Coronary heart disease (CHD) is the second leading cause of death in the United States. Despite previous downward trends, which have not persisted, CHD mortality remains higher in African Americans than in Whites. Among African American and White adolescents and adults are trends of increased physical inactivity, smoking, and obesity. Approximately 47 million Americans have metabolic syndrome, a constellation of obesity, hypertension, dyslipidemia, and insulin resistance leading to diabetes. Despite a lower prevalence of metabolic syndrome, African Americans are more insulin resistant than Whites at similar degrees of adiposity, have higher blood pressures, and among women, have more obesity. Since African Americans tend to be diagnosed later and have more risk factors, which confers greater than additive risks, we propose the term “African American multiple-risk patient (AAMRP).” The AAMRP poses clinical and public health challenges for healthcare providers. We provide clinical and public health strategies for early detection and aggressive management of AAMRP. (Ethn Dis. 2006;16:633–639)

Key Words: African Americans, Cardiovascular Disease, High-Risk

INTRODUCTION

Cardiovascular disease (CVD) is the second leading cause of death in the United States and in most developed countries.1 Downward trends in coronary heart disease (CHD) mortality are less pronounced in African Americans than in Whites despite a similar or lower prevalence of obstructive coronary disease and earlier clinical onset.2 In African American and White adolescents as well as adults, we find trends of increased obesity and physical inactivity. In addition, adolescents are now smoking more than their parents at comparable ages.3–6

The metabolic syndrome, a constellation of risk factors that includes abdominal obesity, insulin resistance with or without glucose intolerance, elevated blood pressure, and atherogenic dyslipidemia (elevated triglyceride and low high-density lipoprotein cholesterol [HDL-C]) is a major clinical and public health challenge. The clinical challenge derives from the fact that patients with multiple risk factors have greater than additive risk. The public health challenge derives from the fact that ≈47 million Americans, nearly one fourth of the United States population, have metabolic syndrome as defined by the Third Adult Treatment Panel (ATP-III) of the National Cholesterol Education Program and therefore are at high risk for cardiovascular disease.7–11

Approximately 47 million Americans, nearly one fourth of the US population, have metabolic syndrome as defined by the Third Adult Treatment Panel (ATP-III) of the National Cholesterol Education Program and therefore are at high risk for cardiovascular disease.7–11 implies that diabetics should be treated as aggressively as survivors of a first myocardial infarction (MI) or stroke.

The clinical and public health impact of metabolic syndrome in the African American population is likely to be large and compounded by underdiagnosis, especially in women. According to the Third National Health and Nutrition Examination Survey (NHANES III), African American men and women have the highest age-adjusted prevalence of high blood pressure, and African American women have the highest age-adjusted prevalence of abdominal obesity.3,7,10 Given that African Americans are diagnosed later, have higher individual risk factors as well as more risk factors, and because the presence of multiple risk factors confers greater than additive risk,12 we have defined the African American multiple-risk patient (AAMRP). The AAMRP poses major clinical and public health
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challenges for healthcare providers. We provide herein clinical and public health strategies for early detection and aggressive management of AAMRP.

**Who is the AAMRP?**

Cardiovascular risk factors include both genetic and environmental factors. Further, familial and ethnic risk factors have genetic and environmental components. Risk factor clustering is common in African Americans. According to new data from NHANES III, African American men and women have a lower age-specific prevalence of metabolic syndrome than White men and women. African Americans, however, have the highest rates of CHD mortality and tend to have more obesity among women, as well as more hypertension and diabetes mellitus or glucose intolerance. Paradoxically, African Americans are less likely to have the “atherogenic dyslipidemic triad” (elevated low-density lipoprotein cholesterol [LDL-C], high triglycerides, and low HDL-C). In one study, African American men with CHD had significantly higher levels of HDL-C than White men with CHD. African Americans also have a higher prevalence of small, dense LDL-C particles and elevated lipoprotein (a).

The AAMRP may be diagnosed as a patient who self-defines as African American and who fulfills the metabolic syndrome criteria. In these high-risk patients, the various modifiable cardiovascular risk factors are often underdiagnosed, frequently uncontrolled, more severe at presentation, and may be associated with a positive family history. Thus, delays in identification lead to greater difficulties in management, and ultimately, to higher morbidity and mortality.

**Target Organ Damage**

Many AAMRP at the time of presentation have at least some degree of hypertension, dyslipidemia, diabetes mellitus, and even renal insufficiency, which alone and in combination may increase risks of myocardial infarction (MI), stroke, peripheral arterial disease, end-stage renal disease (ESRD), and cardiovascular death. Cardiovascular and cerebrovascular events such as cardiac arrest, acute MI, atherosclerotic heart disease, and arrhythmia are the most common causes of death in patients with ESRD regardless of race. Combined, these events account for deaths than septicemia or other known causes in patients with ESRD.

Even patients with mild renal insufficiency typically die from cardiovascular disease. Patients with renal insufficiency have concentric left ventricular hypertrophy (LVH). Up to 60% of patients in one series, whose creatinine clearance was so low as to require dialysis, had LVH on echocardiogram. A graded, stepwise increase in percentage of LVH was highly correlated with creatinine clearance. In another study, patients with ESRD whose left ventricular mass was greater than the mean had shorter survival than those whose left ventricular mass was less than the mean.

Patients with renal disease may develop LVH from increased blood pressure, which includes higher overall levels, a blunted fall in nocturnal blood pressure, and vascular stiffness. Volume overload anemia also may occur in patients in late-stage renal failure; such patients probably also have more insulin resistance and increased exposure to growth factors. The association between insulin resistance and LVH may be due to a hypertrophic factor common to both hypertension and insulin resistance. One such factor might be increased sympathetic nervous system (SNS) activity. Hyperinsulinemia is associated with increased norepinephrine levels and increased SNS activity. Elevated plasma norepinephrine levels in the absence of hypertension cause LVH in dogs. Significant increases in left ventricular mass occur after several weeks of diet-induced elevated endogenous catecholamine levels in normotensive offspring of hypertensive parents. These observations may be explained by the ability of catecholamines to elevate intracellular calcium, which initiates a calcineurin-dependent transcriptional pathway resulting in cardiac hypertrophy. Insulin resistance is also associated with an elevation of intracellular calcium. Genetic and environmental factors may cause LVH in patients with renal dysfunction. The five-year ongoing phase of the African American Study of Kidney Disease (AASK) will provide relevant data by collecting genetic information, insulin levels, echocardiograms, and ambulatory blood pressure monitors at baseline and follow-up.

**Screening and Diagnostic Guidelines for AAMRP**

The Framingham Risk Score includes several major independent risk factors for cardiovascular disease in addition to LDL-C: age, sex, cigarette smoking, blood pressure, and HDL-C. Risk estimates are calculated and appropriate primary and secondary interventions outlined. African Americans with any given Framingham Risk Score should be treated more aggressively because their absolute risks are likely to be higher than those of their White counterparts, in whom the risk scores were derived. Nonetheless, the Framingham Risk Score in African Americans is powerfully associated with the dyslipidemia of insulin resistance.

The ATP-III criteria can be used to diagnose metabolic syndrome (Table 1). In African Americans, however, risk factors tend to be clustered and more severe at presentation. For the AAMRP, a broader, two-step screening approach may allow earlier identification of factors that confer high risk for cardiovascular events (Table 2). Initial
criteria include lifestyle, ethnic, and medical history elements. The latter are included because while a family history of diabetes or cardiovascular disease and obesity are not considered under ATP-III/Framingham criteria, both are known cardiovascular risk factors and are well described in the African American population. The second step is the patient evaluation; this phase includes clinical laboratory and physical exam components.

Microalbuminuria, an indicator of early renal disease that is predictive of major cardiovascular events even in patients without clinical diabetes mellitus, should be evaluated in the AAMRP. In the Heart Outcomes Prevention Evaluation (HOPE) trial, microalbuminuria was found in nearly 15% of patients without clinical diabetes. Patients with any degree of microalbuminuria had significantly higher relative risks of major cardiovascular events, all-cause death, and hospitalization for heart failure. For every 0.4-mg/mmol increase in the urine albumin/creatinine ratio in the HOPE trial, the risk of major cardiovascular events increased by 5.9%. In the Hypertension Optimal (HOT) study, elevated serum creatinine and glomerular filtration rate <60 mL/minute was predictive of major cardiovascular events.

### TREATMENT GOALS AND TARGETS

While evidence-based values have been used to identify appropriate treatment goals, these targets usually have been established in Whites. Their relevance for African Americans is not clear. Since an AAMRP has such higher absolute risks, targets will need to be lower and input more aggressive (Table 3).

### Treatment and Prevention Strategies

In the AAMRP, prevention and management strategies must be multifaceted and comprehensive, focusing on all cardiovascular risk factors. Many notable expert professional and governmental groups have issued guidelines outlining various primary and secondary prevention strategies. Each also recognizes and echoes the difficulties in identifying and treating these high-risk patients.

### Therapeutic Lifestyle Changes

Therapeutic lifestyle changes (TLC) are important in reducing cardiovascular risk. The emphasis of TLC is on dietary advice, weight control, increased physical activity, and smoking cessation to normalize lipids, blood pressure, body weight, and glucose intolerance.

### Weight Control and Physical Activity

Weight control and management are critical in all adults and especially in African American women. Body mass index (BMI) levels in African American women are much higher than in White women. Over a 20-year period, African American women gain weight at a faster rate than Whites. The prevalence of class 3 obesity (BMI

Table 1. National Cholesterol Education Program III Criteria that define metabolic syndrome*9

- Abdominal obesity (waist circumference >102 cm [men], 88 cm [women])
- Hypertriglyceridemia (≥150 mg/dL)
- Low HDL-C (<40 mg/dL [men], <50 mg/dL [women])
- Hypertension (≥130/85 mm Hg)
- High fasting plasma glucose (≥110 mg/dL)

*A persons having three or more of these risk factors have metabolic syndrome.

Table 2. Checklist to identify AAMRP

**Step 1: Screen Patient Profile**

<table>
<thead>
<tr>
<th>Risk Factor</th>
<th>Who is at Risk?</th>
</tr>
</thead>
<tbody>
<tr>
<td>Ethnicity</td>
<td>African American, other minorities</td>
</tr>
<tr>
<td>Age</td>
<td>&gt;45 years</td>
</tr>
<tr>
<td>Family history</td>
<td>First-degree relatives with diabetes</td>
</tr>
<tr>
<td>Medical history</td>
<td>Acanthosis nigricans, polycystic ovary disease</td>
</tr>
<tr>
<td>Physical activity</td>
<td>Sedentary lifestyle</td>
</tr>
<tr>
<td>Lifestyle</td>
<td>Smoking history</td>
</tr>
<tr>
<td>Pregnancy</td>
<td>Birth of infant weighing 9 lbs or gestational diabetes mellitus</td>
</tr>
</tbody>
</table>

**Step 2: Patient Evaluation**

<table>
<thead>
<tr>
<th>Criteria</th>
<th>Values</th>
</tr>
</thead>
<tbody>
<tr>
<td>Waist circumference* (WC)</td>
<td>Men: WC &gt;40 in (102 cm)</td>
</tr>
<tr>
<td></td>
<td>Women: WC &gt;35 in (88 cm)</td>
</tr>
<tr>
<td>Blood pressure*</td>
<td>≥130/85 mm Hg</td>
</tr>
<tr>
<td>Triglyceride*</td>
<td>≥150 mg/dL</td>
</tr>
<tr>
<td>HDL-C*</td>
<td>Men: &lt;40 mg/dL</td>
</tr>
<tr>
<td></td>
<td>Women: &lt;50 mg/dL</td>
</tr>
<tr>
<td>LDL-C</td>
<td>≥100 mg/dL</td>
</tr>
<tr>
<td>Fasting plasma glucose*</td>
<td>≥100 mg/dL</td>
</tr>
<tr>
<td>Postprandial glucose</td>
<td>≥140 mg/dL</td>
</tr>
<tr>
<td>Microalbuminuria</td>
<td>Diabetic men: ACR (albumin/creatinine ratio) &gt;25 mg/g</td>
</tr>
<tr>
<td></td>
<td>Diabetic women: ACR &gt;35 mg/g</td>
</tr>
</tbody>
</table>

* Risk factors included in the definition of metabolic syndrome. AAMRP=African American multiple-risk patient; HDL-C=high-density lipoprotein cholesterol; LDL-C=low-density lipoprotein cholesterol.
>30 kg/m$^2$) is growing at a rapid pace in African American men and women. Physical activity (20 minutes of moderate activity several times per week) confers a 35% to 55% decrease in heart disease risk and a reduction in diabetes development. Though not well studied in African Americans, no evidence supports that the benefits of weight loss would be any less.

**Smoking Cessation**

African Americans generally have higher smoking rates, lower cessation rates, and begin the habit at later ages than do their White counterparts. Using data from the National Health Interview Survey, King and colleagues showed that middle-aged African American men (between 35 and 44 years of age) had the highest rates of cigarette smoking. Smoking cessation reduces the risk of heart disease in secondary and primary prevention. A recent systematic review of 20 prospective cohort studies showed a 36% reduction in crude relative risk of all-cause death among smokers with CHD who quit smoking after the index cardiac event. Therefore, advice on smoking cessation should be provided to all AAMRP who are current smokers.

**Lipids**

The AAMRP with lipid disorders should receive treatment for elevated LDL-C, high triglycerides, and low HDL-C. In randomized trials of statin drugs and their meta-analyses, lowering cholesterol by 22% over three years significantly reduced risks of MI, stroke, and vascular death, each by 30%, and total cardiovascular death rates by 20%. In one trial, statins reduced the risk of diabetes mellitus by 30%.

**Blood Pressure**

Hypertension is the most common cause of ESRD in African Americans, and in the risk for ESRD increases with increasing severity of hypertension. The risk of ESRD is higher in African Americans than in Native Americans, Whites, or Asians. African Americans have a relative risk for developing ESRD during their lifetime that is 4.45 times greater than in the White population. The mean age at which African American men develop ESRD is 55.6 years, far younger than any other White, Asian, or Native American counterpart.

Lowering blood pressure with thiazide-type diuretics and many other antihypertensive drugs leads to significant reductions in congestive heart failure, MI, and stroke. Lowering diastolic blood pressures to 80–85 mm Hg reduces cardiovascular events in hypertensive diabetic patients. In the AAMRP, because baseline blood pressures tend to be high, multiple-drug therapy is likely to be needed; inclusion of an angiotensin-converting enzyme (ACE) inhibitor at an appropriate dose may provide simultaneous benefits on diabetes and renal function.

Despite a large number of safe and effective antihypertensive agents, substantial numbers of AAMRP with elevated blood pressure are not receiving treatment. A survey of Midwest primary care physicians showed that those who were not treating hypertension aggressively were satisfied with elevated systolic blood pressure readings (in 93% of visits, systolic blood pressure readings were ≥140 mm Hg, which is above the currently recommended cut point and well above that which we recommend for the AAMRP). In 29% of visits, blood pressure was not addressed because the visit was not initially set up as a blood pressure check or competing medical problems were present.

**Glucose**

The risk for all-cause mortality and morbidity increases as a continuum with poorer glucose control. Clear-cut evidence exists that microvascular and macrovascular complications of type 2 diabetes can be prevented by the attainment of glycemic treatment goals. Attractive clinical outcomes have been demonstrated for high-risk groups, such as people with diabetes, in whom use of an ACE inhibitor was associated with a reduction in MI, stroke, cardiovascular deaths, and total deaths. For example, in addition to blood-pressure treatment effects, a reduction of risk developing type 2 diabetes was apparent in the HOPE study with ramipril. Concerns exist about higher doses of ACE inhibitors needed in African Americans, and although emerging data are promising, whether findings are equally applicable across racial and ethnic groups is not year clear.

**Pharmacologic Interventions**

In the AAMRP, drug therapy should be used aggressively and early to reach treatment goals. At the point when drug...
therapy is needed to achieve target values, TLC should be maintained, as they enhance drug-related reductions in blood pressure, cholesterol, and glucose. In the AAMRP, pharmacologic intervention should be started concomitantly with TLC, as recommended for high-risk patients.9

Adjunctive Drug Therapy

Aspirin (325 mg) should be considered in all patients who have suffered a prior occlusive event and in primary prevention in those whose 10-year risk of CHD is ≥10%.54 Aspirin should be used as an adjunct, not an alternative. Sufficient data from randomized trials with clinical endpoints are not yet available to demonstrate benefit from folic acid supplementation. Randomized trial data show no clinical benefit of antioxidant vitamins (β carotene, vitamin E) in reducing risk of cardiovascular disease.

BARRIERS TO IDENTIFICATION AND TREATMENT OF AAMRP

Many barriers exist to successful identification of the AAMRP as well as to implementation of interventions designed to address cardiovascular and metabolic risk factors. These barriers may be financial, socioeconomic, reimbursement-related, as well as patient- or healthcare provider-based.

To realize the behavioral change needed to improve the level of care for AAMRP, healthcare providers and patients must become active participants in health care and create a solid working partnership (Table 4).55–57 Focused, directed provider-patient efforts can improve biological and functional clinical outcomes in patients with clinical disease. In one study, interventions conducted by ancillary healthcare personnel, who met with diabetic patients for 20 minutes before their appointment and instructed them to be more interactive and more empowered during the physician visit, resulted in better functional status and better glycosylated hemoglobin values than in patients who did not receive this counseling.58 When a dialogue exists between patients and healthcare providers such that they concur on which of the patient’s medical problems require treatment or followup (versus medical problems mentioned by the provider only), patients perceive that these problems are substantially improved or resolved.59

Greater investment in the public health infrastructure may help overcome many of the perceived barriers to improving the care of the AAMRP. Successful interventions can be structured through community or religious organizations. One such community church-based program, “Eat for Life,” was a multicomponent effort designed to increase fruit and vegetable intake by African Americans.60 Participants who received motivational telephone calls significantly increased fruit and vegetable intake as compared with two other groups receiving none or only one such call. Another community-based program, “CardioVision 2020,” ongoing in Olmsted County, Minnesota, involves a multifaceted public health approach to improving cardiovascular risk factors.61

Ancillary personnel such as pharmacists can be involved in efforts to enhance the healthcare provider-patient relationship and should participate in a multidisciplinary patient-centered team approach. Changes in office procedures may enhance communication between visits and thus promote better acceptance of medical or TLC interventions. Ambulatory monitoring programs may provide support by making scheduling easier for the patient.

CONCLUSIONS

Coronary heart disease remains the leading cause of death in African Americans, despite downward trends. Although African Americans have a lower prevalence than Whites of metabolic syndrome, a constellation of obesity, hypertension, dyslipidemia, and insulin resistance leading to diabetes, African Americans are more insulin resistant at similar degrees of adiposity, have higher blood pressures, and among women, more obesity. Because African Americans are diagnosed later, have higher individual risk factor levels as well as more risk factors, and because multiple risk factors confer greater than additive risks, we propose the term AAMRP.

Table 4. Healthcare provider interventions for behavior change55–57

- Establish rapport with the patient; develop a partnership
- Know the patient’s goals and values before setting the agenda
- Prioritize health behaviors to modify
- Assess patient’s readiness for change
- Make change personally relevant
- Empower the patient/provide autonomy
- Be a good role model
- Provide motivational feedback to increase confidence
- Proceed slowly
a high-risk patient who poses significant clinical and public health challenges for healthcare providers. We have provided clinical and public health strategies for their early detection and aggressive management.

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