

Guidelines for the Primary Prevention of Stroke
A Statement for Healthcare Professionals From the American Heart
Association/American Stroke Association

*The American Academy of Neurology affirms the value of these
guidelines as an education tool for neurologists*
*Endorsed by the American Association of Neurological Surgeons,
the Congress of Neurological Surgeons, and the Preventive
Cardiovascular Nurses Association*



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Stroke Professional Education Committee

- Slide Set Prepared By A Member of the Stroke Professional Educational Committee: Opeolu Adeoye, MD MS

Writing Group



James F. Meschia, MD, FAHA, Chair; Cheryl Bushnell, MD, MHS, FAHA, Vice-Chair; Bernadette Boden-Albala, MD; Lynne T. Braun, PhD, CNP, FAHA; Dawn M. Bravata, MD; Seemant Chaturvedi, MD, FAHA; Mark A. Creager, MD, FAHA; Robert H. Eckel, MD, FAHA; Mitchell S. V. Elkind, MD, MS, FAAN, FAHA; Myriam Fornage, PhD, FAHA; Larry B. Goldstein, MD, FAHA; Steven M. Greenberg, MD, PhD, FAHA; Susanna E. Horvath, MD; Costantino Iadecola, MD; Edward C. Jauch, MD, MS, FAHA; Wesley S. Moore, MD, FAHA; John A. Wilson, MD; on behalf of the American Heart Association Stroke Council, Council on Cardiovascular and Stroke Nursing, Council on Clinical Cardiology, Council on Functional Genomics and Translational Biology, and Council on High Blood Pressure Research



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INTRODUCTION



- About 795,000 people in the US have a stroke each year.
- Globally, over the past four decades stroke incidence rates have fallen by 42% in high-income countries and increased by more than 100% in low- and middle-income countries.
- This Guideline summarizes the evidence on established and emerging stroke risk factors.
- The Guideline working group used the ACC/AHA COR/LOE to grade the available evidence.

Applying classification of recommendations and levels of evidence

		SIZE OF TREATMENT EFFECT				
		CLASS I <i>Benefit >>> Risk</i> Procedure/Treatment SHOULD be performed/administered	CLASS IIa <i>Benefit >> Risk</i> <i>Additional studies with focused objectives needed</i> IT IS REASONABLE to perform procedure/administer treatment	CLASS IIb <i>Benefit ≥ Risk</i> <i>Additional studies with broad objectives needed; additional registry data would be helpful</i> Procedure/Treatment MAY BE CONSIDERED	CLASS III <i>No Benefit or CLASS III Harm</i>	
				Procedure/ Test	Treatment	
				COR III: No Benefit	No Proven Benefit	
				COR III: Harm	Excess Cost w/o Benefit or Harmful	
					Harmful to Patients	
ESTIMATE OF CERTAINTY (PRECISION) OF TREATMENT EFFECT	LEVEL A Multiple populations evaluated* Data derived from multiple randomized clinical trials or meta-analyses	<ul style="list-style-type: none"> Recommendation that procedure or treatment is useful/effective Sufficient evidence from multiple randomized trials or meta-analyses 	<ul style="list-style-type: none"> Recommendation in favor of treatment or procedure being useful/effective Some conflicting evidence from multiple randomized trials or meta-analyses 	<ul style="list-style-type: none"> Recommendation's usefulness/efficacy less well established Greater conflicting evidence from multiple randomized trials or meta-analyses 	<ul style="list-style-type: none"> Recommendation that procedure or treatment is not useful/effective and may be harmful Sufficient evidence from multiple randomized trials or meta-analyses 	
	LEVEL B Limited populations evaluated* Data derived from a single randomized trial or nonrandomized studies	<ul style="list-style-type: none"> Recommendation that procedure or treatment is useful/effective Evidence from single randomized trial or nonrandomized studies 	<ul style="list-style-type: none"> Recommendation in favor of treatment or procedure being useful/effective Some conflicting evidence from single randomized trial or nonrandomized studies 	<ul style="list-style-type: none"> Recommendation's usefulness/efficacy less well established Greater conflicting evidence from single randomized trial or nonrandomized studies 	<ul style="list-style-type: none"> Recommendation that procedure or treatment is not useful/effective and may be harmful Evidence from single randomized trial or nonrandomized studies 	
	LEVEL C Very limited populations evaluated* Only consensus opinion of experts, case studies, or standard of care	<ul style="list-style-type: none"> Recommendation that procedure or treatment is useful/effective Only expert opinion, case studies, or standard of care 	<ul style="list-style-type: none"> Recommendation in favor of treatment or procedure being useful/effective Only diverging expert opinion, case studies, or standard of care 	<ul style="list-style-type: none"> Recommendation's usefulness/efficacy less well established Only diverging expert opinion, case studies, or standard of care 	<ul style="list-style-type: none"> Recommendation that procedure or treatment is not useful/effective and may be harmful Only expert opinion, case studies, or standard of care 	
Suggested phrases for writing recommendations		should is recommended is indicated is useful/effective/beneficial	is reasonable can be useful/effective/beneficial is probably recommended or indicated	may/might be considered may/might be reasonable usefulness/effectiveness is unknown/unclear/uncertain or not well established	COR III: No Benefit is not recommended is not indicated should not be performed/administered/other is not useful/beneficial/effective	COR III: Harm potentially harmful causes harm associated with excess morbidity/mortality should not be performed/administered/other
Comparative effectiveness phrases [†]		treatment/strategy A is recommended/indicated in preference to treatment B treatment A should be chosen over treatment B	treatment/strategy A is probably recommended/indicated in preference to treatment B it is reasonable to choose treatment A over treatment B			

Assessing the Risk of First Stroke



- An ideal stroke risk assessment tool that is simple, widely applicable and accepted, and that takes into account the effects of multiple risk factors does not exist.
- Risk assessment tools should be used with care, as they do not include all the factors that contribute to disease risk.

Assessing the Risk of First Stroke: Recommendations

- The use of a risk assessment tool such as the Framingham Stroke Profile and the AHA/ACC CV Risk Calculator (<http://my.americanheart.org/cvriskcalculator>) is reasonable as these tools can help identify individuals who could benefit from therapeutic interventions and who may not be treated based on any single risk factor.
(Class IIa, Level of Evidence B)

Genetic Factors



- The cause of ischemic stroke remains unclear in as many as 35% of patients.
- The use of DNA sequence information has not yet proven useful for guiding preventive therapy.

Genetic Factors: Recommendations

- Obtaining a family history can be useful in identifying people who may have increased stroke risk. **(Class IIa, Level of Evidence A)**
- Referral for genetic counseling may be considered for patients with rare genetic causes of stroke. **(Class IIb, Level of Evidence C)**
- Treatment of Fabry disease with enzyme replacement therapy might be considered, but has not been shown to reduce the risk of stroke, and its effectiveness is unknown. **(Class IIb, Level of Evidence C)**
- Non-invasive screening for unruptured intracranial aneurysms in patients with >2 or more first-degree relatives with subarachnoid hemorrhage or intracranial aneurysms might be reasonable. **(Class IIb, Level of Evidence C)**

Genetic Factors: Recommendations

- Non-invasive screening for unruptured intracranial aneurysms in patients with no more than one relative with subarachnoid hemorrhage or intracranial aneurysms is not recommended.
(Class III, Level of Evidence C)
- Non-invasive screening may be considered for unruptured intracranial aneurysms in patients with autosomal dominant polycystic kidney disease and one or more relatives with autosomal dominant polycystic kidney disease and subarachnoid hemorrhage or one or more relatives with autosomal dominant polycystic kidney disease and intracranial aneurysm.
(Class IIb, Level of Evidence C)
- Non-invasive screening for unruptured intracranial aneurysms in patients with cervical fibromuscular dysplasia may be considered.
(Class IIb, Level of Evidence C)

Genetic Factors: Recommendations



- Screening for intracranial aneurysms in every carrier of autosomal dominant polycystic kidney disease or Ehlers-Danlos type 4 mutations is not recommended. **(Class III, Level of Evidence C)**
- Genetic screening of the general population for the prevention of a first stroke is not recommended. **(Class III, Level of Evidence C)**
- Pharmacogenetic dosing of vitamin K antagonists may be considered when initiating therapy. **(Class IIb, Level of Evidence C)**
- Screening of patients at risk for myopathy in the setting of statin use is not recommended when considering initiation of statin therapy. **(Class III, Level of Evidence C)**

Physical Inactivity



- A sedentary lifestyle is associated with several adverse health effects, including an increased risk of stroke.
- Clinical trials documenting a reduction in risk of a first or recurrent stroke with regular physical activity have not been conducted.
- Evidence from observational studies is sufficiently strong to make recommendations for routine physical activity to prevent stroke.

Physical Inactivity: Recommendations

- Physical activity is recommended because it is associated with a reduction in the risk of stroke.
(Class I, Level of Evidence B)
- The 2008 Physical Activity Guidelines for Americans are endorsed and recommend that adults should do at least 150 minutes a week of moderate-intensity, or 75 minutes a week of vigorous-intensity aerobic physical activity.
(Class I, Level of Evidence B)

Dyslipidemia: Recommendations



- In addition to therapeutic lifestyle changes, treatment with an HMG coenzyme-A reductase inhibitor (statin) medication at intensities recommended in the 2013 ACC/AHA Guideline on the Treatment of Blood Cholesterol to Reduce Atherosclerotic Cardiovascular Risk in Adults is recommended for primary prevention of ischemic stroke in patients estimated to have a high 10-year risk for cardiovascular events. **(Class I, Level of Evidence A)**
- Niacin may be considered for patients with low high-density lipoprotein cholesterol or elevated lipoprotein(a), but its efficacy in preventing ischemic stroke in patients with these conditions is not established. Caution should be used with niacin as it increases the risk of myopathy. **(Class IIb, Level of Evidence B)**

Dyslipidemia: Recommendations



- Fibrates acid derivatives may be considered for patients with hypertriglyceridemia, but their efficacy in preventing ischemic stroke is not established.
(Class IIb, Level of Evidence C)
- Treatment with non-statin lipid lowering therapies, such as fibric acid derivatives, bile acid sequestrants, niacin, and ezetimibe may be considered in patients who cannot tolerate statins, but their efficacy in preventing stroke is not established. **(Class IIb, Level of Evidence C)**

Diet and Nutrition: Recommendations

- Reduced intake of sodium and increased intake of potassium as indicated in the US Dietary Guidelines for Americans are recommended to lower blood pressure. **(Class I, Level of Evidence A)**
- A DASH-style diet, which emphasizes fruits, vegetables, and low-fat dairy products and is reduced in saturated fat, also lowers blood pressure and is recommended. **(Class I, Level of Evidence A)**
- A diet that is rich in fruits and vegetables, and thereby high in potassium, is beneficial and may lower the risk of stroke. **(Class I, Level of Evidence B)**
- A Mediterranean diet supplemented with nuts may be considered in lowering the risk of stroke. **(Class IIa, Level of Evidence B)**

Hypertension



- Hypertension remains the most important well-documented, modifiable stroke risk factor.
- Treatment of hypertension is among the most effective strategies for preventing both ischemic and hemorrhagic stroke.
- Reduction in BP is generally more important than the specific agents used to achieve this goal.
- Hypertension remains undertreated in the community.

Hypertension: Recommendations



- Regular blood pressure screening and appropriate treatment of patients with hypertension, including lifestyle modification and pharmacological therapy, are recommended. **(Class I, Level of Evidence A)**
- Regular (annual) blood pressure screening and health-promoting lifestyle modification are recommended for patients with pre-hypertension (systolic blood pressure of 120 to 139 mm Hg or diastolic blood pressure of 80 to 89 mm Hg). **(Class I, Level of Evidence A)**
- Patients who have hypertension should be treated with antihypertensive drugs to a target blood pressure of <140/90 mm Hg. **(Class I, Level of Evidence A)**

Hypertension: Recommendations



- Successful reduction of blood pressure is more important in reducing stroke risk than the choice of a specific agent, and treatment should be individualized based on other patient characteristics and medication tolerance. **(Class I, Level of Evidence A)**
- Self-measured blood pressure monitoring is recommended to improve blood pressure control. **(Class I, Level of Evidence A).**

Obesity and Body Fat Distribution: Recommendations



- Among overweight (body mass index = 25 to 29 kg/m²) and obese (body mass index >30 kg/m²) individuals, weight reduction is recommended for lowering blood pressure. **(Class I, Level of Evidence A)**
- Among overweight (body mass index = 25 to 29 kg/m²) and obese (body mass index >30 kg/m²) individuals, weight reduction is recommended for reducing the risk of stroke. **(Class I, Level of Evidence B)**

Diabetes Mellitus



- People with diabetes mellitus have an increased susceptibility to atherosclerosis and to increased prevalence of atherogenic risk factors (hypertension and abnormal lipids).
- Diabetes is an independent risk factor for stroke.
- Diabetes more than doubles the risk for stroke and about 20% of patients will die of stroke.
- A comprehensive program that includes tight control of hypertension with ACEI or ARB treatment reduces the risk of stroke in people with diabetes.
- Glycemic control reduces microvascular complications.

Diabetes Mellitus: Recommendations

- Control of blood pressure in accordance with AHA/ACC guidelines to a target of < 140/90 mm Hg is recommended in patients with type I or type II diabetes. (**Class I, Level of Evidence A**)
- Treatment of adults with diabetes with a statin, especially those with additional risk factors, is recommended to lower the risk of first stroke. (**Class I, Level of Evidence A**)
- Adding a fibrate to a statin in people with diabetes is not useful for decreasing stroke risk. (**Class III, Level of Evidence B**)
- The usefulness of aspirin for primary stroke prevention for patients with diabetes but low 10-year risk of cardiovascular disease is unclear. (**Class IIb, Level of Evidence B**)

Cigarette Smoking: Recommendations

- Counseling in combination with drug therapy using nicotine replacement, bupropion or varenicline is recommended for active smokers to assist in quitting smoking. **(Class I, Level of Evidence A)**
- Abstention from cigarette smoking is recommended for patients who have never smoked based on epidemiological studies showing a consistent and overwhelming relationship between smoking and both ischemic stroke and subarachnoid hemorrhage. **(Class I, Level of Evidence B)**
- Community-wide or statewide bans on smoking in public spaces are reasonable for reducing the risk of stroke and myocardial infarction. **(Class IIa, Level of Evidence B)**

Atrial Fibrillation



- Atrial fibrillation (AF) is a prevalent, potent, and treatable risk factor for prevention of embolic stroke.
- About 2.3 million Americans have either sustained or paroxysmal AF.
- Non-valvular atrial fibrillation is associated with a 4-5 fold increased risk of ischemic stroke.
- The mechanism for stroke is embolism of stasis-induced thrombi forming in the left atrial appendage (LAA).
- Knowing which treatment offers the optimal balance of benefits and risks for a particular patient remains challenging.
- Despite improving public awareness, anticoagulation for suitable atrial fibrillation patients remains underutilized, particularly among the very elderly.



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Risk Stratification Schemes for Patients with AF

CHADS2

(Risk Score range = 0-6 points)

- Congestive heart failure (1 point)
- Hypertension (1 point)
- Age \geq 75 years (1 point)
- Diabetes mellitus (1 point)
- Stroke/TIA (2 points)

CHA2DS-2VASc

(Risk Score range = 0-9 points)

- Congestive heart failure (1 point)
- Hypertension (1 point)
- Age 65-74 years (1 point), \geq 75 years (2 points)
- Diabetes mellitus 9 1 Point)
- Vascular disease (PAD, MI, aortic plaque) (1 point)
- Female sex (1 point)

• Levels of risk for thrombotic stroke

- Low = 0 points
- Moderate = 1 point
- High risk \geq 2 points

ACCP treatment guidelines

- Low risk: no history
- Moderate risk: OAC
- High risk: OAC

HAS-BLED (bleeding risk schema)

(Risk score range = 0-9 points)

- Hypertension (1 point)
- Abnormal renal function (1 point)
- Abnormal liver function (1 point)
- Prior stroke (1 point)
- Prior major bleeding or bleeding predisposition (1 point)
- INR in therapeutic range $<$ 60% of time (1 point)
- Age $>$ 65 years (1 point)
- Use of antiplatelet or non-steroidal drugs (1 point)
- Excessive alcohol use (1 point)

Scores $>$ 2 associated with clinically relevant and major bleeding.

Atrial Fibrillation: Recommendations

- 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. (***Class I, level of evidence A***)
- For patients with non-valvular 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.

Atrial Fibrillation: Recommendations

- Active screening for AS in the primary care setting in patients ≥ 65 years of age by pulse assessment followed by ECG as indicated can be useful. **(Class IIa, Level of Evidence B)**
- For patients with non-valvular AF and CHA₂DS₂ – VASc score of 0, it is reasonable to omit antithrombotic therapy. **(Class IIa, Level of Evidence B)**

Atrial Fibrillation: Recommendations

- For patients with nonvalvular AF and CHA₂ DS₂ – VASc score of 1, and an acceptably low risk for hemorrhagic complication, no antithrombotic therapy, anticoagulant therapy, or aspirin therapy may be considered (**Class IIb, level of evidence C**). 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 the therapeutic range for patients taking warfarin.
- Closure of the LAA may be considered for high-risk patients with AF who are deemed unsuitable for anticoagulation if performed at a center with low rates of periprocedural complications and the patient can tolerate the risk of a at least 45 days of postprocedural anticoagulation (**Class IIB, level of evidence B**).

Other Cardiac Conditions: Recommendations



- Anticoagulation is indicated in patients with mitral stenosis and a prior embolic event, even in sinus rhythm. **(Class I, Level of Evidence B)**
- Anticoagulation is indicated in patients with mitral stenosis and left atrial thrombus. **(Class I, Level of Evidence B)**
- Warfarin (target INR, 2.0–3.0) and low-dose aspirin are indicated after aortic valve replacement with bileaflet mechanical or current-generation, single-tilting-disk prostheses in patients with no risk factors* **(Class I; Level of Evidence B)**; warfarin (target INR, 2.5–3.5) and low-dose aspirin are indicated in patients with mechanical aortic valve replacement and risk factors* **(Class I; Level of Evidence B)**; and warfarin (target INR, 2.5–3.5) and low-dose aspirin are indicated after mitral valve replacement with any mechanical valve **(Class I; Level of Evidence B)**. *Risk factors include AF, previous thromboembolism, left ventricular dysfunction, and hypercoagulable condition.



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Other Cardiac Conditions Recommendations



- Surgical excision is recommended for the treatment of atrial myxomas. **(Class I; Level of Evidence C).**
- Surgical intervention is recommended for symptomatic fibroelastomas and for fibroelastomas that are >1cm or appear mobile, even if asymptomatic. **(Class I, Level of Evidence C).**
- Aspirin is reasonable after aortic or mitral valve replacement with a bioprosthesis. **(Class IIa; Level of Evidence B).**
- It is reasonable to give warfarin to achieve an INR of 2.0 to 3.0 during the first 3 months after aortic or mitral valve replacement with a bioprosthesis. **(Class IIa; Level of Evidence C).**
- Anticoagulants or antiplatelet agents are reasonable for patients with heart failure who do not have AF or a previous thromboembolic event. **(Class IIa; Level of Evidence A).**

Other Cardiac Conditions: Recommendations



- Vitamin K antagonist therapy is reasonable for patients with STEMI and asymptomatic left ventricular mural thrombi.
(Class IIa; Level of Evidence C).
- Anticoagulation may be considered for asymptomatic patients with severe mitral stenosis and left atrial dimension ≥ 55 mm by echocardiography. **(Class IIb; Level of Evidence B).**
- Anticoagulation may be considered for patients with severe mitral stenosis, an enlarged left atrium, and spontaneous contrast on echocardiography. **(Class IIb; Level of Evidence C).**
- Anticoagulant therapy may be considered for patients with STEMI and anterior apical akinesis or dyskinesis (Class IIb; Level of Evidence C).
- Antithrombotic treatment and catheter-based closure are not recommended in patients with PFO for primary prevention of stroke.
(Class III; Level of Evidence C).

Asymptomatic Carotid Stenosis



- Medical therapy has advanced since clinical trials have been completed comparing endarterectomy plus “best” medical therapy compared to “best” medical therapy alone in patients with an asymptomatic carotid artery stenosis.
- Annual rate of stroke in medically treated patients with an asymptomatic carotid artery stenosis has fallen to 1% or less.
- Interventional therapy has also advanced, particularly regarding perioperative management and device design.

Asymptomatic Carotid Stenosis: Recommendations



- Patients with asymptomatic carotid stenosis should be prescribed daily aspirin and a statin. Patients should also be screened for other treatable risk factors for stroke, and appropriate medical therapies and lifestyle changes should be instituted. (**Class I, Level of Evidence C**)
- In patients who are to undergo CEA, aspirin is recommended perioperatively and postoperatively, unless contraindicated, because aspirin was used in every major trial demonstrating efficacy of CEA. (**Class I, Level of Evidence C**)

Asymptomatic Carotid Stenosis: Recommendations



- It is reasonable to perform CEA in asymptomatic patients who have more than 70% stenosis of the internal carotid artery if the risk of perioperative stroke, MI, and death is low. However, its effectiveness when compared to contemporary best medical management alone is not well established. **(Class IIa, Level of Evidence A).**
- It is reasonable to repeat duplex ultrasonography annually by a qualified technologist in a certified laboratory to assess the progression or regression of disease and response to therapeutic interventions in patients with atherosclerotic stenosis greater than 50%. **(Class IIa, Level of Evidence C).**
- Prophylactic CAS might be considered in highly selected patients with asymptomatic carotid stenosis (minimum 60% by angiography, 70% by validated Doppler ultrasound), but its effectiveness compared with medical therapy alone in this situation is not well established. **(Class IIb, Level of Evidence B)**



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Asymptomatic Carotid Stenosis: Recommendations



- In asymptomatic patients at high risk of complications for carotid revascularization by either CEA or CAS, the effectiveness of revascularization versus medical therapy alone is not well established. **(Class IIb, Level of Evidence B)**
- Screening low risk populations for asymptomatic carotid artery stenosis is not recommended. **(Class III, Level of Evidence C).**

Sickle Cell Disease: Recommendations

- TCD screening for children with SCD is indicated starting at 2 years of age and continuing annually to age 16 years.
(Class I, Level of Evidence B)
- Transfusion therapy (target reduction of hemoglobin S, <30%) is effective for reducing stroke risk in those children at elevated risk.
(Class I, Level of Evidence B)
- Although the optimal screening interval has not been established, it is reasonable for younger children and those with borderline abnormal TCD velocities be screened more frequently to detect development of high-risk TCD indications for intervention.
(Class IIa, Level of Evidence B)

Sickle Cell Disease: Recommendations

- Pending further studies, continued transfusion, even in those whose TCD velocities revert to normal, is probably indicated.
(Class IIa, Level of Evidence B)
- In children at high risk for stroke who are unable or unwilling to be treated with periodic red cell transfusion, it might be reasonable to consider hydroxyurea or bone marrow transplantation.
(Class IIb, Level of Evidence B)
- MRI and MRA criteria for selection of children for primary stroke prevention using transfusion have not been established, and these tests are not recommended in place of TCD for this purpose.
(Class III, Level of Evidence B)

Migraine: Recommendations



- Due to the increased risk of stroke seen in women with migraine headaches with aura and smoking, smoking cessation should be strongly recommended in women with migraine headaches with aura. **(Class I, Level of Evidence B)**
- Due to the increased risk of stroke seen in women with migraine headaches with aura and oral contraceptives, especially those containing estrogen, alternatives to oral contraceptives might be considered in women with active migraine headaches with aura. **(Class IIb, Level of Evidence B)**
- Because there is an association between higher frequency of migraine and risk of stroke, treatments to reduce migraine frequency might be reasonable, though evidence is lacking that this treatment reduces the risk of stroke. **(Class IIb, Level of Evidence C)**
- Closure of patent foramen ovale is not indicated for preventing stroke in patients with migraine. **(Class III, Level of Evidence B)**



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Metabolic Syndrome: Recommendations

- Management of individual components of the metabolic syndrome is recommended, including lifestyle measures (i.e., exercise, appropriate weight loss, proper diet) and pharmacotherapy (i.e., medications for blood pressure lowering, lipid lowering, glycemic control and anti-platelet therapy), as endorsed in other sections of this guideline. (Refer to relevant sections for Class and Levels of Evidence for each recommendation).

Alcohol Consumption: Recommendations

- For numerous health considerations, reduction or elimination of alcohol consumption in heavy drinkers through established screening and counseling strategies as described in the 2004 US Preventive Services Task Force Update is recommended. (**Class I, Level of Evidence A**)
- For individuals who choose to drink alcohol, consumption of ≤ 2 drinks per day for men and ≤ 1 drink per day for non-pregnant women might be reasonable. (**Class IIb, Level of Evidence B**).

Drug Abuse: Recommendation



- Referral to an appropriate therapeutic program is reasonable for patients who abuse drugs that have been associated with stroke, including cocaine, khat, and amphetamines. (**Class IIa, Level of Evidence C**)

Sleep Disordered Breathing: Recommendations



- Because of its association with stroke risk, screening for sleep apnea through a detailed history, including structured questionnaires like the Epworth Sleepiness Scale and Berlin Questionnaire; physical examination; and, if indicated, polysomnography may be considered. **(Class IIb, Level of Evidence C)**
- Treatment of sleep apnea to reduce the risk of stroke may be reasonable, although its effectiveness for primary prevention of stroke is unknown. **(Class IIb, Level of Evidence C)**

Hyperhomocysteinemia: Recommendations



- The use of the B complex vitamins, cobalamin (B12), pyridoxine (B6) and folic acid might be considered for prevention of ischemic stroke in patients with hyperhomocysteinemia, but its effectiveness is not well established. (**Class IIb, Level of Evidence B**)

Elevated Lipoprotein(a): Recommendation

- The use of niacin, which lowers Lipoprotein(a), might be reasonable for prevention of ischemic stroke in patients with high lipoprotein(a), but its effectiveness is not well established. (**Class IIb, Level of Evidence B**)
- The clinical benefit of using Lipoprotein(a) in stroke risk prediction is not well established. (**Class IIb, Level of Evidence B**)

Hypercoagulability: Recommendations

- The usefulness of genetic screening to detect inherited hypercoagulable states for the prevention of first stroke is not well established. **(Class IIb, Level of Evidence C)**
- The usefulness of specific treatments for primary stroke prevention in asymptomatic patients with a hereditary or acquired thrombophilia is not well established. **(Class IIb, Level of Evidence C)**
- Low dose aspirin (81mg/day) is not indicated for primary stroke prevention in individuals who are persistently aPL positive. **(Class III, Level of Evidence B)**

Inflammation and Infection: Recommendations



- Patients with chronic inflammatory disease such as rheumatoid arthritis or systemic lupus erythematosus should be considered at increased risk of stroke. (**Class I, Level of Evidence B**)
- Annual influenza vaccination can be useful in lowering stroke risk in patients at risk of stroke. (**Class IIa, Level of Evidence B**)
- Measurement of inflammatory markers such as hs-CRP or Lp-PLA2 in patients without cardiovascular disease may be considered to identify patients who may be at increased risk of stroke, although their usefulness in routine clinical practice is not well established. (**Class IIb, Level of Evidence B**)

Inflammation and Infection: Recommendations



- Treatment of patients with hs-CRP > 2.0 mg/dl with a statin to decrease stroke risk might be considered.
(Class IIb, Level of Evidence B)
- Treatment with antibiotics for chronic infections as a means to prevent stroke is not recommended.
(Class III, Level of Evidence A)

Antiplatelet Agents and Aspirin: Recommendations



- The use of aspirin for cardiovascular (including but not specific to stroke) prophylaxis is reasonable for people whose risk is sufficiently high (10-year risk >10%) for the benefits to outweigh the risks associated with treatment. A cardiovascular risk calculator to assist in estimating 10-year risk can be found online at <http://my.americanheart.org/cvriskcalculator>
(Class IIa, Level of Evidence A)
- Aspirin (81 mg daily or 100 mg every other day) can be useful for prevention of a first stroke among women, including those with diabetes, whose risk is sufficiently high for the benefits to outweigh the risks associated with treatment. **(Class IIa, Level of Evidence B)**

Antiplatelet Agents and Aspirin: Recommendations



- Aspirin might be considered for the prevention of a first stroke in people with chronic kidney disease (i.e., $eGFR < 45 \text{ ml/min/1.73 m}^2$). (**Class IIb, Level of Evidence C**). This recommendation does not apply to severe kidney disease (Stage 4 or 5; $eGFR < 30 \text{ ml/min/1.75 m}^2$).
- Aspirin is not useful for preventing a first stroke in low-risk people. (**Class III, Level of Evidence A**)
- Aspirin is not useful for preventing a first stroke in people with diabetes in the absence of other high-risk conditions. (**Class III, Level of Evidence A**)

Antiplatelet Agents and Aspirin: Recommendations



- Aspirin is not useful for preventing a first stroke in people with diabetes and asymptomatic peripheral artery disease (defined as asymptomatic in the presence of an ankle brachial index less than or equal to 0.99).
(Class III, 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.
- Cilostazol may be reasonable for the prevention of a first stroke in people with peripheral arterial disease.
(Class IIb, Level of Evidence B)
- Due to a lack of relevant clinical trials, anti-platelet regimens other than aspirin and cilostazol are not recommended for the prevention of a first stroke. **(Class III, Level of Evidence C)**

Primary Prevention in the Emergency Department



- The ED may serve as an important location to provide health promotion and disease prevention services.
- This opportunity to identify risk factors for stroke and begin primary prevention requires further study into resource utilization, efficacy, effectiveness, and cost.

Primary Prevention in the Emergency Department: Recommendations

- ED-based smoking cessation programs and interventions are recommended. **(Class I, Level of Evidence B)**
- Identification of atrial fibrillation and evaluation for anticoagulation in the ED is recommended. **(Class I, Level of Evidence B)**
- ED population screening for hypertension is reasonable. **(Class IIa, Level of Evidence C)**
- When a patient is identified as having a drug or alcohol abuse problem, ED referral to an appropriate therapeutic program is reasonable. **(Class IIa, Level of Evidence C)**
- The effectiveness of screening, brief intervention, and referral for treatment of diabetes and lifestyle stroke risk factors (obesity, alcohol/substance abuse, sedentary life style) in the ED setting is not established. **(Class IIb, Level of Evidence C)**

Preventive Health Services



- Substantial gaps in primary stroke prevention care exist.
- Quality improvement strategies that are multi-faceted and tailored appear to be the most effective.
- Future research should identify the implementation strategies that are associated with the greatest sustained improvements in preventing stroke.

Preventive Health Services: Recommendations



- It is reasonable to implement programs to systematically identify and treat risk factors in all patients at risk for stroke. (**Class IIa, Level of Evidence A**)

Summary/Conclusions



- Optimization of stroke prevention for individuals requires systems of care that identify risk factors as they emerge and that gain control of emerging risk factors safely, expeditiously, and cost-effectively.
- Access to care is necessary, but not sufficient to guarantee optimal stroke prevention.
- As health professionals, we must ensure that progress in preventing stroke does not lead to complacency.

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