

Clinician's Guide to the Updated ABCs of Cardiovascular Disease Prevention

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Despite significant progress, atherosclerotic cardiovascular disease (ASCVD), which is composed of coronary heart disease (CHD), cardiovascular (CV) death, myocardial infarction (MI), and stroke, remains the leading cause of morbidity and mortality in the Western world. In 2010, it was estimated that ≈ 1 in every 6 deaths was from CHD.¹ In 2012, CHD was estimated to result in >17.3 million deaths annually worldwide.² With attempts to prevent or reduce the onset of modifiable risk factors, the burden of ASCVD can be reduced, making it an attractive target for preventive measures. In the INTERHEART (A Study Of Risk Factors For First Myocardial Infarction In 52 Countries And Over 27 000 Subjects) study, for example, 9 modifiable risk factors—smoking, dyslipidemia, diabetes mellitus (DM), hypertension, abdominal obesity, stress, poor diet, physical inactivity, and excess alcohol consumption—were responsible for >90% of the risk for a first MI.³ Furthermore, because CV risk accrues slowly over time, every person can benefit from preventive interventions, whether primordial, primary, or secondary.

Prevention has played a pivotal role in the reduction in ASCVD morbidity and mortality seen over the last 3 decades.⁴ Nearly half (44%) of the decline in CHD deaths from 1980 to 2000 resulted from population-wide risk-factor reduction, with another half resulting from medical therapies targeting specific risk factors in patients with known or suspected atherosclerosis (47%).^{5,6} In contrast, only 5% of the reduction

in CHD deaths was due to coronary revascularization for chronic stable angina.⁶

In a busy clinical practice, incorporating the recommendations from lengthy guideline documents into every visit can be challenging and difficult to remember. We offer this simplified guide to assist clinician compliance with guideline-based care and to promote participation in the multiple preventive initiatives that exist, including the AHA 2020 goal,⁷ the Million Hearts Initiative,⁸ and the “25×25” target,⁹ each of which is aimed at preventing MIs and strokes and promoting CV health over the next decade and beyond. We present our recommendations in a simple, easy-to-remember “ABCDEF” format (Table 1) that integrates the most recent CV guideline recommendations.^{10–13}

Assessment of Risk

The first step in prevention is to assess a patient's risk of having an ASCVD event. Risk assessment enables clinicians to target those who will benefit most from risk-reducing therapy. The American College of Cardiology/American Heart Association (ACC/AHA) risk assessment guidelines¹⁰ recommend that all adults aged 20 to 79 years old should have risk factors assessed at least every 4 to 6 years for primary prevention (although providers may do this more regularly). For adults aged 40 to 79 years, 10-year risk estimation should be done using the pooled cohort risk assessment tool.¹⁰ Younger adults aged 20 to 59 years at low 10-year risk may be considered for 30-year or lifetime ASCVD risk assessment. Risk assessment in secondary prevention (those with established ASCVD) is much more straightforward as the benefits of pharmacotherapy (ie, aspirin, statin) are well established.¹⁴ Some view those with diabetes who are at least 40 years of age, and possibly stage ≥ 2 chronic kidney disease,¹⁵ as higher risk individuals who merit more aggressive prevention efforts.

With the recent release of the 2013 ACC/AHA Guideline on the Treatment of Blood Cholesterol to Reduce Atherosclerotic Cardiovascular Risk in Adults, a new risk estimator derived from the pooled cohort equations¹⁰ was introduced to assess clinical ASCVD risk. The risk estimator was validated in

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Table 1. Checklist for Primary and Secondary Prevention of ASCVD in “ABCDEF” Format

ABCDEF Component	Recommendation	
A	Assess risk	Multiple risk estimators available (Table 2)
A	Antiplatelet therapy	Primary prevention: aspirin 81 mg/d if >10% 10-year risk by Framingham Risk Score; use contraindicated if risk of bleeding outweighs benefit; no role for dual antiplatelet therapy Secondary prevention: aspirin 81 to 162 mg/d indefinitely; clopidogrel or ticagrelor for 12 months after medically managed ACS. Clopidogrel, prasugrel or ticagrelor after PCI (prasugrel or ticagrelor only recommended for PCI in the setting of ACS); duration depends on stent type; aspirin 81 to 325 mg/d is recommended for all patients following an ischemic stroke.
A	Atrial fibrillation	Primary prevention: control risk factors (hypertension, obstructive sleep apnea, alcohol, obesity) Secondary prevention: warfarin or novel oral anticoagulants for CHA ₂ DS ₂ -VASC ≥2
B	Blood pressure	Primary and secondary prevention: lifestyle interventions with or without pharmacotherapy based on blood pressure targets Blood pressure goal: <150/90 mm Hg in patients aged ≥60 years, <140/90 in patients aged <60 years—see Figure.
C	Cholesterol	Primary prevention: only if within one of the statin-benefit groups (Table 4). In primary prevention, lifestyle has the major emphasis, but in those for whom a risk decision is uncertain, additional factors such as LDL-C ≥160 mg/dL, family history of premature ASCVD, and high lifetime risk (all three especially useful in younger patients for whom quantitative ASCVD risk is low. Lifetime risk calculation expressly used to enhance lifestyle counseling) and CAC score ≥300, ABI <0.9, and hs-CRP ≥2.0 mg/L (these last three especially useful in older patients). Secondary prevention: lifestyle interventions and the proper intensity of tolerated statin therapy
C	Cigarette/tobacco cessation	Primary prevention: education Secondary prevention: assessment, counseling, pharmacotherapy 5As: ask, advise, assess, assist, arrange
D	Diet and weight management	Primary and secondary prevention: Goal of BMI 18.5 to 24.9 kg/m ² ; waist circumference: <40 in (men), <35 in (women) Lose 3% to 5% of body weight Low calorie diet: 1200 to 1500 kcal/d (women); 1500 to 1800 kcal/d (men) Energy deficit via decreased calorie intake and increased physical activity Comprehensive lifestyle program Weight loss maintenance
D	Diabetes prevention and treatment	Primary prevention: lifestyle interventions; goal is normal fasting blood glucose and hemoglobin A1c <5.7% Secondary prevention: lifestyle interventions, metformin, oral hypoglycemic, insulin; goal is hemoglobin A1c <7%
E	Exercise	Primary and secondary prevention: regular aerobic physical activity Goal: 3 to 4 sessions per week, lasting an average of 40 minutes per session, involving moderate- to vigorous-intensity physical activity; cardiac rehabilitation for patients who have had an ASCVD event
F	Heart failure	Primary prevention: treat heart failure risk factors Secondary prevention: A: adherence to meds (ACEI, ARB, beta blocker, aldosterone antagonists, diuretics) B: blood pressure and blood sugar control; behaviors (eg, daily weights) C: cigarette smoking cessation/cholesterol management D: dietary adherence, drinking limited fluids and alcohol, defibrillator E: exercise

ABI indicates ankle brachial index; ACEI, angiotensin converting enzyme inhibitor; ACS, acute coronary syndrome; ARB, angiotensin receptor blocker; ASCVD, atherosclerotic cardiovascular disease; BMI, body mass index; CAC, coronary artery calcium; CHADS₂, Congestive heart failure/Hypertension/Age ≥75/Diabetes/Prior Stroke or TIA; CHADS₂VASc, Congestive heart failure/Hypertension/Age ≥75/Diabetes/Prior Stroke or TIA/Vascular Disease/Age 65–74/Female Sex; HF, heart failure; hs-CRP, high-sensitivity C-reactive protein; LDL-C, low-density lipoprotein cholesterol; PCI, percutaneous coronary intervention.

community-based populations with large numbers of non-Hispanic whites and blacks. Initially, some raised concerns about its calibration and discrimination. These concerns emanated from using the equations in selected low-risk cohorts with likely downstream prevention interventions such as statin use^{16–18}; however, the Reasons for Geographic and Racial Differences in Stroke (REGARDS) study validated the ACC/AHA pooled cohort risk equations in a community-based US population. In that study, the risk estimator proved to be well calibrated and demonstrated fair discrimination or rank

ordering. Consequently, it is the preferred tool for risk assessment in the United States for facilitating risk discussions between clinicians and patients.¹⁰

The cholesterol guidelines specifically chose a ≥7.5% ASCVD risk over the next decade as the cutoff to define a statin benefit group even though its analysis of 3 large, solely primary prevention, randomized controlled trials showed benefit with statin therapy down to a 10-year ASCVD risk of 5%. This was done purposefully to allow for some overestimation of risk because there has been a decline in stroke and

Table 2. Comparison of the ASCVD Risk Estimator and Other Risk Assessment Tools

Risk Score	Components	Predicts	Interpretation	Disadvantages
2013 ACC/AHA prevention guidelines (pooled cohort) ASCVD risk estimator ¹⁰	Age Sex Race (white, black, other) Smoking Total Cholesterol HDL SBP Treatment of HTN DM	10-year risk and lifetime risk of ASCVD (coronary death, MI, stroke)	10-year risk: low risk: <5% warrants risk discussion: ≥5% Lifetime risk: -All risk factors are optimal ≥1 risk factor is not optimal ≥1 risk factor is elevated -1 major risk factor ≥2 major risk factors	1. Does not incorporate family history in the estimation; it is a factor to inform the risk decision if risk decision is uncertain 2. Can over- or underestimate risk in non-US populations 3. Does not include biomarker data
FRS ⁴	Age Sex Total cholesterol HDL Smoking SBP	10-year risk of MI or CHD-related death	Low risk: <10% Intermediate risk: 10% to 20% High risk: >20%	1. Does not predict the risk of developing other cardiovascular events (stroke, PAD and HF) 2. Does not incorporate family history 3. Can over or underestimate risk in non-US populations
D'Agostino Global CVD Score (revised FRS) ⁴	Same as FRS	10-year risk of CHD, PAD and HF	Low risk: <10% Intermediate risk: 10% to 20% High risk: >20%	1. Does not include biomarker data
Reynold's Risk Score ⁴	Same as FRS plus FH of early MI plus hs-CRP	10-year risk of MI, coronary revascularization, cardiovascular death, stroke	Low risk: <10% Intermediate risk: 10% to 20% High risk: >20%	1. Uses "soft end points" (eg, revascularization) that other risk estimators do not

ACC/AHA indicates American College of Cardiology/American Heart Association; ASCVD, atherosclerotic cardiovascular disease; CHD, coronary heart disease; CVD, cardiovascular disease; DM, diabetes mellitus; FH, family history; FRS, Framingham Risk Score; HDL, high-density lipoprotein; HF, heart failure; hs-CRP, high-sensitivity C-reactive protein; HTN, hypertension; MI, myocardial infarction; PAD, peripheral arterial disease; SBP, systolic blood pressure.

CHD incidence during the past 2 decades. The risk estimator (Table 2) incorporates the same traditional elements of the Framingham Risk Score and uses the variables of race, age, total cholesterol level, high-density lipoprotein cholesterol (HDL-C) level, systolic blood pressure (SBP), and smoking status to approximate the 10-year and lifetime risks of an ASCVD event. Patients are then stratified to a low (<5%) 10-year risk category or to a higher level at which a detailed risk discussion about starting a statin should take place.

The new risk estimator incorporates several important changes. First, there is a mechanism for predicting lifetime risk, which, when elevated, warrants early aggressive lifestyle and risk factor modification, even when the 10-year risk may not. Because chronological age remains the dominant risk factor for the development of ASCVD, an estimated lifetime risk can also be a helpful tool for communicating risk to younger patients who are not yet high risk simply due to their young age. Accumulation of the risk factors used in this tool adds synergistically to long-term (30-year) risk even when 10-year risk is not particularly high.^{19,20} Second, the revised ASCVD risk estimator incorporates the risk of stroke.¹⁴ Finally, it distinguishes between men and women and between non-Hispanic white and non-Hispanic black races.¹⁴

A shortcoming of the Framingham Heart Study was its inclusion of a primarily white population.^{21,22} Unfortunately, although the newer risk estimator incorporates race (non-Hispanic white or black) into its risk assessment, some ethnicities remain underrepresented because of insufficient long-term observational cohort data. Despite such shortcomings, the new pooled cohort risk estimator is a simplified tool for risk assessment that is quite helpful in initiating a discussion of prevention, and we endorse its routine use. Clinicians must realize, however, that the risk estimate is dominated by chronological (ie, age) rather than biological or vascular age.²³ In addition, the risk estimator was not designed to be used with those already on statin therapy. As such, clinicians should not re-estimate ASCVD risk after initiation of statin therapy. Instead, risk reduction obtained from statin use should instead be determined by looking at randomized controlled trial data.

The 2013 ACC/AHA risk assessment guidelines recommend consideration of additional factors when a quantitative risk decision remains uncertain. These include coronary artery calcium (CAC) scoring (≥ 300 Agatston units or >75 th percentile for age, sex, and race), a high-sensitivity C-reactive protein level ≥ 2.0 mg/L, an ankle brachial index <0.9 , and a family history of premature ASCVD as “reasonable” (class IIb) choices.¹⁰ The first 3 may be especially useful for adults aged 65 to 75 years to address concerns regarding risk overestimation by biological or vascular age. In addition, the 2013 ACC/AHA cholesterol guidelines added a low-density lipoprotein cholesterol (LDL-C) level ≥ 160 mg/dL and elevated lifetime risk as additional class IIb choices. For younger

patients, an LDL-C level ≥ 160 mg/dL, a family history of premature ASCVD, and/or severe elevation of a risk factor to increase lifetime risk may be especially useful.

CAC scoring, as measured by noncontrast cardiac computed tomography, is the most predictive test of CV disease (CVD) risk in those for whom the decision to start a statin is still uncertain.^{24–27} Dividing patients based on CAC scores of 0, 1 to 100, and >100 was predictive of subsequent CV events among participants from the Multi-Ethnic Study of Atherosclerosis (MESA) that met Justification For The Use Of Statins In Prevention: An Intervention Trial Evaluating Rosuvastatin (JUPITER) trial criteria.²⁶ In addition, in asymptomatic individuals referred for CAC testing, when CAC is absent (score 0) or low (score 1 to 10), 10-year survival is very high.²⁸ Finally, in those who are not on baseline medications for dyslipidemia, a CAC score ≥ 100 strongly predicts ASCVD risk across the spectrum of dyslipidemia.²⁹

Antiplatelet Therapy

Primary Prevention

Aspirin

Unlike secondary prevention, data regarding the use of aspirin in the primary prevention of ASCVD is equivocal. Most early data came from the Antithrombotic Trialists’ Collaboration, which evaluated 95 456 patients from 6 clinical trials.³⁰ Treatment with aspirin was associated with a small reduction in serious vascular events but carried a small increase in the rates of major gastrointestinal and extracranial bleeding. More recently, other studies have called into question the value of aspirin in primary prevention.^{31–33} Finding an appropriate balance between preventing vascular events and exposing individuals to an increased bleeding risk with aspirin therapy remains an area of active research.

Current ACC/AHA guidelines recommend the use of low-dose aspirin for primary prevention, as listed in Table 3. Because guideline recommendations and data vary,^{30–33,36,39,44} treatment with aspirin should be individualized based on the patient’s risk–benefit profile.⁴⁴

P2Y₁₂ receptor antagonists

These agents compose the other major class of antiplatelet agents. Currently, there are no published guidelines related to their use in primary prevention.

Secondary Prevention

Aspirin

Clear support exists for the use of aspirin in the secondary prevention of CVD. The most convincing results come from

Table 3. ACC/AHA Recommendations for Aspirin and Thienopyridine Therapy in Primary and Secondary Prevention

Primary prevention
1. Aspirin (81 mg/d) in patients with at least intermediate risk (>10% 10-year risk of CHD by FRS) (ACC/AHA class Ia). ³⁴
2. Aspirin (81 mg/d) recommended for women >65 years for stroke and MI prevention; may be considered for women <65 years for stroke prevention if bleeding risk is acceptable (class IIb). ³⁵
3. Aspirin (81 to 162 mg/d) is recommended in DM with >10% 10-year risk (class IIa) and may be considered in 5% to 10% 10-year risk with risk factors (class IIb) but not recommended in those with 10-year risk <5%. ³⁶
Secondary prevention
1. Aspirin (81 mg/d) is recommended for all patients following an ACS. ^{37–39}
2. Aspirin (81 to 325 mg/d) is recommended for all patients following an ischemic stroke. ^{38,40}
3. Aspirin (81 mg/d) is recommended for all patients with symptomatic peripheral arterial disease. ⁴¹
4. Clopidogrel may be used as monotherapy in patients that are intolerant of aspirin for the secondary prevention of CV events, ³⁸ stroke, ⁴⁰ or PAD. ⁴¹
5. A P2Y ₁₂ receptor antagonist should be used in combination with aspirin for at least 1 year in patients following an ACS. ^{38,39,42} A. If no PCI was performed, either clopidogrel or ticagrelor should be used. ^{38,39} B. If PCI was performed, clopidogrel, ticagrelor, or prasugrel may be used. ^{38,39}
6. A P2Y ₁₂ receptor antagonist should not be used in patients revascularized by coronary artery bypass graft surgery for stable coronary artery disease, unless some other indication exists. ^{38,39}
7. Clopidogrel should be used in combination with aspirin in patients receiving PCI for stable coronary artery disease, for a time period specific to the type of stent placed, followed thereafter by lifelong aspirin. ⁴³ A. If a bare metal stent was used, clopidogrel should be taken for at least 1 month and ideally for 1 year. ⁴³ B. If a drug-eluting stent was used, clopidogrel should be taken for at least 1 year. ⁴³

ACC/AHA indicates American College of Cardiology/American Heart Association; ACS, acute coronary syndrome; CHD, coronary heart disease; CV, cardiovascular; DM, diabetes mellitus; FRS, Framingham Risk Score; MI, myocardial infarction; PAD, peripheral arterial disease; PCI, percutaneous coronary intervention.

the Antithrombotic Trialists' Collaboration, in which ≈17 000 high-risk patients randomized to low-dose aspirin versus placebo were found to have a significant reduction in major vascular events (6.7% versus 8.2% per year), stroke (2.1% versus 2.5%), and coronary events (4.3% versus 5.3%).³⁰ A subsequent meta-analysis involving ≈135 000 patients at high risk for occlusive vascular events demonstrated risk reduction of ≈25% in serious vascular events with aspirin or other oral antiplatelet therapy.⁴⁵

For patients who undergo coronary revascularization, lifelong aspirin therapy is strongly recommended.³⁸ Traditionally, higher doses of aspirin have been used for at least 1 month after percutaneous revascularization. Recently, 2 large clinical trials (CURRENT-OASIS 7 [Clopidogrel Optimal Loading Dose Usage to Reduce Recurrent Events/Optimal Antiplatelet Strategy For Interventions] and TRITON-TIMI 38 [Trial To Assess Improvement In Therapeutic Outcomes By Optimizing Platelet Inhibition With Prasugrel]) did not show greater efficacy with high-dose (325 mg/d) versus low-dose (75 to 100 mg/d) aspirin therapy.^{46,47} Moreover, there is a US Food and Drug Administration black box warning against the concurrent use of high-dose aspirin with ticagrelor. This warning is based on a significant geographic-treatment interaction in the PLATElet inhibition and patient Outcomes trial (PLATO), with less efficacy with ticagrelor among patients enrolled in North America potentially due to more frequent use of high-dose aspirin.⁴⁸ Consequently, most secondary

prevention patients are more appropriately treated with low-dose aspirin therapy (<100 mg/d).

P2Y₁₂ receptor antagonists

Substantial data support the use of clopidogrel, as an alternative to or as an adjunct to aspirin, in the secondary prevention of CV events. The Clopidogrel versus Aspirin in Patients at Risk of Ischemic Events (CAPRIE) trial compared aspirin (325 mg/d) and clopidogrel (75 mg/d) monotherapies and found a 9% relative risk reduction in the primary end point of ischemic stroke, MI, or vascular death in those receiving clopidogrel.⁴⁹

Based on the TRITON-TIMI 38 trial, which was limited to patients undergoing percutaneous coronary intervention,⁵⁰ and the all-comer PLATO trial,⁵¹ both of the newer dual antiplatelet therapies (prasugrel and ticagrelor, respectively) reduced CV events, nonfatal MI, and stroke in patients after both non-ST elevation acute coronary syndrome or ST-elevation MI.^{52,53} Current guidelines recommend dual antiplatelet therapy for at least 12 months in individuals after an acute coronary syndrome or after drug-eluting stent implantation.⁴³

Based on the TRITON-TIMI 38 trial, which was limited to patients undergoing percutaneous coronary intervention,⁵⁰ and the all-comer PLATO trial,⁵¹ both of the newer P2Y₁₂ receptor antagonists, prasugrel and ticagrelor, afford improved efficacy with respect to death/MI/non-fatal

stroke (for prasugrel) and death from vascular causes/MI/non-fatal stroke (for ticagrelor) when compared to clopidogrel in patients with acute coronary syndrome, respectively. Additionally, both prasugrel and ticagrelor have been shown to reduce the incidence of recurrent CV events.^{54,55} This does come, however, with a cost of increased bleeding.

A prespecified subgroup analysis found that diabetics benefited the most from prasugrel⁵⁶; however, prasugrel was associated with a higher rate of significant bleeding, along with less overall benefit in those with prior stroke, aged ≥ 75 years, or weight < 60 kg. In contrast, ticagrelor was not associated with greater overall rates of major bleeding, but there was a higher incidence of major bleeding not related to coronary artery bypass grafting and more instances of fatal intracranial bleeding.

For the secondary prevention of ischemic stroke or transient ischemic attack, we support the recommendation to use either aspirin (81 to 325 mg/d) or clopidogrel (75 mg/d) alone⁵⁷; dual antiplatelet therapy is associated with increased bleeding. Although it is reasonable to use aspirin (81 to 325 mg/d) or clopidogrel alone (75 mg/d) for symptomatic peripheral artery disease, there is a need for future studies to evaluate antiplatelet therapy in patients with asymptomatic peripheral artery disease.⁵⁸ Finally, current guideline recommendations related to the use of aspirin and P2Y₁₂ receptor antagonists for secondary prevention are listed in Table 3.

Atrial Fibrillation

Atrial fibrillation (AF) is the most common dysrhythmia in the United States, with a prevalence that is expected to rise significantly as the population ages. Despite the recognition of several modifiable risk factors for AF, such as obstructive sleep apnea, hypertension, and alcohol use, its prevalence and incidence continue to grow,⁵⁹ making it an attractive target for preventive interventions. The preventive approach for AF is 2-fold: (1) targeting and treating risk factors and (2) promptly diagnosing and initiating antithrombotic therapy to minimize thromboembolic complications.

Although limiting symptoms may significantly affect one's quality of life, the most feared complication associated with AF is stroke or systemic embolism. To this end, selective ECG screening for clinically asymptomatic disease in otherwise healthy persons may be indicated for stroke prevention. In the recently presented STROKESTOP (Population screening of 75- and 76-year-old men and women for silent atrial fibrillation) trial, population-based screening of asymptomatic patients in Sweden identified 5% of the population as candidates for oral anticoagulation. The full study is currently under way.⁶⁰

Once AF has been diagnosed, thromboembolic risk assessment should be performed to determine optimal antithrombotic therapy. The 2014 ACC/AHA/Heart Rhythm Society AF guidelines recommend risk stratification using the CHA₂DS₂-VASc score, which performs better than the CHADS₂ score alone.^{12,61} Although not formally recommended in the guidelines yet, biomarkers, including high-sensitivity troponin, have been shown to improve risk assessment.⁶² Although aspirin and warfarin have been shown to reduce the risk of stroke in AF,^{63,64} most patients warrant anticoagulant therapy. Until recently, warfarin was the sole anticoagulant approved for AF patients. Novel oral anticoagulants now offer alternatives that do not require prothrombin time monitoring and are associated with superior efficacy and/or safety in nonvalvular AF.⁶⁵⁻⁶⁸ These agents inhibit the coagulation cascade either as a direct thrombin inhibitor (dabigatran) or a factor Xa inhibitor (rivaroxaban, apixaban, or edoxaban, which has not yet received US Food and Drug Administration approval).

Blood Pressure

High blood pressure (BP) is an important risk factor for CHD and an even stronger risk factor for stroke. It also is associated with the development of AF, heart failure (HF), left ventricular hypertrophy, renal failure, and dementia.⁶⁹⁻⁷¹ Results from meta-analyses with > 61 million adults show that each 20-mm Hg increase in SBP or 10-mm Hg increase in diastolic BP doubles the risk of a fatal coronary event.⁷²

New BP recommendations (not sponsored by any national organization) were recently published from the group appointed to the Eighth Joint National Committee (JNC 8).¹³

The new recommendations (Figure) are largely similar to the JNC 7 guidelines with 2 important changes. First, they liberalize the systolic treatment goal from < 140 to < 150 mm Hg for patients aged ≥ 60 years; however, the panel did not recommend reducing pharmacological treatment to allow for increased BP in older patients that are tolerant of a SBP < 150 mm Hg. Considerable controversy has followed this change, and a group of committee members on the JNC 8 panel published a dissenting review of the age-specific SBP treatment goal,⁷³ citing substantial CV benefit from SBP < 140 mm Hg based on observational data and no new evidence since publication of the JNC 7 guidelines to suggest significant harm from treating to SBP < 140 mm Hg. In addition, BP treatment guidelines from other major international organizations have recommended either a universal treatment goal of < 140 over < 90 mm Hg or a change in the target SBP target to < 150 mm Hg for patients aged ≥ 80 years.^{74,75} These treatment goals represent rea-

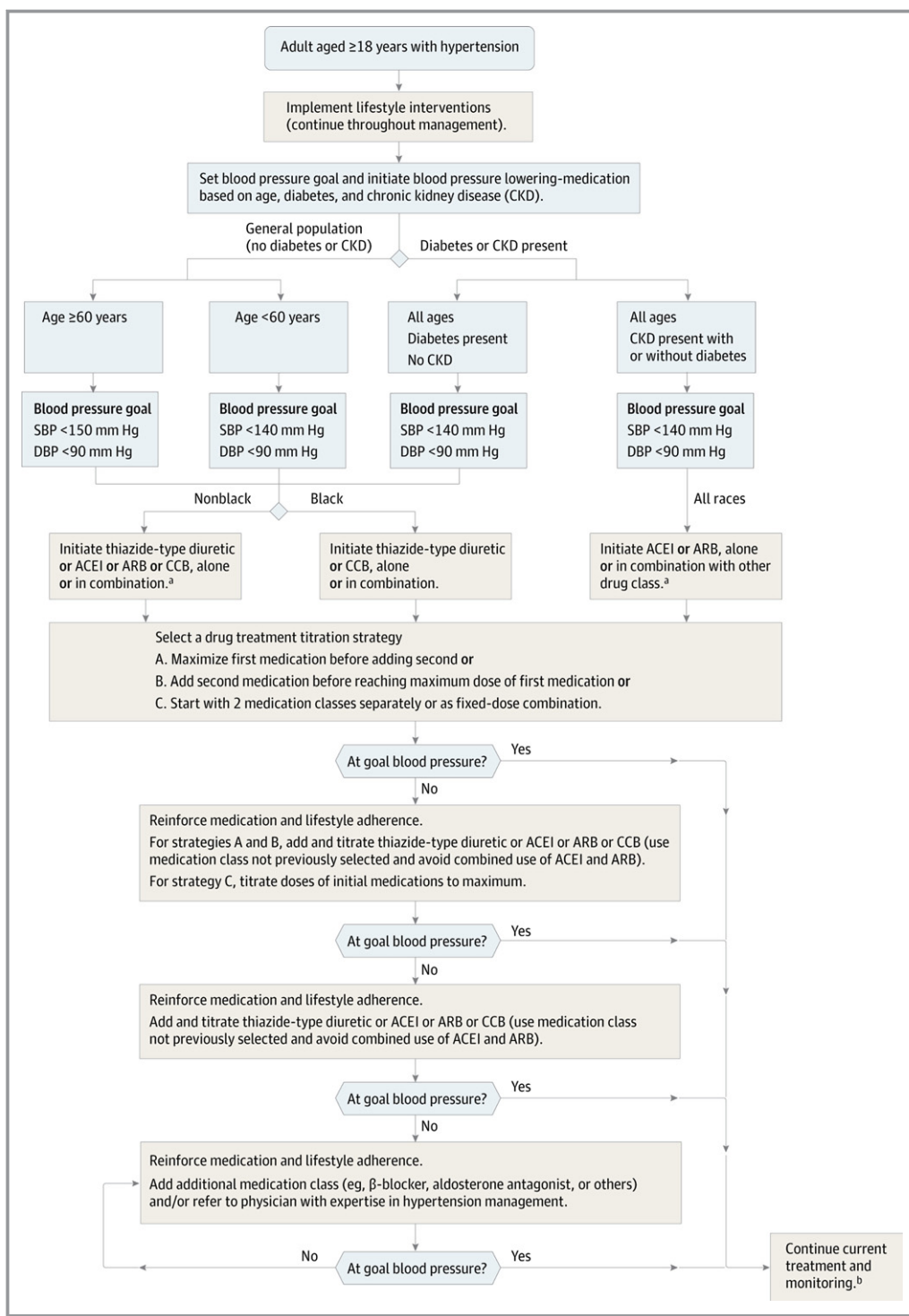


Figure. Eighth Joint National Committee evidence-based algorithm for the treatment of hypertension. Reproduced with permission from: James et al.¹³ ACEI indicates angiotensin-converting enzyme inhibitor; ARB, angiotensin receptor blocker; CCB, calcium channel blocker; CKD, chronic kidney disease; DBP, diastolic blood pressure; SBP, systolic blood pressure.

sonable alternatives to the JNC 8 guideline committee recommendations. Currently, a large randomized controlled trial is ongoing and is randomizing >9000 patients to either standard or intensive BP control and assessing the first

occurrence of MI, acute coronary syndrome, stroke, HF, or CVD death.⁷⁶

The second change is a target of <140 over 90 mm Hg (instead of <130 over 80 mm Hg) in patients with DM or

chronic kidney disease. This change was based on multiple studies, including the ACtion to CONtrol Risk in Diabetes (ACCORD) BP trial, which demonstrated no significant benefit in the primary composite end point among patients treated to a SBP goal <120 mm Hg compared with <140 mm Hg, despite significant reductions in stroke.^{77–80}

Patients diagnosed with hypertension should be encouraged to implement lifestyle changes including regular exercise, dietary sodium restriction, moderation of alcohol consumption, and weight loss, regardless of whether pharmacotherapy is needed. When initiating medical therapy, patients without chronic kidney disease can be started on an ACE inhibitor, an angiotensin receptor blocker, a thiazide diuretic, or a calcium channel blocker. Alternatives for nonblack patients and those with chronic kidney disease include an angiotensin-converting enzyme inhibitor or an angiotensin receptor blocker; however, the combined use of an angiotensin-converting enzyme inhibitor and an angiotensin receptor blocker should be avoided.

Most patients will require at least 2 medications to adequately control their BP. The JNC 8 committee recommends 3 strategies to help achieve BP goals: (1) maximize the dose of the initial medication, (2) add a second medication before reaching the maximal dose of the initial medication, or (3) simultaneously start 2 antihypertensive medications from different classes. Because it is important to achieve and maintain the BP goal, patients should be evaluated regularly, with adjustment and addition of medications as needed. If patients remain hypertensive despite

adequate treatment with 3 medications or if there is a contraindication to treatment with any of the recommended first-line antihypertensive agents, then medications from other classes can be used (eg, beta blocker or aldosterone antagonist) or the patient should be referred to a hypertension specialist.

Because the JNC 8 recommendations do not address prehypertension, resistant hypertension, or secondary hypertension, it is reasonable to follow the prior JNC 7 guidelines or those from other international organizations.^{74,81,82}

Cholesterol

Cholesterol-containing lipoproteins are central to the pathogenesis of atherosclerosis. Elevated total cholesterol and LDL-C are associated with increased ASCVD risk,^{82–84} and lipid-lowering medications can reduce this risk.^{85–87} Intensive lifestyle changes, such as diet and exercise, should be recommended as first-line therapy for all patients.

The newest iteration of the guidelines on the treatment of blood cholesterol (to reduce atherosclerotic CV risk in adults) have markedly changed the approach to lipid management, identifying statins as the preferred drug class to lower LDL-C.¹⁴ Randomized controlled trial data support the use of statins to reduce CV risk in 4 groups: (1) those with known ASCVD, (2) those with an LDL-C level ≥ 190 mg/dL, (3) those aged 40 to 75 years with DM and LDL-C 70 to 189 mg/dL, and (4) those aged 40 to 75 years with LDL-C 70 to 189 mg/dL and an estimated ASCVD 10-year risk of $\geq 7.5\%$ (Table 4).

Table 4. Groups in Who Randomized Controlled Trial Evidence Demonstrated a Reduction in ASCVD With Statin Therapy

Statin Benefit Groups	Recommended Statin Therapy
Patients with clinical ASCVD (acute coronary syndromes, or a history of MI, stable or unstable angina, coronary or other arterial revascularization, stroke, TIA, or peripheral arterial disease presumed to be of atherosclerotic origin) without NYHA class II to IV heart failure or receiving hemodialysis	Moderate- to high-intensity statin therapy
Patients with primary elevations of LDL-C ≥ 190 mg/dL	High-intensity statin therapy, or moderate-intensity statin therapy if not a candidate for high-intensity statin therapy
Patients aged 40 to 75 years with diabetes, and LDL-C 70 to 189 mg/dL without clinical ASCVD	10-year ASCVD $\geq 7.5\%$: high-intensity statin therapy 10-year ASCVD $< 7.5\%$: moderate-intensity statin therapy
Patients without clinical ASCVD or diabetes who are aged 40 to 75 years with LDL-C 70 to 189 mg/dL and have an estimated 10-year ASCVD risk of $\geq 7.5\%$ (as identified by the pooled cohort ASCVD risk estimator in Tables 2 and 3)	Moderate- to high-intensity statin therapy but only after a clinician–patient discussion that reviews optimal lifestyle, need to address other ASCVD risk factors, potential for benefit with statin therapy, and potential for adverse effects and drug–drug interactions based on the patient’s characteristics and clinician judgment and informed personal preference. For those for whom a treatment decision is uncertain, LDL-C ≥ 160 mg/dL, family history of premature ASCVD, lifetime risk [†] , or CAC score [‡] , hs-CRP ≥ 2.0 mg/L, or ABI < 0.9 may be used to inform the decision on statin therapy

ABI indicates ankle brachial index; ASCVD, atherosclerotic cardiovascular disease; CAC, coronary artery calcium; hs-CRP, high-sensitivity C-reactive protein; LDL-C, low-density lipoprotein cholesterol; MI, myocardial infarction; NYHA, New York Heart Association; TIA, transient ischemic attack.

*Lifetime risk, when elevated, warrants early aggressive lifestyle and risk factor modification even when the 10-year risk does not.

[†] ≥ 300 Agatston units or >75 th percentile for age, sex, and race.

The new pooled cohort risk estimator weighs age quite heavily; therefore, many more adults may be considered eligible for statin therapy despite having well-controlled risk factors. Consequently, a central component of the new guideline recommendations is to have an informed discussion with the patient about the relative benefits and risks of drug therapy before starting a statin.

Intensity of statin therapy is chosen to match the risk of those who are most likely to benefit (Table 4). A high-intensity statin lowers LDL-C by $\geq 50\%$, and a moderate-intensity statin lowers LDL-C by 30% to $< 50\%$. Recommendations for statin intensity based on indication are summarized in Table 4. In addition, appropriate periodic monitoring (every 3 to 12 months) of lipid values should be obtained to monitor adherence, adequacy of response, and safety measures, as stated in the 2013 cholesterol guidelines.¹⁴

Patients with increased concentrations of LDL-C particles, decreased HDL-C particles, and increased triglycerides carry an increased risk of metabolic syndrome, insulin resistance, and type 2 DM. This form of atherogenic dyslipidemia can be assessed by non-HDL-C or by measuring an apolipoprotein B level.⁸⁸ In addition, lipoprotein(a), which is a modified form of LDL that confers atherogenic risk independent of LDL-C, can be elevated in the absence of other lipid abnormalities.

Both atherogenic dyslipidemia and lipoprotein(a) abnormalities contribute to residual ASCVD risk in patients with well-controlled LDL-C. Consistent with international guidelines,^{89–92} checking for elevated apolipoprotein B and lipoprotein(a) levels as an adjunct to the lipid panel can further risk-stratify patients and potentially justify intensifying statin therapy. Owing to synergistic effects when LDL-C levels are elevated,⁹³ especially in those with personal or family histories of premature ASCVD, patients may benefit from more intensive statin therapy and lifestyle interventions.⁹⁴ At the present time, use of interventions to lower lipoprotein(a) directly has not yet been proven to reduce ASCVD risk.⁹⁴

Statins

The hydroxymethylglutaryl coenzyme A reductase inhibitors are the most widely studied lipid-lowering agents. Strong evidence supports their use as first-line agents in high-risk groups²⁵ and in primary prevention when lifestyle interventions alone are inadequate to reduce ASCVD risk sufficiently. A wealth of accumulated data support the consideration of statins in primary prevention in those with elevated cholesterol levels along with another CHD risk factor.^{95–97} Data from the JUPITER trial also demonstrated the benefit from statin treatment in patients with “normal” cholesterol levels but elevated high sensitivity-C reactive protein levels.⁹⁶

Statin use in secondary prevention is also essential for reducing CHD risk. The Heart Protection Study (HPS) demonstrated 13% relative risk reduction in total mortality over a mean of 5.5 years when patients with increased CVD risk were treated with simvastatin 40 mg/d, regardless of baseline LDL-C levels.⁹⁸ Multiple secondary prevention trials have demonstrated benefit from the use of statins after acute coronary syndrome (MIRACL [Effects Of Atorvastatin On Early Recurrent Ischemic Events In Acute Coronary Syndromes. The Miracl Study: A Randomized Controlled Trial], Pravastatin or Atorvastatin Evaluation and Infection Therapy-Thrombolysis in Myocardial Infarction 22 [PROVE IT-TIMI 22], Aggrastat To Zocor [A to Z])^{99–101} and in patients with stable CHD (4S [Scandinavian Simvastatin Survival Study], Treating to New Targets [TNT], The Incremental Decrease in End Points through Aggressive Lipid Lowering [IDEAL]).^{102–104} A robust dose-dependent relationship between the degree to which LDL-C is lowered and the relative reduction of CHD events, independent of baseline patient risk, has been noted across these trials.¹⁰⁵

The incidence of side effects observed after run-in phases of clinical trials is low and includes myalgias (1.1% to 5.0%), creatine kinase elevation (0.9%), and transaminitis (1.4%). Each of these adverse effects can be exacerbated with concomitant use of fibrates, immunosuppressive medications, and antifungals or other antibiotics.¹⁰⁶ Although some reports have raised concerns regarding adverse long-term effects on cancer incidence, cognitive function, and DM,¹⁰⁷ careful evaluation of existing scientific evidence does not support an impact of statins on the incidence of cancer or cognitive decline.^{108–111} One recent study found that increased risk of new-onset DM was limited to patients who were already prediabetic and that the benefits of statin therapy in these patients still greatly outweighed the risk associated with new-onset DM.¹¹²

When statin medications are not tolerated due to mild side effects, a drug holiday for 2 to 4 weeks should be considered, followed by reinitiation with the same statin, a reduced dose of the same statin with eventual uptitration, or even less frequent dosing (every other day or twice to thrice weekly). A switch to a statin associated with fewer musculoskeletal side effects such as fluvastatin¹¹³ or a more hydrophilic statin (eg, pravastatin, rosuvastatin) may help alleviate side effects.¹¹⁴ Given the strong evidence for statins, trying at least 3 different statin medications or referring the patient to a lipid clinic with specific expertise is recommended before labeling a patient as intolerant of statin therapy.

Other Lipid-Lowering Agents

For the minority of patients that are statin intolerant, it is reasonable to turn to other agents, such as bile acid sequestrants, ezetimibe, fibrates, or niacin; however, the

recent cholesterol guidelines indicate that for routine prevention, nonstatin therapies have not yet been proven to provide acceptable ASCVD risk reduction compared with their potential for adverse effects.

Bile acid sequestrants (eg, cholestyramine, colesevelam) lower LDL-C by 15% to 20% and have been shown to reduce CV risk when used as monotherapy.^{85,86} Ezetimibe is a cholesterol absorption inhibitor that, when combined with simvastatin, produced beneficial outcomes in patients with chronic kidney disease (except for those on hemodialysis) compared with placebo.¹¹⁵ A large outcomes trial, IMPROVED Reduction of Outcomes: Vytorin Efficacy International Trial (IMPROVE-IT),¹¹⁶ was designed to determine whether ezetimibe adds incremental benefit when added to a statin in those with low levels of LDL-C. Although these results should be reported soon, ezetimibe is not currently routinely recommended for lowering of lipids, especially when LDL-C is otherwise well controlled.

When used alone, fibrates (eg, gemfibrozil, fenofibrate) modestly reduce LDL-C, increase HDL-C, and have been shown to reduce rates of nonfatal MI.^{117–119} For patients with atherogenic dyslipidemia persisting after statin monotherapy, addition of fenofibrate can further lower non-HDL-C. The incremental benefit of this strategy is currently unresolved when compared with an intensified lifestyle and optimal adherence to statin therapy.

The ACCORD trial did not find incremental benefit from addition of fenofibrate to a statin with attainment of a LDL-C of ≈ 80 mg/dL.¹²⁰ Although there was a trend toward benefit in the subgroup that had triglycerides >200 mg/dL and low HDL-C, such benefit was not noted in women. As such, this benefit must be considered hypothesis generating and would require evaluation in another trial enrolling only those with this form of mixed dyslipidemia.

Niacin represents another lipid-modifying agent that effectively decreases LDL-C and triglycerides while increasing HDL-C. When used as monotherapy, it too has been shown to reduce CV events.¹²¹ In 2 trials evaluating its benefit as an addition to statin therapy, it did not result in incremental benefit despite incremental lowering of LDL-C and non-HDL-C levels.^{122,123} These disappointing results suggest a more limited role of these agents for those already on higher intensity statin therapy.^{120,122,124}

Cigarette and Tobacco Cessation

Tobacco use in all of its forms is proatherogenic and prothrombotic and is the leading cause of preventable death in the Western world.¹²⁵ Active smoking and second-hand smoke have been identified as major risk factors for subclinical atherosclerosis.^{126,127} Because smoking cessation

is associated with a 36% relative reduction in mortality for CHD patients,¹²⁸ it is imperative that every attempt be made to help patients end tobacco use.

Many smokers have a desire to quit. The Centers for Disease Control and Prevention recently reported that 69% of current smokers want to stop smoking completely and 52% of smokers had attempted to quit in the past year.¹²⁹ To help providers broach the subject of smoking cessation during office visits, the Agency for Healthcare Research and Quality recommends the “5 A’s”: (1) Ask all patients about tobacco, (2) advise patients to quit, (3) assess willingness to quit, (4) assist with counseling or pharmacotherapy, and (5) arrange for follow-up within the first week after a quit date.

Self-motivation represents an important first step in successful tobacco cessation. Among patients who are motivated to quit, helpful interventions include behavioral counseling with physician extenders, telephone resources (eg, 1-800-QUIT-NOW), identification and alteration of triggers leading to tobacco use, and enlisting of help from family and friends.

For many patients, pharmacotherapy may be needed. Common options include nicotine replacement therapy in transdermal, inhaled, or chewable (gum) forms and bupropion [Zyban], or varenicline [Chantix]. Varenicline appears to be the most effective agent, with 2- to 3-fold higher rates of smoking cessation¹³⁰ and a greater treatment effect than that of bupropion.¹³¹ In addition, a recent meta-analysis demonstrated the safety of varenicline in those with previous CVD.¹³² Nicotine replacement therapy and varenicline work best when administered together.¹³³ For those that cannot tolerate or do not wish to try varenicline, bupropion alone is more effective than placebo.¹³⁴ Finally, use of nicotine replacement therapy increases the rate of success by 50% to 70%.¹³⁵

Diet and Weight Management

The 2013 AHA/ACC Guideline on Lifestyle Management to Reduce Cardiovascular Risk¹³⁶ reaffirms diet as an important intervention for lowering cholesterol and BP. The guideline recommended that patients eat plenty of vegetables, fruits, and whole grains; incorporate low-fat dairy products, poultry, fish, legumes, nontropical vegetable oils, and nuts into their diet; and limit intake of sweets, sugar-sweetened beverages, and red meats. Patients that specifically need to lower their cholesterol levels should reduce saturated and trans fat consumption, with ideally only 5% to 6% of daily calorie intake coming from saturated fat. Those with high BP should consume no more than 2400 mg of sodium a day, with an even greater effect in those consuming <1500 mg a day.

Although many strategies exist to help patients maintain a heart healthy diet, the DASH diet, the US Department of

Agriculture's "Choose My Plate," and the AHA diet are recommended and can be adapted for appropriate calorie requirements, personal and cultural food preferences, and nutritional treatment of other medical conditions. The Mediterranean-style diet (enriched with olive oil, legumes, fish, chicken, nuts, wine, fruits and vegetables and low in artificial sugars, commercial sweets, pastries, butter, margarine, and red meat) also yields heart-healthy benefits.¹³⁷ In fact, the Mediterranean diet was recently shown in the *Prevención con Dieta Mediterránea (PREDIMED)* randomized trial to reduce the incidence of CV events (especially stroke) in high-risk patients¹³⁸ and to improve glycemic control in those with type 2 diabetes.¹³⁹

Obesity (body mass index [BMI] ≥ 30 kg/m²) is a major risk factor for CHD and carries even greater risk when fat is concentrated within the abdominal viscera. The 2013 AHA/ACC/The Obesity Society Guideline for the Management of Overweight and Obesity in Adults¹⁴⁰ recommends that height, weight, BMI, and waist circumference be measured annually or more frequently in those that are overweight or obese. Current cut points for overweight and obesity are BMI >25.0 to 29.9 kg/m² and BMI ≥ 30 kg/m², respectively. Although increased waist circumference is defined as >35 in or 88 cm for women and >40 in or 102 cm for men, even lower cutoffs should be used in some ethnic populations (eg, Hispanic, Asian, and African descent).¹⁴¹

Overweight or obese adults with CVD risk factors (elevated BP, hyperlipidemia, and/or hyperglycemia) should be counseled to lose 3% to 5% of body weight through reduced calorie intake. Consumption of 1200 to 1500 kcal/d for women and 1500 to 1800 kcal/d for men, with restriction of high-carbohydrate foods, low-fiber foods, or high-fat foods, and a 500 or 750 kcal/d energy deficit, respectively, are recommended. The specifics of the calorie-restricted diet should be based on the patient's preferences and health status, with strong consideration of referral to a nutrition professional.

Participation in a comprehensive lifestyle program (electronically delivered or commercially based program) is also recommended for at least 6 months to assist overweight and obese patients in adhering to a lower calorie diet and increasing physical activity as part of attaining an energy deficit. A weight loss maintenance program is an important component of a patient's overall weight loss plan. A long-term (≥ 1 -year) comprehensive weight loss maintenance program that includes regular contact with trained personnel to encourage high levels of physical activity (200 to 300 minutes per week), monitoring of body weight (at least weekly), and adherence to a reduced-calorie diet (needed to maintain lower body weight) should also be considered.

For certain patients, bariatric surgery may be appropriate if they have not responded to behavioral treatment with or

without pharmacotherapy and either the BMI is ≥ 40 kg/m² or the BMI is ≥ 35 kg/m² with obesity-related comorbid conditions.¹⁴² Although drug-therapy options are limited, the US Food and Drug Administration recently approved 2 new medications, lorcaserin (Belviq) and phentermine/topiramate (Osymia), to help with weight reduction when used in conjunction with sustained diet and exercise plans.¹⁴³ Given known safety concerns regarding previously approved weight loss medications, these new options may require close monitoring for side effects.

Diabetes Prevention and Treatment

DM and prediabetes are both important risk factors for CHD.¹⁴⁴ In 2010, the American Diabetes Association (ADA) added hemoglobin A1c cutoffs to its definitions of DM and prediabetes, which has made it simpler to diagnose both conditions with increased sensitivity. DM is diagnosed when hemoglobin A1c is $\geq 6.5\%$, and prediabetes is diagnosed when hemoglobin A1c is 5.7% to 6.4%. The ADA recommends routinely screening all overweight or obese adults beginning at age 45 years, with prediabetics monitored yearly for progression to DM.¹⁴⁵

Lifestyle interventions among prediabetics can significantly lower the rate of DM.¹⁴⁶ These include 5% to 10% weight loss, 150 minutes per week of moderate physical activity, and increased consumption of fiber and whole grain carbohydrates. Metformin can be considered for obese, prediabetic individuals younger than 60 years that are at high risk of progressing to DM (eg, family history of DM or presence of metabolic syndrome).¹⁴⁵

For those with DM, the ADA recommends treatment to achieve a target hemoglobin A1c level $<7\%$. Numerous therapies are available including oral hypoglycemic agents and insulin, but metformin is recommended as first-line treatment for most patients with type 2 DM. More intensive goals should be avoided because they have not been associated with improvement in CV outcomes and have been associated with increased mortality.¹⁴⁷⁻¹⁴⁹

For selected diabetic patients that are adept at using technology, use of mobile phone based "apps" that allow blood glucose tracking can also result in improved hemoglobin A1c levels and higher patient satisfaction.¹⁵⁰⁻¹⁵² Physicians can now write prescriptions for such interventions, many of which are available without cost to the patient.

Exercise

Lack of regular, brisk activity is another important risk factor for CHD.¹⁵³ Physical activity has many beneficial consequences, including weight loss, lipid control, BP improvement,

and insulin sensitization. In the United States, the combination of increasingly sedentary lifestyles along with inactive jobs continues to remain a barrier to exercise for many people.

Limited randomized data is available on the independent effects of exercise on the primary prevention of CVD events. Multiple observational studies have shown that increased physical activity and regular exercise are associated with lower rates of CVD.^{154,155} Exercise has also been shown to benefit those with established CHD by reducing subsequent CV events and all-cause mortality.¹⁵⁶ In patients who are already at moderate to high risk, such as diabetics, exercise and weight loss may not achieve significant event rate reduction but are considered beneficial because of improved overall metabolic profiles.^{157,158}

Accordingly, the 2013 AHA/ACC Guideline on Lifestyle Management to Reduce Cardiovascular Risk¹³⁶ recommends regular aerobic physical activity, 3 to 4 sessions per week, lasting an average of 40 minutes per session, and involving moderate- to vigorous-intensity physical activity to reduce both LDL-C and non-HDL-C levels and improve BP. Although it can be difficult to encourage patients to adopt new exercise regimens, even simple tools like pedometers or personal fitness devices may lead to reliable increases in physical activity. We motivate patients to use pedometers in conjunction with a physical activity goal, typically of 10 000 steps per day.^{159,160} A systematic review that evaluated the use of pedometers demonstrated an average increase in daily steps by 2491 (or ≈ 1 mile), an increase in average physical activity by 27%, and a modest decrease in BMI.¹⁵⁹ A meta-analysis, however, questioned the quality of those data, and additional studies are needed to validate the results.¹⁶¹

Heart Failure

With nearly 6 million Americans living with HF, another 600 000 developing the disease each year, and 1 million related hospitalizations for HF annually, the need exists for a preventive focus¹⁶² that involves both primary and secondary prevention interventions.¹⁶³ Patients at risk for or with HF can be categorized into 1 of 4 stages: Stage A represents patients at risk for HF without structural heart disease, stage B consists of asymptomatic individuals with structural heart disease, stage C includes those with symptoms, and stage D patients are considered refractory.¹¹ The primary preventive goal in HF is limiting patient progression from stage A or B. Although this can largely be accomplished through lifestyle modification, more widespread detection and treatment of hypertension, dyslipidemia, diabetes, and obesity can greatly modify risk.

An important additional risk factor for nonischemic cardiomyopathy is exposure to drugs and toxins, such as alcohol, methamphetamine, and anthracycline-based chemotherapeutic agents. Those who have had exposure to cardiotoxins or have a family history of cardiomyopathy should be aggressively targeted for primary prevention.

Among HF patients with either controlled (stage C) or refractory (stage D) symptoms, “secondary prevention” strategies should be used to prevent hospitalization and/or HF progression. Guideline-directed medical therapy should be implemented, as cited in the ACC/AHA 2013 HF guidelines to reduce the risk of hospitalization and/or death. In particular, all patients with HF with reduced ejection fraction (EF) should be treated with an angiotensin-converting enzyme inhibitor or angiotensin receptor blocker, as well as a beta blocker shown to provide benefit in this population (bisoprolol, carvedilol, or sustained-release metoprolol succinate).¹¹ For those with a reduced EF and New York Heart Association (NYHA) class II or greater symptoms, an aldosterone antagonist should be used, with careful monitoring of renal function and potassium level. Black patients and those with persistent symptoms benefit from the addition of combination therapy with hydralazine and isosorbide dinitrate. Finally, loop diuretics should be used to prevent and reduce the accumulation of excess fluid.

Patients with HF with reduced EF are also at increased risk of sudden cardiac death due to ventricular arrhythmias. Implantable cardioverter defibrillator placement should be considered for primary prevention of sudden cardiac death in patients with left ventricular EF $\leq 35\%$ if they have been on optimal medical therapy for at least 3 months and have a life expectancy of >1 year.¹⁶⁴ For patients with a recent MI, reassessment of EF should occur no sooner than 40 days after the event to allow for the maximal effects of revascularization. For patients with NYHA class II or greater symptoms, left ventricular EF $\leq 35\%$, a QRS duration ≥ 150 ms, and a left bundle branch block, cardiac resynchronization therapy is strongly advised.

For patients with HF with preserved EF, a condition that now accounts for $\approx 50\%$ of HF cases, no therapy has been proven beneficial in halting the natural history of this disease; therefore, prevention is key. Because the morbidity of this disease is driven largely by the confluence of several important comorbidities, including hypertension, DM, chronic renal disease, coronary artery disease, and AF, prevention of these conditions is paramount.

To prevent fluid accumulation, HF patients should avoid drinking large amounts of liquids and consuming excessive amounts of sodium. Limits on liquid and sodium intake remain uncertain, but goals of ≤ 2 L/d and ≤ 2400 mg/d, respectively, are reasonable. Enrollment in a comprehensive disease management program should also be strongly considered

for those at higher risk for rehospitalization or premature death.

Exercise is the key to management of HF patients with either reduced or preserved EF because exercise improves endurance and decreases symptoms.¹⁶⁵ Cardiac rehabilitation (both exercise training and secondary prevention programs) has also been demonstrated to improve outcomes for patients with HF with reduced EF. Accordingly, chronic stable systolic HF with left ventricular EF $\leq 35\%$ and NYHA class II to IV symptoms despite optimal medical therapy is now a Centers for Medicare and Medicaid Services–approved indication for referral to cardiac rehabilitation.¹⁶⁶ These latest advances in treatment should be considered a means of secondary prevention to halt worsening HF.¹¹

Healthy lifestyle choices and the treatment and control of concomitant CVD risk factors (eg, BP, lipids, blood sugar) and cardiac arrhythmias, especially AF, remain essential components of both primary and secondary prevention for HF patients. In an attempt to decrease the tremendous HF disease burden, clinicians should use an ABCDEF prevention strategy for HF patients similar to that used for ASCVD (Table 1). Clinicians can organize their office notes in this ABCDEF manner and use this format for easy communication of recommendations to other health care providers and their patients.

Summary

To facilitate the guideline-based implementation of treatment recommendations in the ambulatory setting and to encourage participation in the multiple preventive health efforts that exist, we have organized several recent guideline updates into a simple ABCDEF approach. We would remind clinicians that evidence-based medicine is meant to inform recommendations but that synthesis of patient-specific data and use of appropriate clinical judgment in each individual situation is ultimately preferred.¹⁶⁷

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