds
- Current use of direct thrombin inhibitors or direct factor Xa inhibitors with elevated sensitive laboratory tests (such as aPTT, INR, platelet count, and ECT; TT; or appropriate factor Xa activity assays)
- Blood glucose concentration <50 mg/dL (2.7 mmol/L)
- CT demonstrates multilobar infarction (hypodensity >1/3 cerebral hemisphere)

Relative exclusion criteria
- Recent experience suggests that under some circumstances—with careful consideration and weighting of risk to benefit—patients may receive fibrinolytic therapy despite 1 or more relative contraindications. Consider risk to benefit of IV rtPA administration carefully if any of these relative contraindications are present:
- Only minor or rapidly improving stroke symptoms (clearing spontaneously)
- Pregnancy
- Seizure at onset with postictal residual neurological impairments
- Major surgery or serious trauma within previous 14 days
- Recent gastrointestinal or urinary tract hemorrhage (within previous 21 days)
- Recent acute myocardial infarction (within previous 3 months)

TARGET: STROKE
TIME LOST IS BRAIN LOST.

2012/2013 Guidelines

- **Intravenous Fibrinolysis**
  - In patients eligible for intravenous rtPA, benefit of therapy is time dependent, and treatment should be initiated as quickly as possible. The door-to-needle time (time of bolus administration) should be within 60 minutes from hospital arrival *(Class I; Level of Evidence A)*. (New recommendation)

TARGET: STROKE
TIME LOST IS BRAIN LOST.

2012/2013 Guidelines

- **Intravenous Fibrinolysis**
  - Intravenous rtPA (0.9 mg/kg, maximum dose 90 mg) is recommended for administration to eligible patients who can be treated in the time period of 3 to 4.5 hours after stroke onset *(Class I; Level of Evidence B)*. The eligibility criteria for treatment in this time period are similar to those for people treated at earlier time periods within 3 hours, with the following additional exclusion criteria: patients >80 years old, those taking oral anticoagulants regardless of international normalized ratio, those with a baseline NIHSS score >25, those with imaging evidence of ischemic injury involving more than one third of the middle cerebral artery territory, or those with a history of both stroke and diabetes mellitus. (Revised from the 2009 IV rtPA Science Advisory)

TARGET: STROKE
TIME LOST IS BRAIN LOST.

2012/2013 Guidelines

- **Intravenous Fibrinolysis**
  - Intravenous rtPA is reasonable in patients whose blood pressure can be lowered safely (to below 185/110 mm Hg) with antihypertensive agents, with the physician assessing the stability of the blood pressure before starting intravenous rtPA *(Class I; Level of Evidence B)*. (Unchanged from the previous guideline)

TARGET: STROKE
TIME LOST IS BRAIN LOST.

2012/2013 Guidelines

- **Intravenous Fibrinolysis**
  - In patients undergoing fibrinolytic therapy, physicians should be aware of and prepared to emergently treat potential side effects, including bleeding complications and angioedema that may cause partial airway obstruction *(Class I; Level of Evidence B)*. (Revised from the previous guideline)

TARGET: STROKE
TIME LOST IS BRAIN LOST.

2012/2013 Guidelines

- **Intravenous Fibrinolysis**
  - Intravenous rtPA is reasonable in patients with a seizure at the time of onset of stroke if evidence suggests that residual impairments are secondary to stroke and not a postictal phenomenon *(Class IIa; Level of Evidence C)*. (Unchanged from the previous guideline)

2012/2013 Guidelines

- **Intravenous Fibrinolysis**
  - The effectiveness of sonothrombolysis for treatment of patients with acute stroke is not well established *(Class IIb; Level of Evidence B)*. (New recommendation)

2012/2013 Guidelines

- **Intravenous Fibrinolysis**
  - The usefulness of intravenous administration of tenecteplase, reteplase, desmoteplase, urokinase, or other fibrinolytic agents and the intravenous administration of ancrod or other defibrinogenating agents is not well established, and they should only be used in the setting of a clinical trial *(Class IIb; Level of Evidence B)*. (Revised from the previous guideline)

2012/2013 Guidelines

- **Intravenous Fibrinolysis**
  - For patients who can be treated in the time period of 3 to 4.5 hours after stroke but have 1 or more of the following exclusion criteria: (1) patients >80 years old, (2) those taking oral anticoagulants, even with international normalized ratio ≤1.7, (3) those with a baseline NIHSS score >25, or (4) those with a history of both stroke and diabetes mellitus, the effectiveness of intravenous treatment with rtPA is not well-established, *(Class IIb, Level of Evidence C)*, and requires further study.

2012/2013 Guidelines

- **Intravenous Fibrinolysis**
  - Use of intravenous fibrinolysis in patients with conditions of mild stroke deficits, rapidly improving stroke symptoms, major surgery in the preceding 3 months, and recent myocardial infarction may be considered, and potential increased risk should be weighed against the anticipated benefits *(Class IIb; Level of Evidence C)*. These circumstances require further study. (New recommendation)

2012/2013 Guidelines

- **Intravenous Fibrinolysis**
  - The intravenous administration of streptokinase for treatment of stroke is not recommended *(Class III; Level of Evidence A)*. (Revised from the previous guideline)

2012/2013 Guidelines

- **Intravenous Fibrinolysis**
  - The use of intravenous rtPA in patients taking direct thrombin inhibitors or direct factor Xa inhibitors may be harmful and is not recommended unless sensitive laboratory tests such as activated partial thromboplastin time, international normalized ratio, platelet count, and ecarin clotting time, thrombin time, or appropriate direct factor Xa activity assays are normal, or the patient has not received a dose of these agents for >2 days (assuming normal renal metabolizing function). Similar consideration should be given to patients being considered for intra-arterial rtPA *(Class III; Level of Evidence C)*. (New recommendation) Further study is required.

2012/2013 Guidelines

- **Endovascular Interventions**
  - Patients eligible for intravenous rtPA should receive intravenous rtPA even if intra-arterial treatments are being considered (*Class I; Level of Evidence A*). (Unchanged from the previous guideline)

2012/2013 Guidelines

- **Endovascular Interventions**
  - Intra-arterial fibrinolysis is beneficial for treatment of carefully selected patients with major ischemic strokes of <6 hours' duration caused by occlusions of the middle cerebral artery who are not otherwise candidates for intravenous rtPA (*Class I; Level of Evidence B*). The optimal dose of intra-arterial rtPA is not well established, and rtPA does not have Food and Drug Administration approval for intra-arterial use. (Revised from the previous guideline)

2012/2013 Guidelines

- **Endovascular Interventions**
  - Intra-arterial fibrinolysis is beneficial for treatment of carefully selected patients with major ischemic strokes of <6 hours' duration caused by occlusions of the middle cerebral artery who are not otherwise candidates for intravenous rtPA (*Class I; Level of Evidence B*). The optimal dose of intra-arterial rtPA is not well established, and rtPA does not have Food and Drug Administration approval for intra-arterial use. (Revised from the previous guideline)

2012/2013 Guidelines

- **Endovascular Interventions**
  - As with intravenous fibrinolytic therapy, reduced time from symptom onset to reperfusion with intra-arterial therapies is highly correlated with better clinical outcomes, and all efforts must be undertaken to minimize delays to definitive therapy *(Class I; Level of Evidence B)*. (New recommendation)

2012/2013 Guidelines

- **Endovascular Interventions**
  - Intra-arterial treatment requires the patient to be at an experienced stroke center with rapid access to cerebral angiography and qualified interventionalists. An emphasis on expeditious assessment and treatment should be made. Facilities are encouraged to define criteria that can be used to credential individuals who can perform intra-arterial revascularization procedures. Outcomes on all patients should be tracked *(Class I; Level of Evidence C)*. (Revised from the previous guideline)

2012/2013 Guidelines

- **Endovascular Interventions**
  - When mechanical thrombectomy is pursued, stent retrievers such as Solitaire FR and Trevo are generally preferred to coil retrievers such as Merci *(Class I; Level of Evidence A)*. The relative effectiveness of the Penumbra System versus stent retrievers is not yet characterized. (New recommendation)

2012/2013 Guidelines

- **Endovascular Interventions**
  - The Merci, Penumbra System, Solitaire FR, and Trevo thrombectomy devices can be useful in achieving recanalization alone or in combination with pharmacological fibrinolysis in carefully selected patients *(Class IIa; Level of Evidence B)*. Their ability to improve patient outcomes has not yet been established. These devices should continue to be studied in randomized controlled trials to determine the efficacy of such treatments in improving patient outcomes. (Revised from the previous guideline)

2012/2013 Guidelines

- **Endovascular Interventions**
  - Intra-arterial fibrinolysis or mechanical thrombectomy is reasonable in patients who have contraindications to the use of intravenous fibrinolysis *(Class IIa; Level of Evidence C)*. (Revised from the previous guideline)

2012/2013 Guidelines

- **Endovascular Interventions**
  - Rescue intra-arterial fibrinolysis or mechanical thrombectomy may be reasonable approaches to recanalization in patients with large-artery occlusion who have not responded to intravenous fibrinolysis. Additional randomized trial data are needed *(Class IIb; Level of Evidence B)*. (New recommendation)

2012/2013 Guidelines

- **Endovascular Interventions**
  - The usefulness of mechanical thrombectomy devices other than the Merci retriever, the Penumbra System, Solitaire FR, and Trevo is not well established *(Class IIb; Level of Evidence C)*. These devices should be used in the setting of clinical trials. (Revised from the previous guideline)

2012/2013 Guidelines

- **Endovascular Interventions**
  - The usefulness of emergent intracranial angioplasty and/or stenting is not well established. These procedures should be used in the setting of clinical trials *(Class IIb; Level of Evidence C)*. (New recommendation)

2012/2013 Guidelines

- **Endovascular Interventions**
  - The usefulness of emergent angioplasty and/or stenting of the extracranial carotid or vertebral arteries in unselected patients is not well established *(Class IIb; Level of Evidence C)*. Use of these techniques may be considered in certain circumstances, such as in the treatment of acute ischemic stroke resulting from cervical atherosclerosis or dissection *(Class IIb; Level of Evidence C)*. Additional randomized trial data are needed. (New recommendation)

2012/2013 Guidelines

- **Anticoagulants**
  - At present, the usefulness of argatroban or other thrombin inhibitors for treatment of patients with acute ischemic stroke is not well established *(Class IIb; Level of Evidence B)*. These agents should be used in the setting of clinical trials. (New recommendation)

2012/2013 Guidelines

- **Anticoagulants**
  - The usefulness of urgent anticoagulation in patients with severe stenosis of an internal carotid artery ipsilateral to an ischemic stroke is not well established (*Class IIb; Level of Evidence B*). (New recommendation)

2012/2013 Guidelines

- **Anticoagulants**
  - Urgent anticoagulation, with the goal of preventing early recurrent stroke, halting neurological worsening, or improving outcomes after acute ischemic stroke, is not recommended for treatment of patients with acute ischemic stroke *(Class III; Level of Evidence A)*. (Unchanged from the previous guideline)

2012/2013 Guidelines

- **Anticoagulants**
  - Urgent anticoagulation for the management of noncerebrovascular conditions is not recommended for patients with moderate-to-severe strokes because of an increased risk of serious intracranial hemorrhagic complications *(Class III; Level of Evidence A)*. (Unchanged from the previous guideline)

2012/2013 Guidelines

- **Anticoagulants**
  - Initiation of anticoagulant therapy within 24 hours of treatment with intravenous rtPA is not recommended *(Class III; Level of Evidence B)*. (Unchanged from the previous guideline)

2012/2013 Guidelines

- **Antiplatelet Agents**
  - Oral administration of aspirin (initial dose is 325 mg) within 24 to 48 hours after stroke onset is recommended for treatment of most patients *(Class I; Level of Evidence A)*. (Unchanged from the previous guideline)

2012/2013 Guidelines

- **Antiplatelet Agents**
  - The usefulness of clopidogrel for the treatment of acute ischemic stroke is not well established *(Class IIb; Level of Evidence C)*. Further research testing the usefulness of the emergency administration of clopidogrel in the treatment of patients with acute stroke is required. (Revised from the previous guideline)

2012/2013 Guidelines

- **Antiplatelet Agents**
  - The efficacy of intravenous tirofiban and eptifibatide is not well established, and these agents should be used only in the setting of clinical trials (*Class IIb; Level of Evidence C*). (New recommendation)

2012/2013 Guidelines

- **Antiplatelet Agents**
  - Aspirin is not recommended as a substitute for other acute interventions for treatment of stroke, including intravenous rtPA *(Class III; Level of Evidence B)*. (Unchanged from the previous guideline)

2012/2013 Guidelines

- **Antiplatelet Agents**
  - The administration of other intravenous antiplatelet agents that inhibit the glycoprotein IIb/IIIa receptor is not recommended *(Class III; Level of Evidence B)*. (Revised from the previous guideline)
  - Further research testing the usefulness of emergency administration of these medications as a treatment option in patients with acute ischemic stroke is required.

2012/2013 Guidelines

- **Antiplatelet Agents**
  - The administration of aspirin (or other antiplatelet agents) as an adjunctive therapy within 24 hours of intravenous fibrinolysis is not recommended *(Class III; Level of Evidence C)*. (Revised from the previous guideline)

2012/2013 Guidelines

- **Volume Expansion, Vasodilators, Induced Hypertension**
  - In exceptional cases with systemic hypotension producing neurological sequelae, a physician may prescribe vasopressors to improve cerebral blood flow. If drug-induced hypertension is used, close neurological and cardiac monitoring is recommended *(Class I; Level of Evidence C)*. (Revised from the previous guideline)

2012/2013 Guidelines

- **Volume Expansion, Vasodilators, Induced Hypertension**
  - The administration of high-dose albumin is not well established as a treatment for most patients with acute ischemic stroke until further definitive evidence regarding efficacy becomes available *(Class IIb; Level of Evidence B)*. (New recommendation)

2012/2013 Guidelines

- **Volume Expansion, Vasodilators, Induced Hypertension**
  - At present, use of devices to augment cerebral blood flow for the treatment of patients with acute ischemic stroke is not well established *(Class IIb; Level of Evidence B)*. These devices should be used in the setting of clinical trials. (New recommendation)

2012/2013 Guidelines

- **Volume Expansion, Vasodilators, Induced Hypertension**
  - The usefulness of drug-induced hypertension in patients with acute ischemic stroke is not well established *(Class IIb; Level of Evidence B)*. (Revised from the previous guideline)
  - Induced hypertension should be performed in the setting of clinical trials.

2012/2013 Guidelines

- **Volume Expansion, Vasodilators, Induced Hypertension**
  - Hemodilution by volume expansion is not recommended for treatment of patients with acute ischemic stroke *(Class III; Level of Evidence A)*. (Revised from the previous guideline)

2012/2013 Guidelines

- **Volume Expansion, Vasodilators, Induced Hypertension**
  - The administration of vasodilatory agents, such as pentoxifylline, is not recommended for treatment of patients with acute ischemic stroke *(Class III; Level of Evidence A)*. (Unchanged from the previous guideline)

2012/2013 Guidelines

- **Neuroprotective Agents**
  - Among patients already taking statins at the time of onset of ischemic stroke, continuation of statin therapy during the acute period is reasonable *(Class IIa; Level of Evidence B)*. (New recommendation)

2012/2013 Guidelines

- **Neuroprotective Agents**
  - The utility of induced hypothermia for the treatment of patients with ischemic stroke is not well established, and further trials are recommended *(Class IIb; Level of Evidence B)*. (Revised from the previous guideline)

2012/2013 Guidelines

- **Neuroprotective Agents**
  - At present, transcranial near-infrared laser therapy is not well established for the treatment of acute ischemic stroke *(Class IIb; Level of Evidence B)*, and further trials are recommended. (New recommendation)

2012/2013 Guidelines

- **Neuroprotective Agents**
  - At present, no pharmacological agents with putative neuroprotective actions have demonstrated efficacy in improving outcomes after ischemic stroke, and therefore, other neuroprotective agents are not recommended *(Class III; Level of Evidence A)*. (Revised from the previous guideline)

2012/2013 Guidelines

- **Neuroprotective Agents**
  - Data on the utility of hyperbaric oxygen are inconclusive, and some data imply that the intervention may be harmful. Thus, with the exception of stroke secondary to air embolization, this intervention is not recommended for treatment of patients with acute ischemic stroke *(Class III; Level of Evidence B)*. (Unchanged from the previous guideline)

2012/2013 Guidelines

- **Surgical Interventions**
  - The usefulness of emergent or urgent carotid endarterectomy when clinical indicators or brain imaging suggests a small infarct core with large territory at risk (eg, penumbra), compromised by inadequate flow from a critical carotid stenosis or occlusion, or in the case of acute neurological deficit after carotid endarterectomy, in which acute thrombosis of the surgical site is suspected, is not well established *(Class IIb; Level of Evidence B)*. (New recommendation)

2012/2013 Guidelines

- **Surgical Interventions**
  - In patients with unstable neurological status (either stroke in evolution or crescendo TIA), the efficacy of emergent or urgent carotid endarterectomy is not well established *(Class IIb; Level of Evidence B)*. (New recommendation)

2012/2013 Guidelines

- **Admission**
  - The use of comprehensive specialized stroke care (stroke units) that incorporates rehabilitation is recommended *(Class I; Level of Evidence A)*. (Unchanged from the previous guideline)

2012/2013 Guidelines

- **Admission**
  - Patients with suspected pneumonia or urinary tract infections should be treated with appropriate antibiotics *(Class I; Level of Evidence A)*. (Revised from the previous guideline)

2012/2013 Guidelines

- **Admission**
  - Subcutaneous administration of anticoagulants is recommended for treatment of immobilized patients to prevent deep vein thrombosis *(Class I; Level of Evidence A)*. (Unchanged from the previous guideline)

2012/2013 Guidelines

- **Admission**
  - The use of standardized stroke care order sets is recommended to improve general management *(Class I; Level of Evidence B)*. (Unchanged from the previous guideline)

2012/2013 Guidelines

- **Admission**
  - Assessment of swallowing before the patient begins eating, drinking, or receiving oral medications is recommended (*Class I; Level of Evidence B*). (Unchanged from the previous guideline)

2012/2013 Guidelines

- **Admission**
  - Patients who cannot take solid food and liquids orally should receive nasogastric, nasoduodenal, or percutaneous endoscopic gastrostomy tube feedings to maintain hydration and nutrition while undergoing efforts to restore swallowing *(Class I; Level of Evidence B)*. (Revised from the previous guideline)

2012/2013 Guidelines

- **Admission**
  - Early mobilization of less severely affected patients and measures to prevent subacute complications of stroke are recommended *(Class I; Level of Evidence C).* (Unchanged from the previous guideline)

2012/2013 Guidelines

- **Admission**
  - Treatment of concomitant medical diseases is recommended *(Class I; Level of Evidence C*). (Unchanged from the previous guideline)

2012/2013 Guidelines

- **Admission**
  - Early institution of interventions to prevent recurrent stroke is recommended *(Class I; Level of Evidence C)*. (Unchanged from the previous guideline)

2012/2013 Guidelines

- **Admission**
  - The use of aspirin is reasonable for treatment of patients who cannot receive anticoagulants for prophylaxis of deep vein thrombosis *(Class IIa; Level of Evidence A)*. (Revised from the previous guideline)

2012/2013 Guidelines

- **Admission**
  - In selecting between nasogastric and percutaneous endoscopic gastrostomy tube routes of feeding in patients who cannot take solid food or liquids orally, it is reasonable to prefer nasogastric tube feeding until 2 to 3 weeks after stroke onset *(Class IIa; Level of Evidence B)*. (Revised from the previous guideline)

2012/2013 Guidelines

- **Admission**
  - The use of intermittent external compression devices is reasonable for treatment of patients who cannot receive anticoagulants *(Class IIa; Level of Evidence B)*. (Revised from the previous guideline)

2012/2013 Guidelines

- **Admission**
  - Routine use of nutritional supplements has not been shown to be beneficial *(Class III; Level of Evidence B)*. (Revised from the previous guideline)

2012/2013 Guidelines

- **Admission**
  - Routine use of prophylactic antibiotics has not been shown to be beneficial *(Class III; Level of Evidence B)*. (Revised from the previous guideline)

2012/2013 Guidelines

- **Admission**
  - Routine placement of indwelling bladder catheters is not Recommended because of the associated risk of catheter-associated urinary tract infections *(Class III; Level of Evidence C)*. (Unchanged from the previous guideline)

2012/2013 Guidelines

- **Treatment of Acute Neurological Complications**
  - Patients with major infarctions are at high risk for complicating brain edema and increased intracranial pressure. Measures to lessen the risk of edema and close monitoring of the patient for signs of neurological worsening during the first days after stroke are recommended *(Class I; Level of Evidence A)*. Early transfer of patients at risk for malignant brain edema to an institution with neurosurgical expertise should be considered. (Revised from the previous guideline)

2012/2013 Guidelines

- **Treatment of Acute Neurological Complications**
  - Decompressive surgical evacuation of a space-occupying cerebellar infarction is effective in preventing and treating herniation and brain stem compression *(Class I; Level of Evidence B)*. (Revised from the previous guideline)

2012/2013 Guidelines

- **Treatment of Acute Neurological Complications**
  - Decompressive surgery for malignant edema of the cerebral hemisphere is effective and potentially lifesaving (*Class I; Level of Evidence B*). Advanced patient age and patient/family valuations of achievable outcome states may affect decisions regarding surgery. (Revised from the previous guideline)

2012/2013 Guidelines

- **Treatment of Acute Neurological Complications**
  - Recurrent seizures after stroke should be treated in a manner similar to other acute neurological conditions, and antiepileptic agents should be selected by specific patient characteristics (*Class I; Level of Evidence B*). (Unchanged from the previous guideline)

2012/2013 Guidelines

- **Treatment of Acute Neurological Complications**
  - Placement of a ventricular drain is useful in patients with acute hydrocephalus secondary to ischemic stroke (*Class I; Level of Evidence C*). (Revised from the previous guideline)

2012/2013 Guidelines

- **Treatment of Acute Neurological Complications**
  - Although aggressive medical measures have been recommended for treatment of deteriorating patients with malignant brain edema after large cerebral infarction, the usefulness of these measures is not well established (*Class IIb; Level of Evidence C*). (Revised from the previous guideline)

2012/2013 Guidelines

- **Treatment of Acute Neurological Complications**
  - Because of lack of evidence of efficacy and the potential to increase the risk of infectious complications, corticosteroids (in conventional or large doses) are not recommended for treatment of cerebral edema and increased intracranial pressure complicating ischemic stroke (*Class III; Level of Evidence A*). (Unchanged from the previous guideline)

2012/2013 Guidelines

- **Treatment of Acute Neurological Complications**
  - Prophylactic use of anticonvulsants is not recommended (*Class III; Level of Evidence C*). (Unchanged from the previous guideline)

TARGET: STROKE℠

TIME LOST IS BRAIN LOST.

STROKEASSOCIATION.ORG/TARGETSTROKE