Complete Summary

GUIDELINE TITLE

Primary prevention of ischemic stroke: a guideline from the American Heart Association/American Stroke Association Stroke Council: cosponsored by the Atherosclerotic Peripheral Vascular Disease Interdisciplinary Working Group; Cardiovascular Nursing Council; Clinical Cardiology Council; Nutrition, Physical Activity, and Metabolism Council; and the Quality of Care and Outcomes Research Interdisciplinary Working Group.

BIBLIOGRAPHIC SOURCE(S)

Goldstein LB, Adams R, Alberts MJ, Appel LJ, Brass LM, Bushnell CD, Culebras A, DeGraba TJ, Gorelick PB, Guyton JR, Hart RG, Howard G, Kelly-Hayes M, Nixon JV, Sacco RL, American Heart Association, American Stroke Association Stroke Council. Primary prevention of ischemic stroke: a guideline from the American Heart Association/American Stroke Association Stroke Council [trunc]. Circulation 2006 Jun 20;113(24):e873-923. PubMed

GUIDELINE STATUS

This is the current release of the guideline.

** REGULATORY ALERT **

FDA WARNING/REGULATORY ALERT

Note from the National Guideline Clearinghouse: This guideline references a drug(s) for which important revised regulatory and/or warning information has been released.

- August 16, 2007, Coumadin (Warfarin): Updates to the labeling for Coumadin to include pharmacogenomics information to explain that people's genetic makeup may influence how they respond to the drug.
- October 6, 2006, Coumadin (warfarin sodium): Revisions to the labeling for Coumadin to include a new patient Medication Guide as well as a reorganization and highlighting of the current safety information to better inform providers and patients.

COMPLETE SUMMARY CONTENT

SCOPE

DISEASE/CONDITION(S)

Ischemic stroke

GUIDELINE CATEGORY

Prevention
Risk Assessment
Screening

CLINICAL SPECIALTY

Cardiology
Family Practice
Internal Medicine
Neurology
Preventive Medicine

INTENDED USERS

Advanced Practice Nurses
Nurses
Physician Assistants
Physicians

GUIDELINE OBJECTIVE(S)

To provide an overview of the evidence on various established and potential stroke risk factors and to provide recommendations for the reduction of stroke risk

TARGET POPULATION

Adult patients at increased risk of stroke

INTERVENTIONS AND PRACTICES CONSIDERED

1. Risk-assessment using a tool, such as the Framingham Stroke Profile
2. Consideration of risk factors including:
    - Cardiovascular disease

- Hypertension
- Cigarette smoking/smoke exposure
- Diabetes
- Atrial fibrillation
- Other cardiac conditions (dilated cardiomyopathy, valvular heart disease, intracardiac congenital defects)
- Dyslipidemia
- Asymptomatic carotid stenosis
- Sickle cell disease (SCD)
- Diet and nutrition
- Physical activity level
- Obesity and body fat distribution
- Metabolic syndrome
- Alcohol and drug abuse
- Oral contraceptive (OC) use
- Sleep-disordered breathing

3. Screening
    - For hypertension
    - Of patients with asymptomatic carotid stenosis for other risk factors of stroke
    - Of children with sickle cell disease using transcranial Doppler ultrasound
4. Risk factor control
    - Hypertension management (lifestyle modification, pharmacological therapy, management in diabetic patients)
    - Diabetes management (statin, angiotensin-converting enzyme inhibitor [ACEI], angiotensin receptor blocker [ARB])
    - Atrial fibrillation (antithrombotic therapy [warfarin or aspirin])
    - Management of other cardiac conditions (warfarin for post–ST-segment–elevation patients with myocardial infarction [MI] and left ventricular [LV] dysfunction with extensive regional wall-motion abnormalities and in patients with severe LV dysfunction with or without congestive heart failure)
    - Dyslipidemia (statin therapy, lifestyle modifications, niacin, gemfibrozil)
    - Asymptomatic carotid stenosis (aspirin therapy, prophylactic carotid endarterectomy in highly selected patients with high-grade asymptomatic carotid stenosis)
    - Sickle cell disease (transfusion therapy)
    - Lifestyle modifications (dietary modifications, increase physical activity, smoking-cessation weight reduction, folic acid and B vitamin supplementation)
    - Referral for drug and alcohol abuse counseling
    - Aspirin prophylaxis (prevention of first stroke in high risk women)
    - Referral to sleep specialist for treatment of sleep-disordered breathing

MAJOR OUTCOMES CONSIDERED

- Incidence of ischemic stroke
- Benefits and risks of interventions used to prevent ischemic stroke

METHODOLOGY

METHODS USED TO COLLECT/SELECT EVIDENCE

Hand-searches of Published Literature (Primary Sources)
Hand-searches of Published Literature (Secondary Sources)
Searches of Electronic Databases
Searches of Unpublished Data

DESCRIPTION OF METHODS USED TO COLLECT/SELECT THE EVIDENCE

The writers used systematic literature reviews (covering the time period since the last review published in 2001 up to January 2005), reference to previously published guidelines, personal files, and expert opinion to summarize existing evidence.

NUMBER OF SOURCE DOCUMENTS

Not stated

METHODS USED TO ASSESS THE QUALITY AND STRENGTH OF THE EVIDENCE

Weighting According to a Rating Scheme (Scheme Given)

RATING SCHEME FOR THE STRENGTH OF THE EVIDENCE

Levels of Evidence

Level of Evidence A: Data derived from multiple randomized clinical trials.

Level of Evidence B: Data derived from a single randomized trial or nonrandomized studies.

Level of Evidence C: Consensus opinion of experts.

METHODS USED TO ANALYZE THE EVIDENCE

Systematic Review

DESCRIPTION OF THE METHODS USED TO ANALYZE THE EVIDENCE

Not stated

METHODS USED TO FORMULATE THE RECOMMENDATIONS

Expert Consensus

DESCRIPTION OF METHODS USED TO FORMULATE THE RECOMMENDATIONS

The writing group consisted of experts with special interests in primary prevention representing disciplines including several medical specialties, epidemiology, and the neurosciences. Writing group members were nominated by the committee chair on the basis of each individual's previous work in relevant topic areas and were approved by the American Heart Association Stroke Council's Scientific Statement Oversight Committee.

The writers used systematic literature reviews (covering the time period since the last review published in 2001 up to January 2005), reference to previously published guidelines, personal files, and expert opinion to summarize existing evidence, indicate gaps in current knowledge, and when appropriate, formulate recommendations based on standard American Heart Association criteria.

All members of the writing group had numerous opportunities to comment in writing on the recommendations and approved the final version of this document.

RATING SCHEME FOR THE STRENGTH OF THE RECOMMENDATIONS

Recommendation Grade

Class I Conditions for which there is evidence for and/or general agreement that the procedure or treatment is useful and effective.

Class II Conditions for which there is conflicting evidence and/or a divergence of opinion about the usefulness/efficacy of a procedure or treatment.

> **Class IIa** The weight of evidence or opinion is in favor of the procedure or treatment.
>
> **Class IIb** Usefulness/efficacy is less well established by evidence or opinion.

Class III Conditions for which there is evidence and/or general agreement that the procedure or treatment is not useful/effective and in some cases may be harmful.

COST ANALYSIS

A formal cost analysis was not performed and published cost analyses were not reviewed.

METHOD OF GUIDELINE VALIDATION

Peer Review

DESCRIPTION OF METHOD OF GUIDELINE VALIDATION

The guideline underwent extensive peer review before consideration and approval by the American Heart Association (AHA) Science Advisory and Coordinating Committee.

RECOMMENDATIONS

MAJOR RECOMMENDATIONS

Recommendation grades (Class I - III) and levels of evidence (A-C) are defined at the end of the "Major Recommendations" field.

Summary

Assessing the Risk of a First Stroke

Each individual patient should have an assessment of his or her stroke risk **(Class I, Level of Evidence A)**. The use of a risk-assessment tool such as the Framingham Stroke Profile should be considered as these tools can help identify individuals who could benefit from therapeutic interventions and who may not be treated based on any 1 risk factor **(Class IIa, Level of Evidence B)**.

Genetic Causes of Stroke

Referral for genetic counseling may be considered for patients with rare genetic causes of stroke **(Class IIb, Level of Evidence C)**. There remain insufficient data to recommend genetic screening for the prevention of a first stroke.

Cardiovascular Disease

Persons with evidence of noncerebrovascular atherosclerotic vascular disease (coronary heart disease, cardiac failure, or intermittent claudication) are at increased risk of a first stroke.

Treatments used in the management of these other conditions (e.g., platelet antiaggregants) and as recommended in other sections of this guideline can reduce the risk of stroke (Class and Level of Evidence as indicated in the relevant sections).

Hypertension

Regular screening for hypertension (at least every 2 years in adults and more frequently in minority populations and the elderly) and appropriate management **(Class I, Level of Evidence A)**, including dietary changes, lifestyle modification, and pharmacological therapy as summarized in the Seventh Report of the Joint National Committee on the Prevention, Detection, Evaluation and Treatment of High Blood Pressure (JNC7) (Chobanian et al., 2003), are recommended.

Cigarette Smoking

Abstention from cigarette smoking and smoking cessation for current smokers are recommended (see Table below titled "Other Guideline Recommendations") **(Class I, Level of Evidence B)**. Data from cohort and epidemiological studies are consistent and overwhelming. Avoidance of environmental tobacco smoke for stroke prevention should also be considered **(Class IIa, Level of Evidence C)**. The use of counseling, nicotine products, and oral smoking-cessation medications has been found to be effective for smokers and should be considered **(Class IIa, Level of Evidence B)**.

Diabetes

It is recommended that hypertension be tightly controlled in patients with either type 1 or type 2 diabetes (the JNC 7 recommendation of <130/80 mm Hg in diabetic patients is endorsed) as part of a comprehensive risk-reduction program **(Class I, Level of Evidence A)**. Treatment of adults with diabetes, especially those with additional risk factors, with a statin to lower the risk of a first stroke is recommended **(Class I, Level of Evidence A)** ("Executive Summary of the Third Report," 2001). Recommendations to consider treatment of diabetic patients with an angiotensin converting enzyme inhibitor (ACEI) or angiotensin receptor blocker (ARB) are endorsed.

Atrial Fibrillation

Anticoagulation of patients with atrial fibrillation who have valvular heart disease (particularly those with mechanical heart valves) is recommended **(Class I, Level of Evidence A)**.

Antithrombotic therapy (warfarin or aspirin) is recommended to prevent stroke in patients with nonvalvular atrial fibrillation based on assessment of their absolute stroke risk and estimated bleeding risk while considering patient preferences and access to high-quality anticoagulation monitoring **(Class I, Level of Evidence A)**. Warfarin (international normalized ratio [INR] 2.0 to 3.0) is recommended for high-risk (>4% annual risk of stroke) patients (and for most moderate-risk patients according to patient preferences) with atrial fibrillation who have no clinically significant contraindications to oral anticoagulants **(Class I, Level of Evidence A)**.

Other Cardiac Conditions

Various American Heart Association (AHA) and American College of Cardiology practice guidelines recommend strategies to reduce the risk of stroke in patients with a variety of cardiac conditions. These include the management of patients with valvular heart disease (Cannegieter, Rosendaal, & Briet, 1994), unstable angina (Braunwald et al., 2002), chronic stable angina (Gibbons et al., 2003), and acute myocardial infarction (MI) (Antman et al., 2004). Strategies to prevent postoperative neurological injury and stroke in patients undergoing surgical revascularization for atherosclerotic heart disease are discussed in detail in the recently published coronary artery bypass graft surgery guidelines (Eagle et al., 2004). It is reasonable to prescribe warfarin for post-ST-segment– elevation patients with MI and left ventricular (LV) dysfunction with extensive regional wall-motion abnormalities **(Class IIa, Level of Evidence A)**, and warfarin may be

considered in patients with severe left ventricular (LV) dysfunction with or without congestive heart failure **(Class IIb, Level of Evidence C)** (Antman et al., 2004).

Dyslipidemia

National Cholesterol Education Program III guidelines for the management of patients who have not had a cerebrovascular event with elevated total cholesterol, or with elevated non-high-density lipoprotein (HDL) cholesterol in the presence of hypertriglyceridemia, are endorsed (National Institutes of Health, 2002; Grundy et al., 2004). It is recommended that patients with known coronary heart disease (CHD) and high-risk hypertensive patients even with normal low-density lipoprotein (LDL) cholesterol levels be treated with lifestyle measures and a statin **(Class I, Level of Evidence A)**. The use of lipid-lowering therapy in diabetic patients is specifically addressed in the diabetes section of this guideline.

Suggested treatments for patients with known CHD and low HDL cholesterol include weight loss, increased physical activity, smoking cessation, and possibly niacin or gemfibrozil **(Class IIa, Level of Evidence B)**.

Asymptomatic Carotid Stenosis

It is recommended that patients with asymptomatic carotid artery stenosis be screened for other treatable causes of stroke and that intensive therapy of all identified stroke risk factors be pursued **(Class I, Level of Evidence C)**. The use of aspirin is recommended unless contraindicated because aspirin was used in all of the cited trials as an antiplatelet drug except in the surgical arm of 1 study, in which there was a higher rate of MI in those who were not given aspirin **(Class I, Level of Evidence B)**. Prophylactic carotid endarterectomy is recommended in highly selected patients with high-grade asymptomatic carotid stenosis performed by surgeons with <3% morbidity/mortality rates **(Class I, Level of Evidence A)**. Patient selection should be guided by an assessment of comorbid conditions and life expectancy, as well as other individual factors, and be balanced by an understanding of the overall impact of the procedure if all-cause mortality is considered as one of the end points, and it should include a thorough discussion of the risks and benefits of the procedure with an understanding of patient preferences. Carotid angioplasty–stenting might be a reasonable alternative to endarterectomy in asymptomatic patients at high risk for the surgical procedure **(Class IIb, Level of Evidence B)**; however, given the reported periprocedural and overall 1-year event rates, it remains uncertain whether this group of patients should have either procedure.

Sickle Cell Disease (SCD)

It is recommended that children with SCD be screened with transcranial Doppler (TCD) ultrasound starting at 2 years of age **(Class I, Level of Evidence B)**. It is recommended that transfusion therapy be considered for those at elevated stroke risk **(Class I, Level of Evidence B)**. Although the optimal screening interval has not been established, it is reasonable that younger children and those with TCD velocities in the conditional range should be rescreened more frequently to detect development of high-risk TCD indications for intervention **(Class IIa, Level of Evidence B)**. Pending further studies, it is reasonable to continue transfusion even in those whose TCD velocities revert to normal **(Class IIa, Level of**

Evidence B). Magnetic resonance imaging and magnetic resonance angiography criteria for selection of children for primary stroke prevention using transfusion have not been established, and these tests should not be substituted for TCD **(Class III, Level of Evidence B)**. Adults with SCD should be evaluated for known stroke risk factors and managed according to the general guidelines in this statement **(Class I, Level of Evidence A)**.

Postmenopausal Hormone Therapy

It is recommended that postmenopausal hormone therapy (with estrogen with or without a progestin) not be used for primary prevention of stroke **(Class III, Level of Evidence A)** (National Institutes of Health, 2002; Grundy et al., 2004). The use of hormone replacement therapy for other indications should be informed by the risk estimate for vascular outcomes provided by the reviewed clinical trials. There are not sufficient data to provide recommendations about the use of other forms of therapy such as selective estrogen receptor modulators.

Diet and Nutrition

A reduced intake of sodium and increased intake of potassium is recommended to lower blood pressure in persons with hypertension **(Class I, Level of Evidence A)**, which may thereby reduce the risk of stroke. The recommended sodium intake is $\leq$2.3 g/day (100 mmol/day), and the recommended potassium intake is $\geq$4.7 g/day (120 mmol/day). The Dietary Approaches to Stop Hypertension (DASH) diet, which emphasizes fruit, vegetables, and low-fat dairy products and is reduced in saturated and total fat, also lowers blood pressure and is recommended **(Class I, Level of Evidence A)**. A diet that is rich in fruits and vegetables may lower the risk of stroke and may be considered **(Class IIb, Level of Evidence C)**.

Physical Inactivity

Increased physical activity is recommended because it is associated with a reduction in the risk of stroke **(Class I, Level of Evidence B)**. Exercise guidelines as recommended by the Centers for Disease Control and Prevention (CDC) and the National Institutes of Health ($\geq$30 minutes of moderate intensity activity daily) as part of a healthy lifestyle are reasonable **(Class IIa, Level of Evidence B)**.

Obesity and Body Fat Distribution

Epidemiological studies indicate that increased body weight and abdominal fat are directly associated with stroke risk. Weight reduction is recommended because it lowers blood pressure **(Class I, Level of Evidence A)** and may thereby reduce the risk of stroke.

Metabolic Syndrome

Management of individual components of the metabolic syndrome, including lifestyle measures and pharmacotherapy as recommended in the National Cholesterol Education Program Adult Treatment Panel III ("Executive Summary of

the Third Report, 2001) and the JNC 7 (Chobanian et al., 2003) as reviewed in other sections of this guideline, are endorsed.

Lifestyle management should include exercise, appropriate weight loss, and proper diet. Pharmacotherapy may include medications for blood pressure lowering, lipid lowering, glycemic control, treatment of microalbuminuria or proteinuria, and antiplatelet therapy (e.g., aspirin) according to the individual circumstance and risk. It is not known whether agents that ameliorate aspects of the insulin resistance syndrome are useful for reducing stroke risk.

Alcohol Abuse

Reduction of alcohol consumption in heavy drinkers through established screening and counseling methods as outlined in the US Preventive Services Task Force Update 2004 is endorsed (US Preventive Services Task Force [USPSTF], 2004). For those who consume alcohol, a recommendation of $\leq$2 drinks per day for men and $\leq$1 drink per day for nonpregnant women best reflects the state of the science for alcohol and stroke risk (US Department of Health and Human Service, 2005) **(Class IIb, Level of Evidence B)**.

Drug Abuse

Successful identification and management of drug abuse can be challenging. When a patient is identified as having a drug addiction problem, referral for appropriate counseling may be considered **(Class IIb, Level of Evidence C)**.

Oral Contraceptives (OCs)

The incremental risk of stroke associated with use of low-dose OCs in women without additional risk factors appears low, if it exists **(Class III, Level of Evidence B)** (Chan et al., 2004; Siritho et al., 2003). It is suggested that OCs be discouraged in women with additional risk factors (e.g., cigarette smoking or prior thromboembolic events **[Class III, Level of Evidence C]**) (Chan et al., 2004; Bousser et al., 2000). For those who elect to assume the increased risk, aggressive therapy of stroke risk factors may be useful **(Class IIb, Level of Evidence C)** (Chan et al., 2004; Siritho et al., 2003; Bousser et al., 2000).

Sleep-Disordered Breathing (SDB)

SDB is associated with stroke risk. Questioning bed partners and patients, particularly those with abdominal obesity and hypertension, about symptoms of SDB and referral to a sleep specialist for further evaluation as appropriate may be useful, especially in the setting of drug-resistant hypertension **(Class IIb, Level of Evidence C)**.

Migraine

There are insufficient data to recommend a specific treatment approach that would reduce the risk of first stroke in women with migraine, including migraine with aura.

Hyperhomocysteinemia

Recommendations to meet current guidelines for daily intake of folate (400 microg/day), B_6 (1.7 mg/day), and B_{12} (2.4 microg/day) by consumption of vegetables, fruits, legumes, meats, fish, and fortified grains and cereals (for nonpregnant, nonlactating individuals) may be useful in reducing the risk of stroke **(Class IIb, Level of Evidence C)**. There are insufficient data to recommend a specific treatment approach that would reduce the risk of first stroke in patients with elevated homocysteine levels. In the interim, use of folic acid and B vitamins in patients with known elevated homocysteine levels may be useful given their safety and low cost **(Class IIb, Level of Evidence C)**.

Elevated Lipoprotein(a)

Although no definitive recommendations about lipoprotein(a) (Lp(a)) modification can be made because of an absence of outcome studies showing clinical benefit, treatment with niacin (extended-release or immediate-release formulation at a total daily dose of 2000 mg/day as tolerated) can be considered because it reduces Lp(a) levels by approximately 25% **(Class IIb, Level of Evidence C)**. Further recommendations must await the results of prospective trials utilizing niacin and statins in subjects stratified for Lp(a) concentration and apo(a) isoform subtypes (Guyton et al., 1998).

Elevated Lipoprotein-Associated Phospholipase A_2 (Lp-PLA_2)

No recommendations about Lp-PLA_2 modification can be made because of an absence of outcome studies showing clinical benefit with reduction in its blood levels.

Hypercoagulability

There are insufficient data to support specific recommendations for primary stroke prevention in patients with a hereditary or acquired thrombophilia.

Inflammation

Currently, no evidence supports the use of hs-C-reactive protein (CRP) screening of the entire adult population as a marker of general vascular risk. Aggressive risk factor modification is recommended for patients at high risk for stroke given exposure to traditional risk factors regardless of hs-CRP level. In agreement with AHA/CDC guidelines, hs-CRP can be useful in considering the intensity of risk factor modification in those at moderate general cardiovascular risk on the basis of traditional risk factors **(Class IIa, Level of Evidence B)** (Adams et al., 1998).

Infection

Data are insufficient to recommend antibiotic therapy for stroke prevention on the basis of seropositivity for 1 or a combination of putative pathogenic organisms. Future studies on stroke risk reduction based on treatment of infectious diseases will require careful stratification and identification of patients at risk for organism exposure.

Aspirin

Aspirin is not recommended for the prevention of a first stroke in men **(Class III, Level of Evidence A)**. The use of aspirin is recommended for cardiovascular (including but not specific to stroke) prophylaxis among persons whose risk is sufficiently high for the benefits to outweigh the risks associated with treatment (a 10-year risk of cardiovascular events of 6% to 10%) **(Class I, Level of Evidence A)**. Aspirin can be useful for prevention of a first stroke among women whose risk is sufficiently high for the benefits to outweigh the risks associated with treatment **(Class IIa, Level of Evidence B)**. The use of aspirin for other specific situations (e.g., atrial fibrillation, carotid artery stenosis) is discussed in the relevant sections of this statement.

Other Guideline Recommendations

Factor	Goal	Recommendations
Cigarette smoking (USPSTF, 1996)	Cessation Avoid environmental tobacco smoke	Strongly encourage patient and family to stop smoking. Provide counseling, nicotine replacement, and formal programs as available.
Diabetes	Improved glucose control Treatment of hypertension Consider statin	Improve glucose control through diet, oral hypoglycemics, and insulin. See guidelines and policy statements.
Asymptomatic carotid stenosis		Endarterectomy may be considered in selected patients with $\geq$60% and <100% carotid stenosis, performed by surgeon with surgical morbidity/mortality rate <3%. Careful patient selection should be guided by comorbid conditions, life expectancy, patient preference, and other individual factors. Patients with asymptomatic stenosis should be fully evaluated for other treatable causes of stroke.
Sickle cell disease	Monitor children with SCD with transcranial Doppler for development of vasculopathy (see text)	Institute transfusion therapy for children who develop evidence of sickle cell vasculopathy (see text).
Physical activity (Pate et al., 1995)	At least 30 minutes of moderate-intensity activity daily	Encourage moderate exercise (e.g., brisk walking, jogging, cycling, or other aerobic activity). Incorporate medically supervised programs for high-risk patients (e.g., cardiac disease) and

Factor	Goal	Recommendations
		adaptive programs according to physical/neurological deficits.
Poor diet/nutrition	Well-balanced diet	A diet containing ≥5 servings of fruits and vegetables per day may reduce the risk of stroke.
Alcohol (USPSTF, 1996)	Moderation	Men should consume no more than 2 drinks/day, and nonpregnant women should consume no more than 1 drink/day.
Drug abuse (USPSTF, 1996)	Cessation	An in-depth history of substance abuse should be included as part of a complete health evaluation for all patients.
Oral contraceptive use	Avoid in those at high risk	Inform patients about stroke risk and encourage alternative forms of birth control among women who smoke cigarettes, have migraines (especially with older age or smoking), are ≥35 years of age, or have had prior thromboembolic events.
Sleep-disordered breathing	Successful treatment of sleep-disordered breathing	Consider sleep laboratory evaluation in patients with snoring, excessive sleepiness, and vascular risk factors, particularly if body mass index is >30 and drug-resistant hypertension is present.

Definitions:

Levels of Evidence

Level of Evidence A: Data derived from multiple randomized clinical trials.

Level of Evidence B: Data derived from a single randomized trial or nonrandomized studies.

Level of Evidence C: Consensus opinion of experts.

Strength of Recommendations

Class I Conditions for which there is evidence for and/or general agreement that the procedure or treatment is useful and effective.

Class II Conditions for which there is conflicting evidence and/or a divergence of opinion about the usefulness/efficacy of a procedure or treatment.

Class IIa The weight of evidence or opinion is in favor of the procedure or treatment.

Class IIb Usefulness/efficacy is less well established by evidence or opinion.

Class III Conditions for which there is evidence and/or general agreement that the procedure or treatment is not useful/effective and in some cases may be harmful.

CLINICAL ALGORITHM(S)

None provided

EVIDENCE SUPPORTING THE RECOMMENDATIONS

REFERENCES SUPPORTING THE RECOMMENDATIONS

References open in a new window

TYPE OF EVIDENCE SUPPORTING THE RECOMMENDATIONS

The type of supporting evidence is identified and graded for each recommendation (see "Major Recommendations").

BENEFITS/HARMS OF IMPLEMENTING THE GUIDELINE RECOMMENDATIONS

POTENTIAL BENEFITS

Prevention of ischemic stroke and associated morbidity and mortality

POTENTIAL HARMS

- Although the attributable risk of stroke associated with atrial fibrillation increases with age, elderly (i.e., ≥75 years of age) atrial fibrillation patients have about twice the risk of serious bleeding complications during anticoagulation as compared with younger patients. Nevertheless, anticoagulation is still warranted if their risk of ischemic stroke without warfarin is greater than their risk of bleeding.
- The benefit of endarterectomy in the setting of asymptomatic carotid artery stenosis is highly dependent on surgical risk, with the benefit being obviated by periprocedural complication rates in excess of the 2.7% to 3.1% rates observed in the Asymptomatic Carotid Atherosclerosis Study and the Medical Research Council Asymptomatic Surgery Trial.
- Unless exchange methods in which blood is removed from the patient with each transfusion are used, long-term transfusion is associated with iron toxicity that must be treated with chelation. In the Stroke prevention trial in Sickle Cell Anemia, there was no evidence of transfusion-related infection, but iron overload and alloimmunization remain important transfusion risks.
- Side effects of pharmacologic interventions

QUALIFYING STATEMENTS

QUALIFYING STATEMENTS

- This guideline largely focuses on an individual patient– oriented approach to stroke prevention. This is in contrast to a population-based approach in which ". . . the entire distribution of risk factors in the population is shifted to lower levels through population-wide interventions," which is reflected in the American Heart Association Guide for Improving Cardiovascular Health at the Community Level.
- Because of the diverse nature of the topics, it was not possible to provide a systematic, uniform summary of the magnitude of the effect associated with each of the recommendations. Patient preferences need to be considered, as with all recommendations.

IMPLEMENTATION OF THE GUIDELINE

DESCRIPTION OF IMPLEMENTATION STRATEGY

An implementation strategy was not provided.

IMPLEMENTATION TOOLS

Tool Kits

For information about availability, see the "Availability of Companion Documents" and "Patient Resources" fields below.

INSTITUTE OF MEDICINE (IOM) NATIONAL HEALTHCARE QUALITY REPORT CATEGORIES

IOM CARE NEED

Staying Healthy

IOM DOMAIN

Effectiveness
Patient-centeredness

IDENTIFYING INFORMATION AND AVAILABILITY

BIBLIOGRAPHIC SOURCE(S)

Goldstein LB, Adams R, Alberts MJ, Appel LJ, Brass LM, Bushnell CD, Culebras A, DeGraba TJ, Gorelick PB, Guyton JR, Hart RG, Howard G, Kelly-Hayes M, Nixon JV, Sacco RL, American Heart Association, American Stroke Association Stroke Council. Primary prevention of ischemic stroke: a guideline from the American Heart Association/American Stroke Association Stroke Council [trunc]. Circulation 2006 Jun 20;113(24):e873-923. PubMed

ADAPTATION

Not applicable: The guideline was not adapted from another source.

DATE RELEASED

2006 Jun

GUIDELINE DEVELOPER(S)

American Heart Association - Professional Association
American Stroke Association - Disease Specific Society

SOURCE(S) OF FUNDING

American Heart Association

GUIDELINE COMMITTEE

Not stated

COMPOSITION OF GROUP THAT AUTHORED THE GUIDELINE

Primary Authors: Larry B. Goldstein, MD, FAAN, FAHA (*Chair*); Robert Adams, MS, MD, FAHA; Mark J. Alberts, MD, FAHA; Lawrence J. Appel, MD, MPH, FAHA; Lawrence M. Brass, MD, FAHA; Cheryl D. Bushnell, MD, MHS, FAHA; Antonio Culebras, MD, FAAN, FAHA; Thomas J. DeGraba, MD, FAHA; Philip B. Gorelick, MD, MPH, FAAN, FAHA; John R. Guyton, MD, FAHA; Robert G. Hart, MD, FAHA; George Howard, DrPH, FAHA; Margaret Kelly-Hayes, RN, EdD, MS, FAHA; J.V. (Ian) Nixon, MD, FAHA; Ralph L. Sacco, MD, MS, FAAN, FAHA

FINANCIAL DISCLOSURES/CONFLICTS OF INTEREST

The American Heart Association makes every effort to avoid any actual or potential conflicts of interest that may arise as a result of an outside relationship or a personal, professional, or business interest of a member of the writing panel. Specifically, all members of the writing group are required to complete and submit a Disclosure Questionnaire showing all such relationships that might be perceived as real or potential conflicts of interest.

Table: Writing Group Disclosures

Writing Group Member Name	Employment	Research Grant	Speakers Bureau/Honoraria	Stock Ownership	Consultant/Advisory Board
Larry B. Goldstein	Duke Center for Cerebrovascular Disease, Duke University Medical Center; Durham Veterans Administration	Grants: NIH, Veterans Administration, CDC/University of North Carolina–Chapel Hill, Pfizer/Parke-Davis (SPARCL	Speaking honoraria: Bayer, Pfizer/Parke Davis Speakers bureau: None	None	AstraZeneca, Bristol-Myers Squibb/Sanofi, CuraGen Corp, DPharm, GlaxoSmithKline, Johnson&Johnson, Merck Research Laboratories, Pfizer/

Writing Group Member Name	Employment	Research Grant	Speakers Bureau/Honoraria	Stock Ownership	Consultant/Advisory Board
	Medical Center	Steering Committee) Clinical trial site: Boehringer Ingelheim, AGA Corp			Parke Davis
Robert Adams	Medical College of Georgia	None	Boehringer Ingelheim, BMS, Wyeth, Sanofi-Synthelabo, Novartis	None	Boehringer Ingelheim, BMS, Sanofi-Synthelabo, Wyeth
Mark J. Alberts	Northwestern University Medical School	None	None	AstraZeneca, Bristol-Myers Squibb, Sanofi	None
Lawrence J. Appel	Johns Hopkins	None	None	None	None
Lawrence M. Brass	Yale University	Bristol-Myers Squibb, Sanofi/Synthelabo	Bristol-Myers Squibb, Sanofi/Synthelabo, Solvay Pharmaceuticals, Wyeth	None	AstraZeneca, Bristol-Myers Squibb, Merck, ONO Pharmaceuticals, Sanofi/Synthelabo, Solvay Pharmaceuticals, Wyeth
Cheryl D. Bushnell	Duke Center for Cerebrovascular Disease, Duke University Medical Center	None	None	None	None
Antonio Culebras	Upstate Medical University	None	Boehringer Ingelheim	None	None
Thomas J. DeGraba	National Naval Medical Center	Uniformed Services University of Health Sciences	None	None	None
Philip B. Gorelick	University of Illinois at Chicago	None	Bayer, Bristol-Meyers Squibb–Sanofi, Boerhinger-Ingelheim, Merck, Pfizer, Wyeth	None	Bayer, Bristol-Meyers Squibb–Sanofi, Boerhinger-Ingelheim, Merck, Pfizer, Wyeth
John R. Guyton	Duke University Medical Center	AstraZeneca, Bayer, GlaxoSmithKline, Kos, Merck, Pfizer, Schering	AstraZeneca, GlaxoSmithKline, Kos, Merck, Pfizer, Sankyo Pharma	None	AstraZeneca, Kos, Merck/Schering, Sankyo Pharma, Takeda

Writing Group Member Name	Employment	Research Grant	Speakers Bureau/Honoraria	Stock Ownership	Consultant/Advisory Board
		Plough			
Robert G. Hart	University of Texas Health Science Center	None	None	None	None
George Howard	University of Alabama at Birmingham	None	None	None	None
Margaret Kelly-Hayes	Boston University School of Medicine	None	None	None	None
J. V. (Ian) Nixon	Medical College of Virginia	None	None	None	None
Ralph L. Sacco	Columbia University	None	Boehringer Ingelheim (Pharm), Sanofi (Pharm)/Bristol-Myers/Squibb	None	Boehringer Ingelheim (Pharm), GlaxoSmithKline (Pharm)

This table represents the relationships of writing group members that may be perceived as actual or reasonably perceived conflicts of interest as reported on the Disclosure Questionnaire, which all members of the writing group are required to complete and submit.

Table: Reviewers' Disclosures

Reviewer	Employment	Research Grant	Other Research Support	Speakers Bureau/Honoraria	Ownership Interest
Tamilyn Bakas	Indiana University School of Nursing	None	None	None	None
Vito M. Campese	University of Southern	None	None	None	None

Reviewer	Employment	Research Grant	Other Research Support	Speakers Bureau/Honoraria	Ownership Interest
Christopher Cannon	California Brigham & Women's Hospital/Harvard Medical School	Bristol-Myers Squibb, Merck, Sanofi-Aventis, AstraZeneca	None	AstraZeneca, Bristol-Myers Squibb, Guilford Pharmaceuticals, Merck, Millennium, Pfizer, Sanofi-Aventis, Schering Plough, BestMed, I3 Magnfi, NCME	None
J. Donald Easton	Rhode Island Hospital–Brown Medical School	None	None	None	None
S. Claiborne Johnston	University of California, San Francisco	NIH/NINDS, Centocor/Johnson&Johnson, St Jude Medical, Boston Scientific	None	None	None
David A. Morrow	Brigham & Women's Hospital/Harvard Medical School	Merck & Co, Bayer, Biosite, Bristol-Myers Squibb, Beckman Coulter, Roche Diagnostics	None	Bayer, Beckman Coulter, Dade Behring, Sanofi-Aventis	None

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ENDORSER(S)

American Academy of Neurology - Medical Specialty Society
Atherosclerotic Peripheral Vascular Disease Interdisciplinary Working Group - Disease Specific Society
Cardiovascular Nursing Council - Professional Association
Clinical Cardiology Council - Professional Association
Nutrition, Physical Activity, and Metabolism Council - Professional Association
Quality of Care and Outcomes Research Interdisciplinary Working Group - Professional Association

GUIDELINE STATUS

This is the current release of the guideline.

GUIDELINE AVAILABILITY

Electronic copies: Available from the American Heart Association Web site.

Print copies: Available from the American Heart Association, Public Information, 7272 Greenville Ave, Dallas, TX 75231-4596; Phone: 800-242-8721

AVAILABILITY OF COMPANION DOCUMENTS

Get With the Guidelines (GWTG) provides disease-specific process documents and tools for in-house quality improvement. See the American Heart Association Web site for more information. See the related QualityTool summary on the Health Care Innovations Exchange Web site for this related tool set.

PATIENT RESOURCES

None available

NGC STATUS

This summary was completed by ECRI on August 25, 2006. This summary was updated by ECRI on March 6, 2007 following the U.S. Food and Drug Administration (FDA) advisory on Coumadin (warfarin sodium). This summary was updated by ECRI Institute on September 7, 2007 following the revised U.S. Food and Drug Administration (FDA) advisory on Coumadin (warfarin).

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