REVIEW

CME CREDIT

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Hypertension treatment in African Americans: Physiology is less important than sociology

ABSTRACT

African Americans have higher rates of hypertension and its complications than do people of other ethnic groups, and they may respond differently to various antihypertensive drugs. Social, cultural, and economic barriers to care are probably more important than any true physiologic differences between races.

KEY POINTS

Until recently, relatively few African Americans have been enrolled in long-term studies of cardiovascular end points in hypertension, limiting the development of true evidence-based guidelines.

African Americans seem to have a slightly greater blood pressure response to diuretics and calcium channel blockers than do other ethnic groups, and a lesser response to angiotensin-converting enzyme inhibitors and beta-blockers. Nevertheless, the differences do not seem to translate into different clinical outcomes.

The search for cardiovascular risk factors and target-organ damage is particularly important for hypertensive African Americans, who have significantly higher rates of stroke, hypertension-related heart disease, congestive heart failure, and hypertensive nephropathy.

Optimal blood pressure control for African Americans requires an understanding of social and cultural factors that may pose barriers to care.

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HIGH BLOOD PRESSURE is different in African Americans than in other ethnic groups in some ways, but not so different in others.

African Americans still suffer from higher rates of hypertension and its complications compared with the general population. Although physiologic differences may partly account for these disparities, far more important are social, cultural, and economic issues, to which physicians need to be sensitive if they hope to deal effectively with the common and serious problem of hypertension in African Americans.

Here, we summarize key aspects of the management of hypertension and its complications in African Americans. We also identify strategies to overcome barriers to controlling high blood pressure and preventing its consequences.

DISPROPORTIONATE BURDEN IN AFRICAN AMERICANS

Compared with non-Hispanic white people, African Americans have higher rates of hypertension, more severe hypertension, lower rates of blood pressure control (**TABLE 1**), and, therefore, a disproportionate burden of cardiovascular disease[1] and premature death.[2,3]

For example, the heart disease mortality rate is 50% higher, the stroke mortality rate is 80% higher, and the incidence of hypertension-related end-stage renal disease is 320% higher in African Americans than in whites.[4]

TABLE 1

Blood pressure prevalence and control in the US adult population, 1999–2000

ETHNIC GROUP	AGE-ADJUSTED HYPERTENSION PREVALENCE (%)	BLOOD PRESSURE CONTROL AMONG PERSONS RECEIVING TREATMENT FOR HYPERTENSION (%)	BLOOD PRESSURE CONTROL AMONG ALL PERSONS WITH HYPERTENSION (%)
Non-Hispanic white	28.9	55.6	33.4
Non-Hispanic black	33.5	44.6	28.1

DATA FROM HAJJAR I, KOTCHEN TA. TRENDS IN PREVALENCE, AWARENESS, TREATMENT, AND CONTROL OF HYPERTENSION IN THE UNITED STATES, 1988–2000. JAMA 2003; 290:199–206.

Similarly, the age-adjusted incidence of first-time strokes is nearly twice as high for African Americans as for whites (323 vs 167 per 100,000 for men; 260 vs 138 per 100,000 for women). Compared with non-Hispanic whites, the relative risk of stroke death is four times higher for non-Hispanic blacks aged 35 to 54 years, three times higher for those aged 55 to 64, and nearly two times higher for those aged 65 to 74.[5]

Overall, rates of hypertension and age-adjusted cardiovascular disease morbidity and mortality have declined during the past 3 decades, but not to the same extent in African Americans as in whites.[6,7] For example, from 1990 to 1998, the death rate for white non-Hispanics with cardiovascular disease declined 15% vs only 11% in black non-Hispanics. In 2000, death rates from cardiovascular disease were 28% higher for black men than for white men (509.6 vs 397.6 per 100,000) and 39% higher for black women than for white women (397.1 vs 285.8 per 100,000).[6]

A low-dose diuretic should be an initial hypertension therapy in all races

SAME PRINCIPLES APPLY

Recent studies of antihypertensive therapy (TABLE 2) have included more African Americans than in the past.[8–14] Although many of these trials showed some ethnic differences in the magnitude of blood pressure reduction with different classes of agents, class-specific ethnic differences in key clinical outcomes, including overall cardiovascular mortality, were minimal.

In general, therefore, the same principles apply when considering antihypertensive therapy for African Americans as for other racial groups.[2]

- A low-dose diuretic should be used as initial therapy, either alone or in combination with another drug (FIGURE 1).
- Use of antihypertensive agents of other classes should be guided by whether the patient has coexisting medical conditions that are compelling indications for these agents. The preference for agents that block the renin-angiotensin system as supplemental antihypertensive agents in patients with diabetes and chronic kidney disease cannot be overemphasized. (However, the use of these agents in African Americans is associated with a slightly higher rate of angioedema.)
- The blood pressure goal is less than 140/90 mm Hg, or less than 130/80 mm Hg if the patient has diabetes or chronic kidney disease.

PREVENTING CARDIOVASCULAR DISEASE

Hypertension is a major risk factor for cardiovascular disease, and many people with hypertension also have one or more other cardiovascular risk factors (eg, obesity, diabetes, dyslipidemia), known collectively as the *metabolic syndrome*.[15,16] Compared with white people, African Americans have higher rates of hypertension, obesity, and diabetes but lower rates of dyslipidemia.

Risk starts at 120/80

The excess risk for cardiovascular disease extends to people with what was previously called "high-normal" blood pressure, ie,

TABLE 2

Major hypertension studies in African Americans

STUDY*	NO.	% AFRICAN AMERICAN	DESIGN AND RESULTS
ALLHAT[8]	33,357	36%	Double-blind comparison of chlorthalidone, amlodipine, lisinopril, and doxazosin (doxazosin arm terminated early due to high rate of congestive heart failure) At 6 years, no difference among treatment groups in the primary outcome of combined cardiovascular disease Chlorthalidone was superior to lisinopril in reducing stroke and congestive heart failure and superior to amlodipine in reducing congestive heart failure African Americans had a 40% lower rate of stroke with chlorthalidone therapy vs lisinopril
ALLHAT-LLT[9]	10,355	38%	Randomized comparison of pravastatin vs usual care in subset of ALLHAT cohort with elevated low-density lipoprotein cholesterol Pravastatin reduced total cholesterol levels by 17% vs 8% with usual care All-cause mortality was similar for the two treatment groups No racial or ethnic differences in outcomes
LIFE[10,11]	9,193	6%	Double-blind comparison of losartan vs atenolol; hydrochlorothiazide as second-line agent At 4.8 years, 13% reduction in composite outcome with losartan vs atenolol ($P = .021$) and 25% reduction in new-onset diabetes ($P = .001$) Among 566 black participants, 11% of atenolol group vs 17% of losartan group reached primary end points (death, myocardial infarction, or stroke); they were also less likely to achieve goal blood pressure
AAASPS[12]	1,809	100%	Double-blind comparison of aspirin vs ticlopidine in African Americans with recent noncardioembolic ischemic stroke At 2 years, no difference in primary outcome (recurrent stroke or myocardial infarction) with ticlopidine (14.7%) vs aspirin (12.3%) The aspirin group had fewer side effects and a trend for reduction in fatal or nonfatal stroke
AASK[13,14]	1,094	100%	Double-blind comparison of amlodipine, ramipril, and metoprolol in nondiabetic African Americans with hypertensive renal disease; > 90% also received diuretics At 4 years, no difference in primary outcome (rate of decline in glomerular filtration rate) by blood pressure level or therapy Ramipril reduced the composite end point (decline in glomerular filtration rate of 50% or to 25 mL/minute/1.75 m^2, end-stage renal disease, or death) by 38% vs amlodipine and 22% vs metoprolol Amlodipine arm was terminated early because of increased clinical composite end point

*ALLHAT = Antihypertensive and Lipid-lowering Treatment to Prevent Heart Attack Trial; LIFE = Losartan Intervention for End Point Reduction; AAASPS = African American Antiplatelet Stroke Prevention Study; AASK = African American Study of Kidney Disease and Hypertension

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130–139 mm Hg systolic or 85–89 mm Hg diastolic, or both[17] In addition, in people with high-normal blood pressure, the adjusted risk of microalbuminuria (an independent marker of premature cardiovascular mortality)[18] was found to be 34% greater for African Americans than for whites.[19]

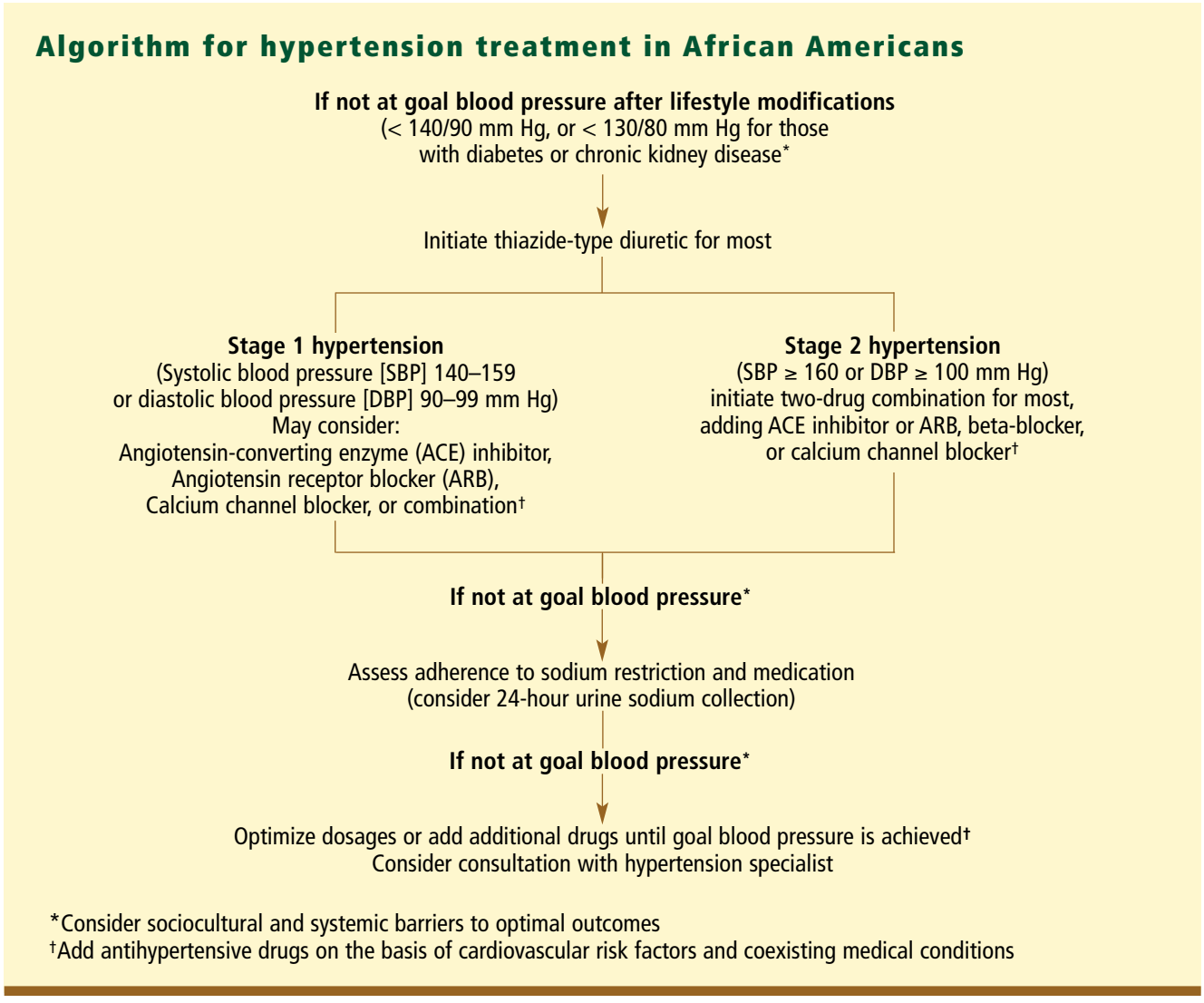

FIGURE 1

For these reasons, hypertension categories have been revised, and blood pressure of 120–139 systolic or 80–89 diastolic or both is now called *prehypertension*, a change designed to encourage physicians to consider early antihypertensive treatment in the presence of other cardiovascular risk factors (eg, microalbuminuria, dyslipidemia).[3]

Left ventricular hypertrophy is more common in African Americans

East et al[20] found a 50% greater prevalence of left ventricular hypertrophy among women and blacks in a sample of more than 2,000 patients with coronary artery disease. Left ventricular hypertrophy remained an independent predictor of increased mortality after adjusting for other clinical risk factors, and the high prevalence of left ventricular hypertrophy among blacks and women partially accounted for ethnic and sex differences in mortality rates.

The Losartan Intervention for End Point Reduction (LIFE) trial[10] randomly assigned more than 9,000 participants (6% black) with hypertension and left ventricular hypertrophy to receive either the beta-blocker atenolol or the angiotensin II receptor blocker (ARB) losartan with a diuretic as needed.

Losartan was more effective in reducing cardiovascular events for the entire cohort, but a subanalysis of blacks revealed no benefit—and actually more cardiovascular events with losartan compared with atenolol, even though blood pressure reduction and left ven-

tricular mass regression were similar in African American and white subjects with both treatments (TABLE 2).[11]

Part of the reason for the disparity in outcomes in the LIFE trial may be that fewer African American subjects achieved the blood pressure goal. However, these preliminary findings need further investigation.

Cardiovascular disease prevention in African Americans: Bottom line

- The clinical and laboratory search for cardiovascular risk factors and target-organ damage is particularly important for hypertensive African Americans, who have significantly higher rates of stroke, hypertension-related heart disease, congestive heart failure, and hypertensive nephropathy.[2–4]
- Looking for and identifying specific end-organ damage and coexisting cardiovascular risk factors can help physicians to prioritize their nonpharmacologic recommendations, select compelling evidenced-based medical treatment, and establish appropriate goals.
- Aspirin, beta-blockers and other agents, and revascularization or surgery should be used as often as they are for patients of other ethnicities.
- The threshold for assessing left ventricular hypertroply, which is more prevalent and is associated with increased mortality risk in African Americans, should be low. If left ventricular hypertrophy is found, then an angiotensin-converting enzyme (ACE) inhibitor should be started.

CONGESTIVE HEART FAILURE DUE TO HYPERTENSION

Compared with congestive heart failure in white patients, congestive heart failure in African Americans is more often due to hypertension, carries a worse prognosis, and often responds less well to evidence-based medical therapy.[21,22]

Studies of heart failure in African Americans

SOLVD (Studies of Left Ventricular Dysfunction). Exner et al,[22] in a pooled analysis of blacks and matched whites assigned to enalapril therapy in the SOLVD prevention and treatment trials, noted similar risk reductions in mortality but a lesser reduction in rates of hospitalization for congestive heart failure for African Americans.

However, several clinical and statistically significant variables for the matched white subjects were not included in the multivariate model. Specifically, African Americans had higher blood pressure, a 50% greater prevalence of hypertrophic heart disease, and a 50% lower prevalence of aspirin use, suggesting that the matched-cohort analysis did not compare truly similar populations.

The US Carvedilol Heart Failure Study Group[23] prospectively randomly assigned more than 1,000 subjects (20% African American) to treatment with the beta-blocker carvedilol or placebo. The researchers found a similar reduction in mortality and hospitalizations among African Americans and whites.

Medicare study. In a retrospective study of nearly 30,000 fee-for-service Medicare beneficiaries hospitalized because of congestive heart failure in 1998 and 1999,[24] African American patients received comparable quality of care, had slightly higher rates of readmission, and had lower mortality rates 1 year after discharge compared with white patients.

Congestive heart failure in African Americans: Bottom line

These data strongly suggest that when quality care is provided, racial disparities in congestive heart failure outcomes dissipate. Therefore, the data support similar care for patients with congestive heart failure regardless of ethnicity.

STROKE PREVENTION

Hypertension control remains a key strategy for reducing stroke. Most hypertension trials show an even greater reduction in strokes than in coronary events.[3]

Stroke mortality rates have been falling rapidly for both African Americans and whites, but African Americans still have a higher rate than do whites, and the difference is largely unchanged.[25]

Studies of stroke prevention in African Americans

Unlike most cardiovascular disease outcomes, there appears to be greater variation in

In African Americans, the search for risk factors and target organ damage is particularly important

response to evidence-based preventive treatment for stroke between African Americans and whites.

LIFE. In the LIFE trial,[10] a subanalysis of African American subjects (of whom a lower percentage achieved their blood pressure goal) revealed no benefit in the ARB group; in fact, subjects in this group had more strokes than subjects in the atenolol group (TABLE 2).[16]

ALLHAT (The Antihypertensive and Lipid-lowering Treatment to Prevent Heart Attack Trial)[8] found that the incidence of stroke was comparable in the group receiving a diuretic vs the group receiving a calcium channel blocker. A subanalysis of the African American participants revealed a 40% relative risk reduction in stroke with diuretic therapy compared with ACE inhibitor therapy.

Therefore, diuretics and calcium channel blockers are preferred for blood pressure control and stroke prevention when there is no overriding indication for blocking the renin-angiotensin system.

AAASPS (The African American Antiplatelet Stroke Prevention Study), a randomized, double-blind, multicenter trial in more than 1,800 blacks with a recent noncardioembolic ischemic stroke followed for up to 2 years,[12] found no difference in outcomes in subjects taking ticlopidine vs aspirin to prevent recurrent stroke and myocardial infarction. In fact, there was a trend toward fewer fatal or nonfatal strokes in the aspirin group.

Thus, aspirin may be a better treatment for African Americans who can tolerate aspirin who have had a noncardioembolic ischemic stroke.

Diuretics and calcium blockers are preferred for preventing stroke in African Americans

Stroke prevention in African Americans: Bottom line

- Diuretics remain the preferred antihypertensive treatment for preventing strokes in hypertensive African Americans, although calcium channel blockers have also been associated with excellent stroke outcomes (TABLE 2).
- Blood pressure should be maintained at less than 140/90 mm Hg unless the patient cannot tolerate it.
- Aspirin should be used as indicated. Ticlopidine should not be used unless aspirin is contraindicated. There are no race-specific data for clopidogrel, a newer antiplatelet agent.

CHRONIC KIDNEY DISEASE

Hypertension is second only to diabetes as the most common cause of end-stage renal disease (ESRD).[26] Hypertension-related ESRD is up to six times more common in African Americans than in the general population.[27]

The African American Study of Kidney Disease and Hypertension was the largest prospective chronic kidney disease study to focus on African Americans (TABLE 2).[13] Rates of secondary clinical outcomes (ie, doubling of serum creatinine level, end-stage renal disease, or death) were lower in the group taking ACE inhibitors than in the groups taking beta-blockers or a dihydropyridine calcium channel blocker. This finding suggests that optimal clinical outcomes are achieved when ACE inhibitors are used as initial antihypertensive therapy with diuretics in African Americans patients with hypertensive nephrosclerosis.[13,14]

There was no difference in clinical outcomes by blood pressure goal. However, the group with the lower blood pressure goal had lower levels of proteinuria, which underscores the importance of getting the blood pressure below 140/90 mm Hg and the potential benefit of even tighter blood pressure control in patients with chronic kidney disease, as demonstrated in other studies.[28] Contrary to popular belief, with aggressive care, target blood pressure levels can be achieved in this high-risk population.[29]

ACE inhibitors and ARBs remain the mainstay of therapy for diabetic nephropathy, although African Americans accounted for fewer than 10% of subjects in most large randomized trials and about 15% in two recent trials.[30–34] The inclusion of nearly 15% black participants in these studies, although insufficient for generating independent analyses, suggests that the positive outcomes extend to blacks as well as nonblacks.[33,34] Thus, emerging data from prospective randomized trials support using either an ACE inhibitor or an ARB as initial therapy in combination with diuretics for treating hypertensive and diabetic nephropathy.[2,3]

TABLE 3

Understanding barriers to blood pressure control in African Americans

Overweight/obese (body mass index > 25/30 kg/m^2)
- Cultural concern that a thin body means poor health

High dietary intake of sodium and fat
- Cultural food preferences likely started or were exacerbated during slavery, when high salt and fat content were needed to preserve food or make suboptimal food more palatable
- Salt sensitivity is more common in African Americans than in whites; if blood pressure is not controlled, check 24-hour urinary sodium excretion to assess dietary adherence

Low dietary calcium intake
- High prevalence of lactose intolerance

Low adherence to treatment plan
- Some medication side effects (impotence with diuretics and beta blockers; angioedema with angiotensin-converting enzyme inhibitors) are more common in African Americans
- High rate of poverty, low rate of health insurance (check prescription plan and ability to pay for prescribed drugs and adjust therapy as needed)
- Assess biobehavioral barriers and family support structure
- Recognize distrust of the medical establishment

Missed office appointments
- Transportation difficulties: many patients do not have a car, and many cities have poor mass transportation systems
- Competing priorities, such as caring for a child, grandchild, or elder (often related to extended family home structure and geographic disconnection of child care and elder care facilities from health care centers)
- Limited ability to leave work to keep health care appointments in many jobs

Chronic kidney disease in African Americans: Bottom line

- Blood pressure should be treated to less than 130/80 mm Hg—especially in patients with proteinuria or diabetes.
- The initial therapy should be an ACE inhibitor or ARB in combination with a diuretic, with other antihypertensive agents added as needed to achieve the blood pressure goal.

OVERCOMING BARRIERS TO CARE

Many of the major risk factors for cardiovascular disease in African Americans are behavioral and therefore modifiable (TABLE 3). By identifying and communicating the risk attributable to behavior (eg, dietary indiscretion, physical inactivity, excessive alcohol intake, smoking), particularly within the context of an established cardiovascular disease burden, we should engage and encourage the patient to be proactive in reducing risk. Effective communication requires compassion and concern by the health care provider to engender a sense of trust.[35]

Dietary modifications are key (TABLE 4). Participants—including African Americans—in the Dietary Approaches to Stop Hypertension (DASH) study[36] achieved 5-to-10-mm Hg reductions in systolic blood pressure on the study diet vs the control diet. This was an extremely controlled environment using prepared food; nevertheless, a diet similar to that used in the DASH study should yield improved blood pressures.[37,38] (See related article on page 745.)

Biobehavioral and socioeconomic factors—often cited as plausible explanations for the lack of awareness and treatment of high blood pressure in African Americans—may not fully explain the failure to achieve recommended blood pressure goals, however.[39]

Many of the major risk factors for cardiovascular disease in African Americans are modifiable

TABLE 4

Therapeutic lifestyle changes recommended to control hypertension

Weight loss
- Lose weight gradually by making permanent changes in daily diet for entire family
- Initiate 800-1,500-kcal/day diet and set a reasonable weight loss goal (1–2 lb/week for first 3–6 months)

Healthy diet (low-fat, low-sodium, high potassium, adequate calcium)
- Eat more broiled and steamed foods
- Eat more grains, fresh fruits, and vegetables
- Eat fewer fats and use healthier fats, such as olive oil
- Eat fewer processed foods, fast foods, and fried foods (try to limit to 1 serving/day or use fresh or frozen foods)
- Read labels and pay attention to the sodium, potassium, and fat content of foods
- Do not add salt when cooking; instead use vinegar, lemon juice, or sodium substitutes such as potassium instead of standard table salt for seasoning
- Do not use smoked meats such as bacon and ham hocks to season foods
- If lactose-intolerant, try lactose-free milk or yogurt, or drink calcium-fortified juices or soy milk
- No more than two beers, one glass of wine, or one shot of hard liquor per day for men; less for women

Physical fitness
- Increase physical activity in daily routine (eg, if currently sedentary, get off the bus six blocks from home or walk in the evening with spouse, friend, or group.)
- Gradually increase time spent at an enjoyable physical activity to 30–45 minutes 3–5 days/week

Low-stress lifestyle
- Learn coping skills for specific stressors in work and home environment
- Practice meditation, relaxation, yoga, biofeedback

Additional considerations
- Maintain smoke-free environment

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African Americans are particularly vulnerable to the ecology of the health care system (eg, clinical care methods, patient preferences, environment influences, ethnic discrimination) that influence access, quality, and outcomes in health care delivery.[40,41]

In large clinical trials, the dedication and determination of the research team helps to ensure that sociocultural and economic barriers to recruitment and retention are minimized. We believe that advocacy for a similar level of dedication and determination among health care providers and allocation of resources in the health care industry for overcoming sociocultural and economic barriers to care can only improve outcomes for ethnic minorities.

Hypertension treatment should be driven by the presence of coexisting cardiovascular risk factors and an understanding of sociocultural influences that affect access to care and adherence to evidence-based treatment (TABLE 4). Such approaches will ultimately reduce the disproportionate impact of hypertension and cardiovascular disease in African Americans.

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