One woman dies of cardiovascular disease (CVD) every minute in the United States. CVD is the primary cause of mortality in US women, substantially affecting the lives of African American women compared to other ethnic groups. In a national survey conducted by the American Heart Association, 87% of women surveyed failed to cite heart disease as a major threat to their health. These misperceptions may lead women to underestimate their risk for CVD, resulting in a delay in seeking medical care, thus increasing their morbidity and mortality rates. Professional association guidelines and Internet resources for women and their health care providers are available to address the risk factors of smoking, diabetes mellitus, obesity, hypertension, hyperlipidemia, and physical inactivity. Unless women are informed and educated about these risk factors, they are unable to modify their lifestyles, be proactive in their health care, or reduce their cardiovascular risks. J Midwifery Womens Health 2008;53:430–439 © 2008 by the American College of Nurse-Midwives.

**keywords:** cardiovascular disease, prevention, risk factors, women

### INTRODUCTION

Cardiovascular disease (CVD) is the number one cause of death and disability of women in the United States, disproportionately affecting more African American women than any other ethnic group.1 More than 459,000 women die of CVD annually.2 Yet in a national survey conducted by the American Heart Association (AHA), only 13% of women cited heart disease and stroke as their greatest health threat.2

Most women perceive breast cancer as their greatest health concern.3 In reality, myocardial infarction (MI), stroke, and related CVDs are responsible for almost twice as many deaths among women than all forms of cancer combined.2 Younger women and minority women are even less aware of their CVD risks.2 African American and white women have the highest prevalence of CVD compared to Hispanic, Asian, and Pacific Islander women. However, CVD and stroke is also the number one cause of mortality of Hispanic women.1 In 2006, CVD was responsible for more than 28% of the 122,000 deaths among Hispanic Americans, while Asian and Pacific Islander women are the least affected by cardiovascular heart disease compared to all other ethnic groups.1

Health care providers have an essential role in both screening for CVD and raising women’s awareness. This article provides an overview of heart disease in women by reviewing the gender differences in symptoms, diagnosis, and treatment, and describes strategies for decreasing CVD risks in women by making changes in the modifiable risk factors.

### HEART DISEASE AND WOMEN

CVD is a general term used to describe diseases of the heart and the blood vessel system usually related to atherosclerosis (narrowing of the arterial blood vessel wall caused by formation of fatty plaques).4 Coronary heart disease (CHD), the most common form of heart disease, causes narrowing of the arteries supplying the heart and can cause cardiac ischemia, which results in angina symptoms (chest discomfort and radiating pain).4

If an artery becomes blocked, it can result in MI (death of a part of the muscle).4 A cerebrovascular accident occurs if a cerebral artery becomes occluded or ruptures, leading to tissue death.4 Although the basic facts of CVD are the same for both men and women, there are pronounced gender-based differences in its presentation, recognition, and treatment.

#### Gender Differences in Symptoms of Coronary Heart Disease

Most women with CHD present with typical chest pain, but many women also experience atypical symptoms (such as fatigue, shortness of breath, epigastric pressure, nausea, vomiting, numbness of the arms, and/or jaw pain). In contrast, men usually present with severe radiating substernal pressure accompanied by nausea.5 The quality of the chest pain or discomfort in women is usually less severe or milder compared to men. Mc-Sweeney et al.3 surveyed 515 women 4 to 6 months after they had an acute MI to determine what symptoms women experienced before the MI (prodromal phase) and what symptoms occurred during the MI (acute phase) that did not resolve until women sought treatment. They found that 57% of women in the study experienced chest pain in the month before the acute attack, but the intensity of the chest pain was mild. The remaining 43% did not experience any pain during the prodromal phase before experiencing an acute MI. Given that chest pain is considered a hallmark of CHD, women who do not experience chest pain may fail to recognize the serious...
ness of their symptoms, delay seeking medical treatment, or be misdiagnosed once they arrive at the hospital for treatment.

However, in order to act on atypical symptoms, women must be aware of the symptoms that can occur, and surveys have shown that they are not. In 2000, Mosca et al.² conducted a national survey of 1000 women to assess their awareness, knowledge, and perception of heart disease and found a lack of awareness of heart attack warning signals. Although 67% of the women knew some of the “classic” signals of heart attack, such as chest pain, shortness of breath, pain in the arm, and tightness in the chest, only 10% were aware of the less common signals that women may have such as nausea, fatigue, and dizziness, and 7% of the women did not answer the question at all.⁶

The survey results also revealed that most women learned about CHD from magazines (43%) and television (24%), and less so from their own physician (18%). The findings suggested that many women (90%) felt comfortable discussing CHD prevention with their doctor, yet most of them (70%) did not.⁷ The lack of provider–patient discussion about CHD may be related, in part, to the aforementioned gender-based myths associated with CHD. Wenger⁷ crystallizes the problem of traditional gender bias in heart disease: “…The community has viewed women’s health almost with a ‘bikini’ approach, looking essentially at the breast and reproductive system, and almost ignoring the rest of the woman as part of women’s health.”

Finally, many women interpret their symptoms as insignificant,³ further increasing their risk for a heart attack as they devalue (or diminish) their symptoms. Women may also be more preoccupied with high-profile female health problems (e.g., breast cancer and osteoporosis). Clinicians also fail to recognize atypical symptoms of heart attacks in women.⁸

In addition to failing to recognize symptoms, many women, particularly African American women, often delay seeking help for cardiac symptoms. Banks and Malone⁹ found that “African American women experienced trivialization of their complaints by clinicians and a focus on technological procedures over respectfully attending to their concerns, which provided further disincentives to seeking care.” African American women may also experience different symptoms as their primary complaint—such as shortness of breath rather than chest pain—and interpret these symptoms differently compared to members of other groups.¹⁰

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Gender Differences in the Evaluation and Diagnosis of Coronary Heart Disease

The starting point of gender-related inequalities in the health care delivery system could be when women arrive at the emergency room with chest pain indicative of symptomatic CHD.¹¹ Women diagnosed with CHD are less likely to receive the prompt diagnostic testing and intervention procedures as compared to men.¹² In 2005, Anand et al.¹² conducted a post-hoc analysis of data from a randomized clinical trial consisting of approximately 4800 women and more than 7200 men diagnosed with acute coronary syndromes. An acute coronary syndrome is defined as a combination of MI, non-ST elevation MI, ST-elevation MI, and unstable angina.¹² They found that women underwent fewer invasive procedures including angiography, angioplasty, and coronary artery bypass graft (CABG) surgery compared to men (47.6% vs. 60.5%; P = .0001). While there were no differences in heart attacks, strokes, or deaths, women returned to the hospital with persistent complaints of chest pain more frequently than men during the 9-month follow-up period. If there is lower utilization of noninvasive diagnostic testing at the initial point of care, it may translate into a delayed diagnosis, delayed initiation of therapeutic intervention, and ultimately poorer outcomes.¹¹ Less aggressive care of women with CHD can lead to higher rates of complications and higher death rates.⁶

Daly et al.¹³ studied more than 3700 men and women diagnosed with angina and found that women were less likely than men to be referred for cardiac diagnostic procedures such as exercise electrocardiography and coronary angiography. Women with confirmed CHD were less likely to be revascularized compared to their male counterparts, and were twice as likely to suffer death and a non-fatal MI in the 1-year follow-up period. Additionally, women compared to men in this study were also placed in lower CHD risk categories. This failure of clinicians to recognize cardiovascular risk in women was also found by Mosca et al.¹⁴ Their 2005 online study of 500 randomly selected physicians of different specialties used a standardized questionnaire to evaluate whether or not physicians were aware of and adhering to the current CVD prevention guidelines. The study design presented case scenarios describing high-, intermediate-, and low-risk patients according to the Framingham risk score, which estimates the risk of developing CHD within a 10-year period.¹⁵ Women diagnosed as intermediate-risk were significantly more likely to be assigned to a lower-risk category by primary care physicians than men with the same risk profiles (P < .0001), and the results were similar for physicians in other specialties such as obstetricians/gynecologists and cardiologists.¹⁴ In addition, only 20% of the physicians surveyed knew that there was a higher mortality in women compared to men from CVD.¹⁴
McSweeney et al.16 conducted a qualitative study of 40 women with CHD and interviewed each woman for approximately 2 hours. They found that even though the women experienced many prodromal and acute symptoms associated with CHD, there was a significant delay in a cardiac diagnosis despite frequent visits to their clinicians. In fact, some women experienced a MI before they were actually diagnosed with CHD, and other women received a non-cardiac diagnosis of indigestion, depression, anxiety, and joint pain. Women who presented with characteristic cardiac symptoms were diagnosed without problems, but women who presented with atypical symptoms experienced a delayed diagnosis.16 Considering that two-thirds of women who die suddenly from heart disease had no previously recognized symptoms,17 the necessity for early symptom recognition, prompt diagnosis, and immediate treatment is clear.

Gender Differences in the Treatment of Coronary Heart Disease

A 2005 study18 of 890 men and women with a confirmed MI evaluated outcomes in cardiac treatment and found that women who suffer heart attacks not only wait longer compared to men to be seen and assessed, but they also experience differences in treatment.15 Men were assessed within 20 minutes after arrival to the hospital compared to women who waited 10 minutes longer. After approximately 30 minutes, 95% of men received aspirin to decrease platelet aggregation and clot formation; 92% of women received the same treatment but waited 20 minutes longer for it. After approximately 50 minutes, 43% of the men received reperfusion therapy to dissolve blood clots in their coronary arteries and restore adequate blood flow to their heart. Women waited considerably longer (70 minutes), and only 35% of women received the same treatment. Even though outcomes and complications of these delays were not addressed, the authors concluded that: “These delays in treating women who suffer heart attacks could expose them to a greater rate of life-threatening complications and a less favorable outcome than their male counterparts.”18

In 2007, Hernandez et al.19 examined more than 13,000 African American and white men and women to evaluate the use of an implantable cardioverter-defibrillators for persons suffering from heart failure with left ventricular systolic dysfunction. The data revealed that less than 40% of eligible patients received this therapy, and among women and blacks, the incidence was even lower. Only 28.2% of black women, 29.8% of white women, and 33.4% of black men received the defibrillators, yet 43.6% of the white men received the defibrillators.19 Heart failure with left systolic dysfunction is a major risk factor for sudden death in persons who have had a heart attack, so it is disconcerting that so few eligible patients received this treatment, and that gender and race disparities were so evident.

Gender Differences in Outcomes

There are physiologic differences that may affect cardiovascular outcomes in women. Women tend to have smaller coronary vessels regardless of their body size; this may cause them to be more prone to coronary occlusion compared to men.20 When revascularization is performed to reestablish blood flow to occluded arteries via percutaneous coronary intervention, or coronary artery bypass graft, the luminal diameter of an artery is a strong predictor of restenosis.20 The size of the coronary vessel correlates with long-term graft patency,20 and may be associated with higher perioperative mortality rates in women after CABG.21 In addition, women tend to be older and have more medical problems because the onset of clinical manifestations of CHD in women is approximately 10 years later and about 20 years for more serious problems such as MI and sudden cardiac death.7

ASSESSING WOMEN FOR CORONARY HEART DISEASE

Estimating Risk

In order to decrease the likelihood of developing CHD, women and/or their health care providers must first recognize the risk factors (Table 1). Table 2 highlights recommended lifestyle interventions for CHD prevention and risk factor reduction in women.

Health care providers can calculate the 10-year absolute risk for developing CHD by using the Framingham risk score for women, which stratifies into 4 categories of high, intermediate, low, and optimal risk. The Framingham risk score calculator uses 5 different factors—age, cholesterol, lipid levels, smoking status, and blood pressure—to give women an individualized score that acts as a starting point for an assessment of her risk for CHD.

<table>
<thead>
<tr>
<th>Table 1. Risk Factors for Cardiovascular Disease</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Unmodifiable Risk Factors</strong></td>
</tr>
<tr>
<td>Increasing age</td>
</tr>
<tr>
<td>Gender</td>
</tr>
<tr>
<td>Race/ethnicity</td>
</tr>
<tr>
<td>Family history of premature cardiovascular disease</td>
</tr>
<tr>
<td><strong>Modifiable Risk Factors</strong></td>
</tr>
<tr>
<td>Obesity</td>
</tr>
<tr>
<td>Unhealthy eating/nutrition</td>
</tr>
<tr>
<td>Lack of physical activity</td>
</tr>
<tr>
<td>Smoking</td>
</tr>
<tr>
<td>Hypertension</td>
</tr>
<tr>
<td>Elevated lipids</td>
</tr>
<tr>
<td>Type 2 diabetes</td>
</tr>
</tbody>
</table>

Adapted from the American Heart Association.1
Table 2. Lifestyle Interventions for Coronary Heart Disease Prevention in Women

<table>
<thead>
<tr>
<th>Lifestyle</th>
<th>Risk Reduction Goal</th>
<th>Supporting Data</th>
</tr>
</thead>
<tbody>
<tr>
<td>Obesity</td>
<td>Maintain a BMI between 18.5–24.9 kg/m² and a waist circumference &lt;35 in</td>
<td>Obesity is an independent risk factor for CVD in women.</td>
</tr>
<tr>
<td></td>
<td></td>
<td>It predisposes or is associated with CHD, heart failure, and sudden death.</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Waist circumference reflects the magnitude of abdomen adipose tissue and total mass</td>
</tr>
<tr>
<td></td>
<td></td>
<td>and is strongly linked to CVD risks.</td>
</tr>
<tr>
<td>Nutrition</td>
<td>Encourage a diet rich in vegetables, fruits, whole-grain, and high-fiber foods.</td>
<td>Men and women who averaged 8 or more servings of fruits and vegetables a day were 30% less likely to have a heart attack or stroke.</td>
</tr>
<tr>
<td></td>
<td>Eat oily fish at least twice weekly.</td>
<td>Fish, especially oily fish, decreases the risk of CVD, in part because of omega-3 fatty acids.</td>
</tr>
<tr>
<td></td>
<td>Decrease the intake of saturated fats and trans-fatty acids and foods high in</td>
<td>saturated fats and trans fats increase blood cholesterol, and an increased blood cholesterol leads to heart attack and increased risk of stroke.</td>
</tr>
<tr>
<td></td>
<td>cholesterol.</td>
<td></td>
</tr>
<tr>
<td>Physical activity</td>
<td>Exercise 30 min or more (moderate-to vigorous intensity aerobic activity) on most and preferably all days of the week</td>
<td>Women who walk briskly for a least 2–3 hours per week–or burn an equivalent amount of energy through vigorous exercise decrease their risk of CHD by 30% to 40%.</td>
</tr>
<tr>
<td>Cessation of smoking</td>
<td>Stop smoking and avoid environmental exposure to tobacco.</td>
<td>Risk of CVD is substantially decreased in women within 1–2 years after smoking cessation.</td>
</tr>
<tr>
<td>Blood pressure control</td>
<td>Maintain BP &lt;140/90 mm Hg (optimal, 120/80 mm Hg). Maintain BP &lt;130/80 mm Hg, if diabetic Pharmacotherapy is indicated when BP is out of acceptable range</td>
<td>The higher the blood pressure, the greater the chances of MI, heart failure, stroke, and kidney disease. Blood pressure control reduces the risk of CVD among persons with diabetes by 33–50%. Every 10-mm Hg reduction in systolic BP reduces the risk of complications related to diabetes by 12%.</td>
</tr>
<tr>
<td>Lipid/lipoprotein management</td>
<td>Maintain total cholesterol &lt;200 mg/dL; LDL-C &lt;100 mg/dL; HDL-C &gt;50 mg/dL; and triglycerides &lt;150 mg/dL</td>
<td>CHD risk increases with elevated total and LDL cholesterol levels and decreases with high HDL cholesterol levels in women and men. The role of triglycerides in the development and progression of CHD in women remains unclear.</td>
</tr>
<tr>
<td>Diabetes management</td>
<td>Maintain fasting blood glucose 65–110 mg/dL; maintain HbA1c &lt;7%</td>
<td>The risk of fatal CHD associated with diabetes is 50% higher in women than in men.</td>
</tr>
</tbody>
</table>

BMI = body mass index; BP = blood pressure; CHD = coronary heart disease; CVD = cardiovascular disease; HbA1c = hemoglobin (A1c); HDL = high-density lipoprotein; LDL = low-density lipoprotein; MI = myocardial infarction.

(Table 3). A risk greater than 20% is considered high; a risk of 10% to 20% is intermediate; and a risk of less than 10% is low.

Based on these categories, interventions can be tailored to meet the needs of each woman according to her individual categories of risk. The most important thing that women can do to decrease the risk of CHD, regardless of their base risk category, is to make lifestyle changes. The 2007 AHA evidence-based guidelines for CVD prevention recommend that all women 20 years of age and older be screened for CVD by their health care providers. The screening process includes a medical history, physical examination (including blood pressure, body mass index [BMI], and waist circumference), and laboratory values of fasting blood glucose and lipids in addition to conducting the Framingham risk assessment.

COUNSELING STRATEGIES TO DECREASE MODIFIABLE CORONARY HEART DISEASE RISK FACTORS

The modifiable risk factors associated with CHD are obesity/nutrition, physical activity, smoking, hypertension, elevated lipids, and diabetes. In addition, the incidence of CHD in women increases after menopause. Appendix A offers Internet resources for patients and health care providers about each of the modifiable risk factors discussed below.

Obesity/Nutrition

Obesity has become a major epidemic in the United States, and over the last 10 years there has been a substantial increase in the number of adults who are obese. According to the National Heart Lung and Blood Institute guidelines, the assessment of overweight
individuals involves three key measures—BMI, waist circumference, and risk factors for diseases and conditions associated with obesity. In adults, overweight is defined as a BMI of 25 to 29 kg/m²; obesity is defined as a BMI 30 kg/m² or higher. Waist circumference is a measure of central obesity and intraabdominal fat and provides an independent prediction of disease risk, because body fat that accumulates around the stomach tends to pose a greater health threat than fat stored in the lower half of the body. In women, a waist circumference of more than 35 inches is associated with an increased risk for type 2 diabetes, hyperlipidemia, hypertension, and CVD. Obese women are 4 times as likely to develop CHD compared to women who are not sedentary. In general, ethnic minority women are less active and less likely to engage in physical activity compared to white women. In 2004, 78.4% of white women, 76% of Asian/Pacific Islander women, 66.1% of black women, and 60.1% of Hispanic women were physically active. The ethnic minority women were the least active compared to white and Asian/Pacific Islander women. The most commonly cited reasons for their inactivity were insufficient time, lack of child care, and lack of access to safe and secure places to exercise.

The benefits of physical activity may include: increased levels of high-density lipoproteins (HDLs, good cholesterol) and decreased levels of low-density lipoproteins (LDLs, bad cholesterol), a decrease in mortality rates for women, a reduced risk of developing CHD and stroke, a reduced chance of developing diabetes, and a reduction in blood pressure. Despite these proven health benefits of physical activity, more than 60% of adult women fail to exercise to realize these benefits.

Physical Activity

According to the Centers for Disease Control and Prevention, “Physical inactivity contributes to 300,000 preventable deaths a year in the United States.” A sedentary lifestyle increases mortality, decreases quality of life, and is preventable by changes in behavior patterns. Women who are sedentary are twice as likely to develop CHD compared to women who are not sedentary. In general, ethnic minority women are less active and less likely to engage in physical activity compared to white women.

Improving diet and lifestyle is a critical component of the AHA’s strategy for CVD risk reduction. In 2006, the AHA issued dietary and lifestyle recommendations that focus on balancing caloric intake and physical activity to achieve and maintain a healthy body weight; consuming a diet rich in vegetables and fruits; choosing whole-grain, high-fiber foods; and consuming fish, especially oily fish, at least twice a week. Note, however, that women of childbearing age should be aware of the mercury content of some fish, including king mackerel, swordfish, and shark, when increasing dietary omega-3 fatty acids (in order to reduce the potential risk of neurologic problems with the fetus).

Recommendations include limiting intake of saturated fat to less than 7% of total calories, trans fat to less than 1% of total calories, and cholesterol to less than 300 mg/day. This can be done by choosing lean meats and vegetables, fat-free or low-fat dairy products, and minimizing the intake of partially hydrogenated fats and beverages and foods with added sugars. Women should also choose and prepare foods with little or no salt and consume alcohol in moderation. The risk of developing CVD can be substantially reduced by adhering to these dietary and lifestyle recommendations. Akesson et al. found that the daily consumption of vegetables and fruit combined with whole grains, fish, beans, and half of a glass of wine significantly reduced (by 50% or more) the risk of heart attacks in women.

### Table 3. Framingham Point Score Estimate of 10-Year Risk for Women

<table>
<thead>
<tr>
<th>Box A</th>
<th>Points per Age, y</th>
</tr>
</thead>
<tbody>
<tr>
<td>20–34</td>
<td>7</td>
</tr>
<tr>
<td>35–39</td>
<td>3</td>
</tr>
<tr>
<td>40–44</td>
<td>0</td>
</tr>
<tr>
<td>45–49</td>
<td>3</td>
</tr>
<tr>
<td>50–54</td>
<td>6</td>
</tr>
<tr>
<td>55–59</td>
<td>8</td>
</tr>
<tr>
<td>60–64</td>
<td>10</td>
</tr>
<tr>
<td>65–69</td>
<td>12</td>
</tr>
<tr>
<td>70–74</td>
<td>14</td>
</tr>
<tr>
<td>75–79</td>
<td>16</td>
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</table>

<table>
<thead>
<tr>
<th>Box B</th>
<th>Total Cholesterol, mg/dl</th>
</tr>
</thead>
<tbody>
<tr>
<td>20–39</td>
<td>2</td>
</tr>
<tr>
<td>40–49</td>
<td>3</td>
</tr>
<tr>
<td>50–59</td>
<td>4</td>
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<tr>
<td>60–69</td>
<td>1</td>
</tr>
<tr>
<td>70–79</td>
<td>0</td>
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<table>
<thead>
<tr>
<th>Box C</th>
<th>Points per Age, y</th>
</tr>
</thead>
<tbody>
<tr>
<td>Smoking</td>
<td>2</td>
</tr>
<tr>
<td>Nonsmoker</td>
<td>0</td>
</tr>
<tr>
<td>Smoker</td>
<td>9</td>
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</table>

<table>
<thead>
<tr>
<th>Box D</th>
<th>Points</th>
</tr>
</thead>
<tbody>
<tr>
<td>High Density Lipoprotein, mg/dl</td>
<td></td>
</tr>
<tr>
<td>&gt;250</td>
<td>1</td>
</tr>
<tr>
<td>200–250</td>
<td>2</td>
</tr>
<tr>
<td>160–199</td>
<td>3</td>
</tr>
<tr>
<td>120–149</td>
<td>4</td>
</tr>
<tr>
<td>&lt;120</td>
<td>5</td>
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</table>

<table>
<thead>
<tr>
<th>Box E</th>
<th>Points</th>
</tr>
</thead>
<tbody>
<tr>
<td>Systolic Blood Pressure, mm Hg</td>
<td></td>
</tr>
<tr>
<td>&lt;120</td>
<td>0</td>
</tr>
<tr>
<td>120–129</td>
<td>1</td>
</tr>
<tr>
<td>130–139</td>
<td>2</td>
</tr>
<tr>
<td>140–149</td>
<td>3</td>
</tr>
<tr>
<td>&gt;150</td>
<td>4</td>
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</table>

<table>
<thead>
<tr>
<th>Box F</th>
<th>Point Total</th>
</tr>
</thead>
<tbody>
<tr>
<td>20–29</td>
<td>9</td>
</tr>
<tr>
<td>30–39</td>
<td>11</td>
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<td>40–49</td>
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<td>60–69</td>
<td>17</td>
</tr>
<tr>
<td>70–79</td>
<td>19</td>
</tr>
</tbody>
</table>

*Women can find their point score in boxes A through F, and then add up these points to receive their total points. The point values in box F will provide an estimate of their 10-year risk. Adapted from Mosca.*
that clinicians screen all women for tobacco use and the implications established by the United States Preventative Services Task Force (USPSTF) are similar, and recommend that clinicians screen all women for tobacco use and provide tobacco interventions for those who smoke.32 The guidelines suggest a five-step behavior and counseling framework for engaging women in conversations about smoking cessation. The counseling and intervention should begin with inquiring about tobacco use, then advising women to stop if they smoke, assessing their readiness to stop, assisting them to stop, and finally arranging support and counseling to help them stop. For women that are having difficulty in relinquishing tobacco use, nicotine replacement therapy should be considered as a safe and effective pharmacotherapy in assisting women to stop. Clinicians should also inquire at each office visit about the success of the therapy that has been initiated.

Smoking
In 2006, an estimated 46 million adults in the United States were smokers. Of these, 20 million were women; 20% were white women and 17% were African American women.33 Smoking is one of the most preventable causes of CVD among women. The risk of CVD increases with the number of cigarettes smoked and the duration of time that a woman smokes.34 A woman who smokes is 4 times more likely to die of CVD than a nonsmoker.35

The 2007 AHA evidence-based guidelines for CVD prevention in women recommend that women who smoke should stop smoking, and also avoid environmental smoke.22 The clinical guidelines and recommendations established by the United States Preventative Services Task Force (USPSTF) are similar, and recommend that clinicians screen all women for tobacco use and provide tobacco interventions for those who smoke.32 The guidelines suggest a five-step behavior and counseling framework for engaging women in conversations about smoking cessation. The counseling and intervention should begin with inquiring about tobacco use, then advising women to stop if they smoke, assessing their readiness to stop, assisting them to stop, and finally arranging support and counseling to help them stop. For women that are having difficulty in relinquishing tobacco use, nicotine replacement therapy should be considered as a safe and effective pharmacotherapy in assisting women to stop. Clinicians should also inquire at each office visit about the success of the therapy that has been initiated.

Hypertension
Approximately 50 million people in the United States have hypertension, and nearly half are women.36 Women who have hypertension have a life expectancy that is 5 years shorter compared to women without hypertension.37 Hypertension is defined as a diastolic blood pressure of 90 mm Hg or higher or a systolic pressure of 140 mm Hg or higher.36 A 20-pound increase in body weight is associated with a 3.0-mm Hg higher systolic and a 2.3-mm Hg higher diastolic blood pressure. This translates into an estimated 12% increased risk for CHD and a 24% increased risk for stroke for persons who are overweight.36 By the age of 50 years, the incidence of hypertension increases significantly in women compared to men, and the prevalence of hypertension in women is equal to or greater than the prevalence in men. But by the age of 60 years, the highest prevalence of hypertension is greatest among African American women.36

Many people believe that hypertension is a disease that results from stressful lifestyles, physical inactivity, smoking, and other unhealthy behaviors. However, with the exception of a few cases, the exact cause of hypertension is unknown.37 Many women with hypertension are undiagnosed.37 This is particularly relevant for African American women, because they have a higher prevalence of hypertension, an earlier onset, and disturbingly higher rates of hypertension-related death from stroke, heart disease, and end-stage renal disease.38 The Seventh Report of the Joint National Committee on Prevention, Detection, Evaluation, and Treatment of High Blood Pressure (JNC 7) recommends that all adults over the age of 18 years be screened for high blood pressure at least every 2 years. During the initial screening, the JNC 7 guidelines recommend that women should be sitting quietly in a chair for at least 5 minutes, with their feet firmly on the floor, and their arm at the level of their heart. Before a diagnosis of hypertension is confirmed, two or more readings on two separate occasions a few weeks apart should be done. If diagnosed with prehypertension, a systolic blood pressure between 120 and 139 mm Hg, and a diastolic blood pressure between 80 and 89 mm Hg, she should be rechecked within a year, and if diagnosed with hypertension stage 1, a systolic blood pressure of 140 to 159 mm Hg and a diastolic of 90 to 99 mm Hg, her blood pressure should be rechecked in 2 months and advised to reduce her blood pressure with lifestyle modifications. If diagnosed with stage 2 hypertension, a systolic blood pressure of 160 mm Hg or more or a diastolic of 100 mm Hg or more, she should be followed closely, and re-evaluated in a month by her health care provider.36

Elevated Lipids
In 2002, the Third Report of the National Cholesterol Education Program (NCEP) Adult Treatment Panel (ATP) III guidelines were released.39 The updated guidelines focus on reducing the burden of heart disease in the United States by recommending the need for more aggressive lowering of the LDL cholesterol levels. LDL cholesterol accounts for 60% to 70% of the total cholesterol, and clinical trials show that reducing LDLs is the most effective way to decrease CHD.39 The ATP III guidelines recommend that the lipoprotein profile should be the primary test in screening for elevated cholesterol levels. The United States Preventive Services Task Force
(USPSTF) recommends that clinicians screen young women for abnormal lipids between the ages of 20 and 45 years if they have pre-existing risk factors for CHD. Additionally, the USPSTF also recommends screening women aged 45 years and older for lipid disorders and treating women with elevated lipids who are at risk for CHD. Total cholesterol should be less than 200 mg/dL; LDL (bad cholesterol), less than 100 mg/dL; HDL (good cholesterol), more than 50 mg/dL; and triglycerides (a type of fat in the blood), less than 150 mg/dL. Research has shown that high HDL levels tend to offer protection to persons even if they have elevated total cholesterol levels. An HDL cholesterol level of 60 mg/dL or higher is considered a negative risk factor, and compared with men, women have slightly higher HDL cholesterol levels. These levels tend to remain steady throughout life.

In women, LDL cholesterol and total cholesterol levels increase after the age of 55 years and peak between 55 and 65 years of age, which is approximately 10 years later compared to the average age that these values peak in men. Elevated triglyceride levels appear to increase the risk of CHD in women.

When lifestyle approaches such as diet, exercise, and weight control are not enough to lower total cholesterol and LDL levels, more aggressive treatment with statins is recommended to achieve the LDL goals. However, statins should not be prescribed for women who are pregnant or who are trying to get pregnant, because statins block the formation of cholesterol, an essential component in fetal development. The reduction of cholesterol in pregnant women can lead to fetal abnormalities.

Diabetes

Women with diabetes have double the risk of developing CVD compared to women without diabetes. According to the American Diabetes Association, women 45 years of age or older should have a fasting blood sugar drawn every 3 years. However, earlier and more frequent screening is advised for women who have a family history of diabetes.

Gestational diabetes mellitus (GDM) is a glucose intolerance that begins or is first detected during pregnancy, and it affects about 7% of all pregnancies. Women with GDM have an increased risk of developing diabetes after pregnancy, further increasing their risk for CVD. Women who have diabetes are not only at a greater risk for CHD, but they also experience poorer outcomes for survival when diagnosed with CVD.

Exercise and physical activity greatly diminishes the risk of developing type 2 diabetes by as much as 30%, and the combination of physical activity and diet can decrease the incidence of type 2 diabetes by 40% to 60% over 3 to 4 years. In 2008, the American Diabetes Association position statement recommended that all individuals who are overweight or obese exercise moderately at least 30 minutes a day to delay or prevent the development of diabetes. Physical activity increases insulin sensitivity, lowers blood glucose levels, and helps maintain weight loss. Exercise in addition to healthy nutrition also helps to restore normal glucose metabolism and decreases overall body fat. In turn, decreasing body fat and modest weight loss has been shown to also improve insulin resistance.

Medical nutrition therapy is vital in preventing and delaying the onset of type 2 diabetes. The 2008 position statement of the American Diabetes Association recommends three levels of prevention for diabetes care. The first level is primary, which seeks to halt or delay the onset of diabetes, and uses public health measures to decrease the prevalence of individuals that are obese. The second level is for individuals with diabetes, and medical nutrition therapy is used to maintain metabolic control. The third level is focused on controlling and managing the complications associated with diabetes.

Role of Menopause

Before menopause, women appear to be somewhat protected from CHD, heart attack, and stroke. However, as women age, their risk of heart disease and stroke begins to rise and continues rising. In women who have undergone early menopause (before 50 years of age) or surgical menopause, the risk of CVD is even higher, especially if other risk factors are present. After menopause, CVD becomes more of a risk for women because of the reduced level of estrogen. A reduced level of estrogen can lead to the formation of atherosclerosis and clot formation in the blood vessels, an increase in LDL levels, and a decrease in HDL levels.

For many years, the prevailing belief has been that hormone therapy (HT) protects the heart. However, the cardioprotective effects of HT have been challenged by the recent studies. The Heart and Estrogen/Progestin Replacement Study (HERS) was the first large, randomized, double-blind, placebo-controlled trial to directly measure whether HT alters cardiac event risk in women with established heart disease. The researchers found that while HT decreased LDL cholesterol levels and increased HDL cholesterol levels, the use of HT was not associated with any change in the incidence of death from CHD. The AHA now recommends that women with a history of CVD refrain from taking HT if the only goal is to prevent further cardiovascular problems.

The Women’s Health Initiative (WHI)—the largest longitudinal study evaluating the use of estrogen plus progestin therapy in more than 16,000 women without heart disease—was halted because of an increase in adverse health outcomes in the women in the estrogen arm of the study. The findings revealed that there was a 26% increase in breast cancer, a 29% increase in heart attacks, and a 22% overall increase in total CVD among...
women receiving the estrogen plus progesterin. The findings suggest that if a woman has an intact uterus, taking the combination of estrogen and progesterin is more of a health risk than a health benefit. Therefore, health care providers and clinicians are cautioned against prescribing HT for the sole purpose of decreasing heart disease in women.

CONCLUSION

CVD is the number one cause of death and disability in all women in the United States. However, only 13% of women consider heart disease and stroke a personal threat to their health. Health care providers have a responsibility to educate and inform women about their risks for CVD and help them develop strategies for prevention. Screening for risk factors for heart disease should be included in the annual physical examinations of women, and guidelines to address the risk factors should be incorporated into practice. Clinicians must dispel the misperception that “heart disease” is a man’s disease and that women are not affected.

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REFERENCES


Appendix A. Clinical Recommendations and Internet Resources

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