Rationale Statements for GWTG-Stroke Achievement & Quality Measures

Updated February 2017

Stroke Achievement Measures

Acute

IV rt-PA 2 hours (arrive by 2 hours, treat by 3 hours):

Guideline Recommendations:

Class I
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 (Level of Evidence: A). (Citation 1, p. 898)

Grade IA
In patients with acute ischemic stroke in whom treatment can be initiated within 3 h of symptom onset, we recommend IV r-tPA over no IV r-tPA. (Citation 2, p. e609S)

Rationale:

The administration of intravenous rt-PA to carefully screened, eligible patients with acute ischemic stroke has been shown to be beneficial in several clinical trials, including the 2-part NINDS rtPA Stroke Trial, in which 624 patients with ischemic stroke were treated with placebo or intravenous rtPA (0.9 mg/kg IV, maximum 90 mg) within 3 hours of symptom onset, with approximately one half treated within 90 minutes. In the first trial (Part I), the primary end point was neurological improvement at 24 hours, as indicated by complete neurological recovery or an improvement of 4 points on the NIHSS. In the second trial (Part II), the pivotal efficacy trial, the primary end point was a global OR for a favorable outcome, defined as complete or nearly complete neurological recovery 3 months after stroke. Treatment with intravenous rtPA was associated with an increase in the odds of a favorable outcome (OR, 1.9; 95% CI, 1.2–2.9). Excellent outcomes on individual functional measures were more frequent with intravenous rtPA for global disability (40% versus 28%), global outcome (43% versus 32%), activities of daily living (53% versus 38%), and neurological deficits (34% versus 20%). The benefit was similar 1 year after stroke. (Citation 1, p. 893)

Citations:

1. AHA/ASA Guidelines. 2013 Guidelines for the Early Management of Adults with Ischemic Stroke. Available at: http://stroke.ahajournals.org/content/early/2013/01/31/STR.0b013e318284056a.

Guideline Recommendations:

Class I
Oral administration of aspirin (initial dose is 325 mg) within 24 to 48 hours after stroke onset is recommended for treatment of most patients (Level of Evidence: A). (Citation 1, p. 908)

For patients with noncardioembolic ischemic stroke or TIA, the use of antiplatelet agents rather than oral anticoagulation is recommended to reduce the risk of recurrent stroke and other cardiovascular events (Level of Evidence: A). (Citation 2, p. 2198)

Aspirin (50–325 mg/d) monotherapy (Level of Evidence: A) or the combination of aspirin 25 mg and extended-release dipyridamole 200 mg twice daily (Level of Evidence: B) is indicated as initial therapy after TIA or ischemic stroke for prevention of future stroke. (Citation 2, p. 2198)

The selection of an antiplatelet agent should be individualized on the basis of patient risk factor profiles, cost, tolerance, relative known efficacy of the agents, and other clinical characteristics (Level of Evidence: C). (Citation 2, p. 2198)

Class IIa
Clopidogrel (75 mg) monotherapy is a reasonable option for secondary prevention of stroke in place of aspirin or combination aspirin/dipyridamole (Level of Evidence: B). This recommendation also applies to patients who are allergic to aspirin. (Citation 2, p. 2198)

Class IIb
The usefulness of clopidogrel for the treatment of acute ischemic stroke is not well established (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. (Citation 1, p. 908)

The efficacy of intravenous tirofiban and eptifibatide is not well established, and these agents should be used only in the setting of clinical trials (Level of Evidence: C). (Citation 1, p. 908)

The combination of aspirin and clopidogrel might be considered for initiation within 24 hours of a minor ischemic stroke or TIA and for continuation for 90 days (Level of Evidence: B). (Citation 2, p. 2198)

For patients with a history of ischemic stroke or TIA, AF, and CAD, the usefulness of adding antiplatelet therapy to VKA therapy is uncertain for purposes of reducing the risk of ischemic cardiovascular and cerebrovascular events (Level of Evidence: C). Unstable angina and coronary artery stenting represent special circumstances in which management may warrant DAPT/VKA therapy. (Citation 2, p. 2199)

For patients who have an ischemic stroke or TIA while taking aspirin, there is no evidence that increasing the dose of aspirin provides additional benefit. Although alternative antiplatelet agents are often considered, no single agent or combination has been adequately studied in patients who have had an event while receiving aspirin (Level of Evidence: C). (Citation 2, p. 2198-99)

Class III
Aspirin is not recommended as a substitute for other acute interventions for treatment of stroke, including intravenous rtPA (Level of Evidence: B). (Citation 1, p. 908)

The administration of other intravenous antiplatelet agents that inhibit the glycoprotein IIb/IIIa receptor...
is not recommended \((\text{Level of Evidence: } B)\). Further research testing the usefulness of emergency administration of these medications as a treatment option in patients with acute ischemic stroke is required. (Citation 1, p. 908)

The administration of aspirin (or other antiplatelet agents) as an adjunctive therapy within 24 hours of intravenous fibrinolysis is not recommended \((\text{Level of Evidence: } C)\). (Citation 1, p. 908)

The combination of aspirin and clopidogrel, when initiated days to years after a minor stroke or TIA and continued for 2 to 3 years, increases the risk of hemorrhage relative to either agent alone and is not recommended for routine long-term secondary prevention after ischemic stroke or TIA \((\text{Level of Evidence: } A)\). (Citation 2, p. 2198)

**Grade I/2**
In patients with a history of noncardioembolic ischemic stroke or TIA, we recommend long-term treatment with aspirin (75-100 mg once daily), clopidogrel (75 mg once daily), aspirin/extended-release dipyridamole (25 mg/200 mg bid), or cilostazol (100 mg bid) over no antiplatelet therapy (Grade 1A), oral anticoagulants (Grade 1B), the combination of clopidogrel plus aspirin (Grade 1B), or triflusal (grade 2B). (Citation 3, p. e601S)

**Grade 2**
Of the recommended antiplatelet regimens, we suggest clopidogrel or aspirin/extended release dipyridamole over aspirin (Grade 2B) or cilostazol (Grade 2C). (Citation 3, p. e601S)

**Rationale:**
Currently available data demonstrate a small but statistically significant decline in mortality and unfavorable outcomes with the administration of aspirin within 48 hours after stroke. It appears that the primary effects of aspirin are attributable to a reduction in early recurrent stroke. Data regarding the utility of other antiplatelet agents, including clopidogrel alone or in combination with aspirin, for the treatment of acute ischemic stroke are limited. In addition, data on the safety of antiplatelet agents when given within 24 hours of intravenous fibrinolysis are lacking. (Citation 1, p. 908)

**Citations:**
1. AHA/ASA Guidelines. 2013 Guidelines for the Early Management of Adults with Ischemic Stroke. Available at: http://stroke.ahajournals.org/content/early/2013/01/31/STR.0b013e318284056a.


**Venous Thromboembolism (VTE) Prophylaxis**

**Guideline Recommendations:**

**Class I**
Subcutaneous administration of antithrombotic is recommended for treatment of immobilized patients to prevent DVT. \((\text{Level of Evidence: } A)\). (Citation 1, p. 918)

**Grade 2**
In patients with acute ischemic stroke and restricted mobility, we suggest prophylactic dose SC UFH or LMWH or intermittent pneumatic compression devices over no prophylaxis (Grade 2B). (Citation 2, p. e617S)

In patients with acute primary intracerebral hemorrhage and restricted mobility, we suggest prophylactic-dose SC heparin (UFH or LMWH) started between days 2 and 4 or intermittent pneumatic compression devices over no prophylaxis (Grade 2C). (Citation 2, p. e619S)

In patients with acute primary intracerebral hemorrhage and restricted mobility, we suggest prophylactic-dose LMWH over prophylactic-dose UFH (Grade 2B). (Citation 2, p. e619S)

In patients with primary intracerebral hemorrhage and restricted mobility, we suggest against elastic compression stockings (Grade 2B). (Citation 2, p. e620S)

**Rationale:**

Stroke patients are at increased risk of developing venous thromboembolism (VTE). Pulmonary embolism (PE) accounts for 10% of deaths after stroke, and the complication may be detected in 1% of patients who have had a stroke. VTE is more likely to occur in the first 3 months after stroke, with an incidence of 2.5% and 1.2%, respectively. Pulmonary emboli generally arise from venous thrombi that develop in a paralyzed lower extremity or pelvis. Besides being associated with a life-threatening pulmonary event, symptomatic DVT also slows recovery and rehabilitation after stroke. The risk of DVT is highest amongst immobilized and older patients with severe stroke. The options for lowering the risk of DVT include early mobilization, administration of antithrombotic agents, and the use of external compression devices. Anticoagulants are given to prevent DVT and PE among seriously ill patients. (Citation 1, p, 917)

**Citations:**

1. AHA/ASA Guidelines. 2013 Guidelines for the Early Management of Adults With Ischemic Stroke. Available at: [http://stroke.ahajournals.org/content/early/2013/01/31/STR.0b013e318284056a](http://stroke.ahajournals.org/content/early/2013/01/31/STR.0b013e318284056a)


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**At or by discharge:**

**Antithrombotics at Discharge**

**Guideline Recommendations:**

**Class I**

Oral administration of aspirin (initial dose is 325 mg) within 24 to 48 hours after stroke onset is recommended for treatment of most patients (*Level of Evidence: A*). (Citation 1, p. 908)

**Class IIa**

For patients with noncardioembolic ischemic stroke or TIA, the use of antiplatelet agents rather than oral anticoagulation is recommended to reduce the risk of recurrent stroke and other cardiovascular events (*Level of Evidence: A*). (Citation 2, p. 2198)
Aspirin (50–325 mg/d) monotherapy (Level of Evidence: A) or the combination of aspirin 25 mg and extended-release dipyridamole 200 mg twice daily (Level of Evidence: B) is indicated as initial therapy after TIA or ischemic stroke for prevention of future stroke. (Citation 2, p. 2198)

The selection of an antiplatelet agent should be individualized on the basis of patient risk factor profiles, cost, tolerance, relative known efficacy of the agents, and other clinical characteristics (Level of Evidence: C). (Citation 2, p. 2198)

**Class IIa**

Clopidogrel (75 mg) monotherapy is a reasonable option for secondary prevention of stroke in place of aspirin or combination aspirin/dipyridamole (Level of Evidence: B). This recommendation also applies to patients who are allergic to aspirin. (Citation 2, p. 2198)

**Class IIb**

The usefulness of clopidogrel for the treatment of acute ischemic stroke is not well established (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. (Citation 1, p. 908)

The efficacy of intravenous tirofiban and eptifibatide is not well established, and these agents should be used only in the setting of clinical trials (Level of Evidence: C). (Citation 1, p. 908)

The combination of aspirin and clopidogrel might be considered for initiation within 24 hours of a minor ischemic stroke or TIA and for continuation for 90 days (Level of Evidence: B). (Citation 2, p. 2198)

For patients with a history of ischemic stroke or TIA, AF, and CAD, the usefulness of adding antiplatelet therapy to VKA therapy is uncertain for purposes of reducing the risk of ischemic cardiovascular and cerebrovascular events (Level of Evidence: C). Unstable angina and coronary artery stenting represent special circumstances in which management may warrant DAPT/VKA therapy. (Citation 2, p. 2199)

For patients who have an ischemic stroke or TIA while taking aspirin, there is no evidence that increasing the dose of aspirin provides additional benefit. Although alternative antiplatelet agents are often considered, no single agent or combination has been adequately studied in patients who have had an event while receiving aspirin (Level of Evidence: C). (Citation 2, p. 2198-99)

**Grade 2**

Of the recommended antiplatelet regimens, we suggest clopidogrel or aspirin/extended release dipyridamole over aspirin (Grade 2B) or cilostazol (Grade 2C). (Citation 3, p. e626S)

**Class III**

Aspirin is not recommended as a substitute for other acute interventions for treatment of stroke, including intravenous rtPA (Level of Evidence: B). (Citation 1, p. 908)

The administration of other intravenous antiplatelet agents that inhibit the glycoprotein IIb/IIIa receptor is not recommended (Level of Evidence: B). Further research testing the usefulness of emergency administration of these medications as a treatment option in patients with acute ischemic stroke is required. (Citation 1, p. 908)

The administration of aspirin (or other antiplatelet agents) as an adjunctive therapy within 24 hours of intravenous fibrinolysis is not recommended (Level of Evidence: C). (Citation 1, p. 908)

The combination of aspirin and clopidogrel, when initiated days to years after a minor stroke or TIA and continued for 2 to 3 years, increases the risk of hemorrhage relative to either agent alone and is not recommended for routine long-term secondary prevention after ischemic stroke or TIA (Level of Evidence: A). (Citation 2, p. 2198)
**Rationale:**

The effectiveness of antithrombotic agents in reducing stroke mortality, stroke-related morbidity and recurrence rates has been studied in several large clinical trials. While the use of these agents for patients with acute ischemic stroke and transient ischemic attacks continues to be the subject of study, substantial evidence is available from completed studies. Current evidence suggest that antithrombotic therapy should be prescribed at discharge following acute ischemic stroke to reduce stroke mortality and morbidity as long as no contraindications exist. For patients with a stroke due to a cardioembolic source (e.g., atrial fibrillation, mechanical heart valve), warfarin is recommended unless contraindicated. Warfarin is not generally recommended for secondary stroke prevention in patients presumed to have a non-cardioembolic stroke.

Warfarin, dabigatran, apixaban and rivaroxaban are all indicated for the prevention of first and recurrent stroke in patients with nonvalvular AF. The selection of an antithrombotic agent should be individualized on the basis of risk factors, cost, tolerability, patient preference, potential for drug interactions, and other clinical characteristics, including time in INR therapeutic range if the patient has been taking warfarin.

Anticoagulants at doses to prevent venous thromboembolism are insufficient antithrombotic therapy to prevent recurrent ischemic stroke or TIA.

**Citations:**


**Anticoagulation for AF/Flutter**

**Guideline Recommendations:**

**Class I**

Vitamin K antagonist (VKA) therapy (*Level of Evidence: A*), apixaban (*Level of Evidence: A*), and dabigatran (*Level of Evidence: B*) are all indicated for the prevention of recurrent stroke in patients with nonvalvular AF, whether paroxysmal or permanent. The selection of an antithrombotic agent should be individualized on the basis of risk factors, cost, tolerability, patient preference, potential for drug interactions, and other clinical characteristics, including renal function and time in INR therapeutic range if the patient has been taking VKA therapy. (Citation 1, p.2190)

For patients with ischemic stroke or TIA with paroxysmal (intermittent), persistent, or permanent AF in whom VKA therapy is begun, a target INR of 2.5 is recommended (range, 2.0–3.0) (*Level of Evidence: A*). (Citation 1, p. 2190)

In patients with AF, antithrombotic therapy should be individualized based on shared decision making after discussion of the absolute and RRs of stroke and bleeding, and the patient's values and preferences. (*Level of Evidence: C*) (Citation 2, p. e211)
For patients with ischemic stroke or TIA and AF who are unable to take oral anticoagulants aspirin alone is recommended (Level of Evidence: A). (Citation 1, p. 2190)

For patients with AF who have mechanical heart valves, warfarin is recommended and the target international normalized ratio (INR) intensity (2.0 to 3.0 or 2.5 to 3.5) should be based on the type and location of the prosthesis. (Level of Evidence: B) (Citation 2, p. e211-12)

For patients with nonvalvular AF with prior stroke, transient ischemic attack (TIA), or a CHA2DS2-VASc score of 2 or greater, oral anticoagulants are recommended. Options include: warfarin (INR 2.0 to 3.0) (Level of Evidence: A), dabigatran (Level of Evidence: B), rivaroxaban (Level of Evidence: B), or apixaban. (Level of Evidence: B) (Citation 2, p. e212)

For patients with nonvalvular AF unable to maintain a therapeutic INR level with warfarin, use of a direct thrombin or factor Xa inhibitor (dabigatran, rivaroxaban, or apixaban) is recommended. (Level of Evidence: C)

Re-evaluation of the need for and choice of antithrombotic therapy at periodic intervals is recommended to reassess stroke and bleeding risks. (Level of Evidence: C) (Citation 2, p. e212)

For patients with atrial flutter, antithrombotic therapy is recommended according to the same risk profile used for AF. (Level of Evidence: C) (Citation 2, p. e212)

For patients with valvular AF at high risk for stroke, defined as a CHA2DS2-VASc score of ≥2 and acceptably low risk for hemorrhagic complications, long term oral anticoagulant therapy with warfarin at a target INR of 2.0 to 3.0 is recommended (Level of Evidence: A). (Citation 3, p. 3777)

For patients with nonvalvular AF, a CHA2DS2-VASc score of ≥2, and acceptably low risk for hemorrhagic complications, oral anticoagulants are recommended (Class I). Options include warfarin (INR, 2.0 to 3.0) (Level of Evidence A), dabigatran (Level of Evidence B), apixaban (Level of Evidence B), and rivaroxaban (Level of Evidence B). The selection of antithrombotic agent should be individualized on the basis of patient risk factors (particularly risk for intracranial hemorrhage), cost, tolerability, patient preference, potential for drug interactions, and other clinical characteristics, including the time that the INR is in therapeutic range for patients taking warfarin. (Citation 3, p. 3777)

Class IIa
Rivaroxaban is reasonable for the prevention of recurrent stroke in patients with nonvalvular AF (Level of Evidence: B). (Citation 1 p. 2190)

For most patients with a stroke or TIA in the setting of AF, it is reasonable to initiate oral anticoagulation within 14 days after the onset of neurological symptoms (Level of Evidence: B). (Citation 1, p. 2190)

In the presence of high risk for hemorrhagic conversion (ie, large infarct, hemorrhagic transformation on initial imaging, uncontrolled hypertension, or hemorrhage tendency), it is reasonable to delay initiation of oral anticoagulation beyond 14 days (Level of Evidence: B). (Citation 1 p. 2190)

For patients with nonvalvular AF with a CHA2DS2-VASc score of 2 or greater and who have endstage CKD (creatinine clearance [CrCl] <15 mL/min) or are on hemodialysis, it is reasonable to prescribe warfarin (INR 2.0 to 3.0) for oral anticoagulation. (Level of Evidence: B) (Citation 2, p. e212)

Class IIb
The combination of oral anticoagulation (ie, warfarin or one of the newer agents) with antiplatelet therapy is not recommended for all patients after ischemic stroke or TIA but is reasonable in patients with clinically apparent CAD, particularly an acute coronary syndrome or stent placement (Level of Evidence: C). (Citation 1, p. 2190)
For patients with ischemic stroke or TIA and AF who are unable to take oral anticoagulants, aspirin alone is recommended. *(Level of Evidence: A)* *(Citation 1, p. 2190)*

The addition of clopidogrel to aspirin therapy, compared with aspirin therapy alone, might be reasonable *(Level of Evidence: B)*. *(Citation 1, p. 2190)*

For patients with nonvalvular AF and moderate-to-severe CKD with CHA2DS2-VASc scores of 2 or greater, treatment with reduced doses of direct thrombin or factor Xa inhibitors may be considered (e.g., dabigatran, rivaroxaban, or apixaban), but safety and efficacy have not been established. *(Level of Evidence: C)* *(Citation 2 p. e212)*

**Class III: No Benefit**

The direct thrombin inhibitor, dabigatran, and the factor Xa inhibitor, rivaroxaban, are not recommended in patients with AF and end-stage CKD or on hemodialysis because of the lack of evidence from clinical trials regarding the balance of risks and benefits. *(Level of Evidence: C)* *(Citation 2 p. e212)*

**Class III: Harm**

The direct thrombin inhibitor, dabigatran, should not be used in patients with AF and a mechanical heart valve. *(Level of Evidence: B)* *(Citation 2 p. e212)*

**Rationale:**

Atrial fibrillation (NVAF) is a common arrhythmia and significantly increases the risk of thromboembolic stroke. The appropriate use of anticoagulant therapy has been shown in multiple studies to be very effective in prevention of first and recurrent thromboembolic stroke in patients with AF, with the greatest benefit in those at highest risk, which includes those with prior TIA or ischemic stroke. However, there is evidence from multiple studies that a significant percentage of patients who are candidates for anticoagulant therapy do not receive appropriate risk stratification or therapy. Oral anticoagulant options include warfarin (titrated to INR 2.0 to 3.0), dabigatran, rivaroxaban or apixaban. Because the use of oral anticoagulants is associated with an increased risk of bleeding, it is important to carefully consider the balance of benefits and risk in each individual patient and to re-evaluate at periodic intervals. The selection of an anticoagulant should take into account risk factors, cost, tolerability, patient preference, potential for drug interactions, and other clinical characteristics.

**Citations:**

1. AHA/ASA 2014 Guidelines for the Prevention of Stroke in Patients With Stroke or Transient Ischemic Attack. Available at: http://stroke.ahajournals.org/content/45/7/2160.


3. AHA/ASA 2014 Guidelines for the Primary Prevention of Stroke. Available at: http://stroke.ahajournals.org/content/45/12/3754.

**Statin Prescribed at Discharge**

**Guideline Recommendations:**

**Class I**

Statin therapy with intensive lipid-lowering effects is recommended to reduce risk of stroke and cardiovascular events among patients with ischemic stroke or TIA presumed to be of atherosclerotic origin and an LDL-C level ≥100 mg/dL with or without evidence for other...
ASCVD (Level of Evidence: B). (Citation 1, p. 2172)

Statin therapy with intensive lipid-lowering effects is recommended to reduce risk of stroke and cardiovascular events among patients with ischemic stroke or TIA presumed to be of atherosclerotic origin, an LDL-C level <100 mg/dL, and no evidence for other clinical ASCVD (Level of Evidence: C). (Citation 1, p. 2172)

Rationale:

Clinical trials have shown that statins are an important strategy to reduce the risk of recurrent stroke and other cardiovascular events in patients who survive ischemic stroke. Stroke hospitalization provides an important window of opportunity to initiate statin treatment. Starting treatment during the acute stroke hospitalization may promote better medication adherence and improve clinical outcomes. (Citation 2)

The most recent AHA/ACC cholesterol guidelines (Citation 3) have moved away from reliance on cholesterol measurement to select individuals for therapy and guide drug dosage. Instead, the guidelines identify 4 “statin benefit groups” for drug treatment to reduce risk for atherosclerotic CVD (ASCVD). Individuals with clinical ASCVD, including those with ischemic stroke or TIA presumed to be of atherosclerotic origin.

In the only trial to date dedicated to the evaluation of secondary stroke risk, the Stroke Prevention by Aggressive Reduction in Cholesterol Levels (SPARCL) study, 4731 people with stroke or TIA, LDL-C levels between 100 and 190 mg/dL, and no known history of coronary heart disease (CHD) were randomly assigned to 80 mg of atorvastatin daily versus placebo. Over a median follow-up period of 4.9 years, 11.2% of those who received atorvastatin experienced a stroke compared with 13.1% who received placebo (absolute reduction in risk, 2.2%; HR, 0.84; 95% CI, 0.71–0.99; \( P=0.03 \)). For the outcome of major cardiovascular events, the 5-year absolute reduction in risk was 3.5% in favor of the high-dose statin group (HR, 0.80; 95% CI, 0.69–0.92; \( P=0.002 \)). (Citation 3, p. 2170) In addition to their low-density lipoprotein cholesterol–lowering effects, statins, or HMG-CoA reductase inhibitors, exert acute neuroprotective properties, including beneficial effects on endothelial function, cerebral blood flow, and inflammation. Formal dose-escalation trials are under way to evaluate statins as acute neuroprotective agents. (Citation 4, p. 912)

Citations:

1. AHA/ASA 2014 Guidelines for the Prevention of Stroke in Patients With Stroke or Transient Ischemic Attack. Available at: http://stroke.ahajournals.org/content/45/7/2160


3. ACC/AHA Blood Cholesterol Guideline. Available at: http://circ.ahajournals.org/content/129/25_suppl_2/S1


Smoking Cessation

Guideline Recommendations:

Class I
Healthcare providers should strongly advise every patient with stroke or TIA who has smoked in the past year to quit (Level of Evidence: C). (Citation 1, p. 2179)
Counseling, nicotine products, and oral smoking cessation medications are effective in helping smokers to quit (Level of Evidence: A). (Citation 1, p. 2179)

Counseling, in combination with drug therapy using nicotine replacement, bupropion, or varenicline, is recommended for active smokers to assist in quitting smoking. (Level of Evidence: A) (Citation 2, p. 3772)

Abstinence from cigarette smoking is recommended for patients who have never smoked on the basis of epidemiological studies showing a consistent and overwhelming relationship between smoking and both ischemic stroke and SAH (Level of Evidence: B). (Citation 2, p. 3772)

**Class Ila**

It is reasonable to advise patients after TIA or ischemic stroke to avoid environmental (passive) tobacco smoke. (Level of Evidence: B). (Citation 1, p. 2179)

**Rationale:**

Although cigarette smoking rates have declined in recent years, it remains the second-leading cause of total deaths and disability in the United States. (Citation 3, p. e40) Smoking nearly doubles the risk for ischemic stroke. The annual number of stroke deaths attributed to smoking in the United States is estimated to be between 21,400 (without adjustment for potential confounding factors) and 17,800 (after adjustment), which suggests that smoking contributes to 12% to 14% of all stroke deaths. (Citation 2, p. 3772) Although the most effective preventive measures are to never smoke and to minimize exposure to environmental tobacco smoke, risk is reduced with smoking cessation. Smoking cessation is associated with a rapid reduction in the risk of stroke and other cardiovascular events to a level that approaches, but does not reach, that of those who never smoked. (Citation 2, p. 3772) Although no randomized controlled trials have been performed, there is very strong consensus that patients who smoke should be counseled to stop smoking to decrease the risk of stroke. Research indicates that patients who receive even brief smoking cessation advice from their physicians are more likely to quit than those receiving no counseling at all. Addressing smoking habits and initiating cessation efforts are reasonable interventions during hospitalization for acute stroke and may promote the patient’s medical recovery.

**Citations:**

1. AHA/ASA 2014 Guidelines for the Prevention of Stroke in Patients With Stroke or Transient Ischemic Attack. Available at: [http://stroke.ahajournals.org/content/45/7/2160](http://stroke.ahajournals.org/content/45/7/2160)

2. AHA/ASA 2014 Guidelines for the Primary Prevention of Stroke. Available at: [http://stroke.ahajournals.org/content/45/12/3754](http://stroke.ahajournals.org/content/45/12/3754).

3. AHA Heart disease and stroke statistics—2016 update. Available at: [http://circ.ahajournals.org/content/133/4/e38](http://circ.ahajournals.org/content/133/4/e38).

**Stroke Quality Measures**

**Acute**

**Dysphagia Screen**

**Guideline Recommendations:**

**Class I**
Assessment of swallowing before the patient begins eating, drinking, or receiving oral medications is recommended. (Level of Evidence: B) (Citation 1, p. 918)

Patients who cannot take solid food and liquids orally should receive NG, nasoduodenal, or PEG tube feedings to maintain hydration and nutrition while undergoing efforts to restore swallowing. (Level of Evidence: B) (Citation 1, p. 918)

A formal screening procedure for dysphagia should be performed in all patients before the initiation of oral intake to reduce the risk of pneumonia. (Level of Evidence: B) (Citation 2, p. 2035)

Early dysphagia screening is recommended for acute stroke patients to identify dysphagia or aspiration, which can lead to pneumonia, malnutrition, dehydration, and other complications. (Level of Evidence: B) (Citation 3, p. e119)

Rationale:

Dysphagia is common after stroke, affecting 42% to 67% of patients within 3 days after stroke. Of these patients, about half aspirate, and one third of those patients develop pneumonia. Dysphagia or aspiration can lead to pneumonia, malnutrition, dehydration, weight loss, and overall decreased quality of life. Aspiration may be “silent” or “occult” and not clinically obvious. Early identification through screening can reduce the risk of developing these adverse health consequences. Additionally, observational studies suggest that dysphagia screening reduces the risk of pneumonia (Citation 3, p.e118). In a prospective 15-hospital study, use of a formal dysphagia screening protocol, which incorporated an evidence-based screening tool, was associated with improved compliance with dysphagia screenings and a significantly reduced risk of pneumonia. (Citation 1, p. 916)

Citations:


2. AHA/ASA 2015 Guidelines for the Management of Spontaneous Intracerebral Hemorrhage. Available at: http://stroke.ahajournals.org/content/46/7/2032

3. AHA/ASA 2016 Guidelines for adult stroke rehabilitation and recovery. Available at: http://stroke.ahajournals.org/content/47/6/e98

IV rt-PA 3.5 hours (arrive by 3.5 hours, treat by 4.5 hours)

Guideline Recommendations:

Class I

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 (Level of Evidence: B). (Citation 1, p. 898)

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. (Citation 1, p. 898)
Rationale:

The administration of thrombolytic agents to carefully screened, eligible patients with acute ischemic stroke has been shown to be beneficial in several clinical trials. Based on the results of these studies, the Food and Drug Administration approved the use of intravenous recombinant tissue plasminogen activator (IV r-TPA or t-PA) for the treatment of acute ischemic stroke when given within 3 hours of stroke symptom onset. A recent prospective study, the European Cooperative Acute Stroke Study (ECASS)-3, has provided new data on rtPA (alteplase) treatment in the 3-to-4.5-hour window. Overall, the ECASS III results were consistent with the results of previous trials, which indicates that intravenous rtPA can be given safely to, and can improve outcomes for, carefully selected patients treated 3 to 4.5 hours after stroke. (Citation 1, p.895)

Citation:

1. AHA/ASA Guidelines. 2013 Guidelines for the Early Management of Adults With Ischemic Stroke. Available at: http://stroke.ahajournals.org/content/early/2013/01/31/STR.0b013e318284056a

Door To IV t-PA in 60 Minutes

Guideline Recommendations:

Class I
An organized protocol for the emergency evaluation of patients with suspected stroke is recommended (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 ED. 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. (Level of Evidence: B) (Citation 1, p.882)

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 (Level of Evidence: A). (Citation 1, p. 898)

Rationale:

Multiple studies have shown that the rapid administration of intravenous recombinant tissue-type plasminogen activator (rtPA) to appropriate patients is a proven, effective treatment in restoring blood flow and reducing long-term morbidity for ischemic stroke patients. The goal is to complete an evaluation and to begin fibrinolytic treatment within 60 minutes of the patient’s arrival. Although the maximum time window in which fibrinolytic therapy may be given in many patients has been expanded to 4.5 hours, preclinical, cerebrovascular imaging, and clinical trial evidence indicate the fundamental importance of minimizing total ischemic time and restoring blood flow to threatened but not yet infarcted tissue as soon as feasible. (Citation 1, p. 896) For every 15-minute reduction of door-to-needle time, there is a 5% lower odds of in-hospital mortality. (Citation 1, p. 878)

Citations:

1. AHA/ASA Guidelines. 2013 Guidelines for the Early Management of Adults With Ischemic Stroke. Available at: http://stroke.ahajournals.org/content/early/2013/01/31/STR.0b013e318284056a
NIHSS Reported

Guideline Recommendations:

Class I
The use of a stroke rating scale, preferably the NIHSS, is recommended (Level of Evidence: B). (Citation 1, p. 882)

Rationale:
An objective, standardized assessment of stroke severity, such as the NIHSS, ensures that the major components of a neurological examination are performed in a timely and uniform fashion and is essential for determining eligibility for thrombolytic therapy. Formal stroke scores or scales, such as the NIHSS, may be performed rapidly and can be administered by a broad spectrum of healthcare providers. Use of the NIHSS helps quantify the degree of neurological deficits, facilitate communication, identify the location of vessel occlusion and provide early prognosis and identify the potential for complications (Citation 1, p. 879-80)

Citations:
1. AHA/ASA Guidelines. 2013 Guidelines for the Early Management of Adults With Ischemic Stroke. Available at: http://stroke.ahajournals.org/content/early/2013/01/31/STR.0b013e318284056a

At or by discharge:

Stroke Education

Guideline Recommendations:
None

Rationale:
Stroke patients and their caregivers can be active in managing their chronic condition if they have appropriate information and resources. If stroke survivors and caregivers are to be active in their decision making and the management of the long-term effects of stroke, appropriate information delivered in a timely and effective format is necessary. It is critical that the process involve assessment of an individual’s needs, education about available resources, linking of patient and resources, referrals, and follow-up to ensure the individual receives the necessary services. Health providers may wish to use a checklist to identify whether referral to other services is warranted. A meta analysis of 21 trials showed that the provision of information (including local resources) to patients and their caregivers may improve aspects of patient satisfaction, improve knowledge of stroke, and reduce patient depression scores.(Citation 1, p.e137)

Citations:
1. AHA/ASA 2016 Guidelines for adult stroke rehabilitation and recovery. Available at: http://stroke.ahajournals.org/content/47/6/e98
Rehabilitation Considered

Guideline Recommendations:

**Class I:**
The use of comprehensive specialized stroke care (stroke units) incorporating rehabilitation is recommended (*Level of Evidence: A*). (Citation 1, p. 918)

Given the potentially serious nature and complex pattern of evolving disability and the increasing evidence for efficacy, it is recommended that all patients with ICH have access to multidisciplinary rehabilitation (*Level of Evidence: A*). (Citation 2, p. 2049)

It is recommended that early rehabilitation for hospitalized stroke patients be provided in environments with organized, interprofessional stroke care. (*Level of Evidence: A*) (Citation 3, p. e104)

It is recommended that stroke survivors receive rehabilitation at an intensity commensurate with anticipated benefit and tolerance. (*Level of Evidence: B*) (Citation 3, p. e104)

It is recommended that stroke patients who are candidates for postacute rehabilitation receive organized, coordinated, interprofessional care. (*Level of Evidence: A*) (Citation 3, p. e103)

It is recommended that stroke survivors who qualify for and have access to IRF care receive treatment in an IRF in preference to a SNF. (*Level of Evidence: B*) (Citation 3, p. e103)

Organized community-based and coordinated interprofessional rehabilitation care is recommended in the outpatient or home-based settings. (*Level of Evidence: C*) (Citation 3, p. e103)

**Class Ila:**
Where possible, rehabilitation can be beneficial when begun as early as possible and continued in the community as part of a well-coordinated (“seamless”) program of accelerated hospital discharge and home-based resettlement to promote ongoing recovery (*Level of Evidence: B*). (Citation 2, p. 2049)

Rationale:

Each year stroke affects nearly 800,000 individuals, with many survivors experiencing persistent difficulty with daily tasks as a direct consequence. (Citation 3, p. e99) After the patient’s condition is stabilized, secondary prevention measures to prevent long-term complications are begun, and measures to provide rehabilitation, patient and family education, and family support should be started. (Citation 1, p. 917) There is strong evidence that organized, interprofessional stroke care not only reduces mortality rates and the likelihood of institutional care and long-term disability but also enhances recovery and increases independence in ADLs (Citation 3, p. e103) The transition from inpatient care to home after a stroke can be difficult for patients and caregivers. Those patients who require ongoing rehabilitation after discharge should continue to be followed up by a care team with expertise in stroke rehabilitation whenever possible. (Citation 3, p. e136)

Citations:

1. AHA/ASA Guidelines. 2013 Guidelines for the Early Management of Adults With Ischemic Stroke. Available at: [http://stroke.ahajournals.org/content/early/2013/01/31/STR.0b013e318284056a](http://stroke.ahajournals.org/content/early/2013/01/31/STR.0b013e318284056a)
2. AHA/ASA 2015 Guidelines for the Management of Spontaneous Intracerebral Hemorrhage. Available at: http://stroke.ahajournals.org/content/46/7/2032

3. AHA/ASA 2016 Guidelines for Adult Stroke Rehabilitation and Recovery. Available at: http://stroke.ahajournals.org/content/47/6/e98

**LDL Documented**

**Guideline Recommendations:**

*Class I*
Adherence to medication and lifestyle, therapeutic response to statin therapy, and safety should be regularly assessed. This should also include a fasting lipid panel performed within 4–12 weeks after initiation or dose adjustment, and every 3–12 months thereafter. Other safety measurements should be measured as clinically indicated. *(Level of Evidence: A) (Citation 1, p. S22)*

**Rationale:**
Assessment of LDL is important in monitoring patients’ response to treatment and potential need for adjustment of dose or evaluation of adherence to prescribed medications.

**Citations:**
1. AHA/ACC 2013 Blood Cholesterol Guidelines. Available at: http://circ.ahajournals.org/content/129/25_suppl_2/S1

**Intensive Statin Therapy**

**Guideline Recommendations:**

*Class I*
High-intensity statin therapy should be initiated or continued as first-line therapy in women and men ≤75 years of age who have clinical ASCVD*, unless contraindicated. *(Level of Evidence A) (Citation 1, p. S11)*

*Clinical ASCVD is defined as acute coronary syndromes, a history of MI, stable or unstable angina, coronary or other arterial revascularization, stroke, transient ischemic attack, or peripheral arterial disease presumed to be of atherosclerotic origin).

Statin therapy with intensive lipid-lowering effects is recommended to reduce risk of stroke and cardiovascular events among patients with ischemic stroke or TIA presumed to be of atherosclerotic origin and an LDL-C level ≥100 mg/dL with or without evidence for other ASCVD. *(Level of Evidence: B) (Citation 2, p. 2172)*

Statin therapy with intensive lipid-lowering effects is recommended to reduce risk of stroke and cardiovascular events among patients with ischemic stroke or TIA presumed to be of atherosclerotic origin, an LDL-C level <100 mg/dL, and no evidence for other clinical ASCVD *(Level of Evidence: C). (Citation 2, p. 2172)*
Class IIa
Among patients already taking statins at the time of onset of ischemic stroke, continuation of statin therapy during the acute period is reasonable (*Level of Evidence: B*). (Citation 3, p. 913)

Rationale:

Women and men with clinical ASCVD (defined from the RCT inclusion criteria as acute coronary syndromes; history of MI, stable or unstable angina, coronary or other arterial revascularization, stroke, transient ischemic attack, or peripheral arterial disease presumed to be of atherosclerotic origin) arterial revascularization, stroke, transient ischemic attack, or peripheral arterial disease presumed to be of atherosclerotic origin are at increased risk for recurrent ASCVD and ASCVD death. An extensive body of evidence demonstrates that high-intensity statin therapy reduces ASCVD events more than moderate-intensity statin therapy in individuals with clinical ASCVD. High-intensity statin therapy should be initiated for adults ≤75 years of age with clinical ASCVD who are not receiving statin therapy, or the intensity should be increased in those receiving a low- or moderate-intensity statin, unless they have a history of intolerance to high-intensity statin therapy or other characteristics that could influence safety (Citation 1, p. S13)

Citations:

1. AHA/ACC 2013 Blood Cholesterol Guidelines. Available at: [http://circ.ahajournals.org/content/129/25_suppl_2/S1](http://circ.ahajournals.org/content/129/25_suppl_2/S1)
2. AHA/ASA 2014 Guidelines for the Prevention of Stroke in Patients With Stroke or Transient Ischemic Attack. Available at: [http://stroke.ahajournals.org/content/45/7/2160](http://stroke.ahajournals.org/content/45/7/2160)
3. AHA/ASA Guidelines. 2013 Guidelines for the Early Management of Adults With Ischemic Stroke. Available at: [http://stroke.ahajournals.org/content/early/2013/01/31/STR.0b013e318284056a](http://stroke.ahajournals.org/content/early/2013/01/31/STR.0b013e318284056a)