Heart disease prevention in women

The NP's role

Abstract: More women die from heart disease than any other illness. This article focuses on risk factors and their prevalence in women along with strategies for preventing this disease. Armed with this information, the NP can play a major role in preventing cardiovascular deaths in women.

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Cardiovascular disease (CVD) is the number one killer of women in the US. Over 400,000 women die from CVD each year.[1] Many women worry about developing breast cancer, but more women die from CVD than breast cancer, accidents, and diabetes mellitus combined. According to the most recent statistics (2013 to 2016), 44.7% of women age 20 and older had some form of CVD.[1] Although women experience myocardial infarctions (MIs) at an older age than men, they are more likely than men to die within a few weeks after an MI. Further, in 2016, 58.2% of the total deaths caused from stroke were in women.[1]

Fortunately, CVD is preventable. Studies show that young women who eat a healthy diet, exercise, and do not smoke demonstrate a 92% decrease in coronary heart disease compared with women without any of these healthy habits.[2] Adoption of better health habits could decrease coronary heart disease in women by 70% as well as nearly cut in half the development of CVD risk factors like diabetes mellitus, hypertension, and hypercholesterolemia.[2]

Healthcare providers and women lack awareness and knowledge about CVD, which leads to late identification and delayed treatment. In a recent study, only 45% of women identified CVD as the number one killer of women and less than half of primary physicians identified CVD as the top priority for women.[3]

The NP can play a significant role in preventing CVD in women with risk factor assessment, patient counseling, and evidence-based intervention implementation. Early assessment of CV risks and establishment of a prevention program with women during NP visits are essential.

The information in this article will help NPs become familiar with the prevalence, risk, and prevention of CVD in women, putting NPs in a position to help decrease the morbidity and mortality associated with CVD in women.

Traditional risk factors

Traditional risk factors affect both men and women and include age, family history, race, dyslipidemia, hypertension, diabetes mellitus, metabolic syndrome, smoking, obesity, and inactivity. However, there are gender-based differences in some of these risk factors. Some of these traditional risk factors are nonmodifiable (age, race, family history), while others can be modified (dyslipidemia, hypertension, diabetes mellitus, metabolic syndrome, smoking, obesity, and inactivity).

Keywords: cardiovascular disease, diabetes mellitus, hypercholesterolemia, hypertension, myocardial infarction, stroke

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Nonmodifiable risk factors. Age is a nonmodifiable risk factor, but establishing healthy habits at an early age can help prevent the incidence of CVD. Because of the effects of estrogen, there is a lag of about 8 to 10 years for women to develop coronary artery disease. At about age 55, the risk of women developing CVD is equal to men. Women who have gone through menopause, either naturally or surgically, are twice as likely to develop CVD than a woman of the same age who has not yet gone through menopause.[4,5]

CV mortality for women is higher than for men, 20.9% versus 14.9%, respectively.[6] In addition, more women age 45 and older are more likely to die than men both 1 year (23% versus 18%) and 5 years (47% versus 36.5%) following an MI.[1]

Women with first-degree relatives who have experienced CVD at an early age, age 55 for men or age 65 for women, have an increased risk for CVD.[4,6] Risk factors, including diabetes, hypertension, dyslipidemia, and obesity, tend to be perpetuated among family members. Family history includes more than genetic makeup; families who share the same lifestyle and environment—a diet of fast food, smoking, air pollution—are more likely to have added risk factors, such as high cholesterol and diabetes.[4]

Non-Hispanic Black women have the highest prevalence of CVD (57.1%) compared with non-Hispanic White women (43.4%), Hispanic women (42.6%), and non-Hispanic Asian women (37.2%).[1] This is likely associated with the high incidence of hypertension, overweight, obesity, and diabetes mellitus in non-Hispanic Black women. (See *Prevalence of hypertension, overweight, obesity, and diabetes mellitus in women age 20 or older.*)

Modifiable risk factors. High cholesterol is considered the highest population-adjusted risk factor for women.[6] More women than men age 20 or older have a cholesterol level above 200 mg/dL (40.4% versus 35.4%). In addition, women are more likely to have low-density lipoprotein cholesterol (LDL-C) levels at or above 130 mg/dL (30.4% versus 30.0%). However, women are less likely than men to have high-density lipoprotein cholesterol (HDL-C) levels less than 40 mg/dL (9.9% versus 29.0%).[1] Unfortunately, clinicians are less apt to prescribe women HMG-CoA reductase inhibitors (statins) than men, even though statins have been shown equally effective in both genders.[6,7,11]

Estrogen promotes vasodilation, which assists in controlling BP in premenopausal women, but after age 65, women are more likely to be hypertensive than men.[1] In women age 20 or older, Black women have a higher rate of hypertension than White women (56% versus 41.3%).[1] According to recent statistics, women have poor BP control; only 29.4% of non-Hispanic White women, 26.5% of non-Hispanic Black women, 27.5% of Hispanic women, and 16.3% of non-Hispanic Asian women have their BP under control.[1] It is important to screen for hypertension and to treat it when identified.

Diabetes mellitus is considered a higher CV risk for women than men. The risk for men is 10.1%, and the risk for women is 19.1%.[8] This increased risk may be associated with added risk factors like obesity, physical inactivity, hypertension, and hyperlipidemia. Hispanic women have double the rate of type 2 diabetes mellitus than non-Hispanic White women, which puts them at an even higher risk.[1] Further, women age 45 or younger with diabetes have a sixfold increase in the risk of developing acute coronary syndrome.[9] Aggressive risk prevention in women with diabetes mellitus is warranted; however, women with diabetes mellitus are treated less aggressively for risk factors than men with diabetes.[10]

Metabolic syndrome is a combination of risk factors and includes three of the following: fasting plasma glucose (FPG) of at least 100 mg/dL or the treatment of hyperglycemia; HDL-C less than 50 mg/dL in women or treatment for low HDL-C; waist circumference

Prevalence of hypertension, overweight, obesity, and diabetes mellitus in women age 20 or older[1]

	Hypertension (2013 to 2016)	Overweight and obesity (2011 to 2014)	Diabetes mellitus (2013 to 2016)
Non-Hispanic Black women	56.0%	82.2%	13.4%
Non-Hispanic White women	41.3%	63.7%	7.3%
Hispanic women	40.8%	77.1%	14.1%
Non-Hispanic Asian women	36.4%	34.6%	9.9%

of more than 88 cm (34.6 in) in women (the threshold varies based on specific countries and ethnicity such as Asian individuals); triglyceride levels of at least 150 mg/dL or those receiving treatment for elevated triglyceride levels; systolic BP of at least 130 mm Hg or diastolic BP of at least 85 mm Hg or treatment of hypertension.[1] Metabolic syndrome has been identified as the chief risk factor in women who have had an MI at an early age.[5,11] In a systematic review, diet and lifestyle modifications were shown to improve all five factors associated with metabolic syndrome.[12]

Although fewer women than men smoke, women have a 25% higher risk of developing CVD than male smokers.[5] Globally, tobacco use accounted for 1.9 million female deaths in 2015.[1] In addition, female smokers had more than double the risk of sudden cardiac death than women who never smoked.[13]

Obesity is a known risk factor for CVD and this risk is compounded with obesity-associated risk factors such as hypertension, hyperlipidemia, physical inactivity, and insulin resistance. A body mass index (BMI) of 25 to 29.9 is considered overweight, and a BMI greater than 30 is considered obese.[14] Measurement of waist circumference is also recommended when BMI is 25 to 34.9. Obesity in women is prevalent with an estimated 66.4% of women in the US being either overweight or obese. The highest rates are in non-Hispanic Black women (82.2%) and Hispanic women (77.1%) with non-Hispanic White women not far behind (63.7%).[1] In addition, more women than men are considered obese and women with obesity have a greater risk of coronary artery disease than men.[6]

Inactivity is a prevalent risk factor for heart disease in women. In 2016, fewer women than men (18.8% versus 26.3%) met the aerobic and strengthening recommendations set in the 2008 *Physical Activity Guidelines for Americans* (the most recent guidelines available in 2016).[1] The benefits of exercise are very clear; in fact, researchers in the INTERHEART study reported that exercise was more cardioprotective in women than men.[6] Assessing the woman's usual activity level is an important aspect of the patient history.

Nontraditional risk factors

Nontraditional risk factors include pregnancy-related disorders, autoimmune disease, radiation and chemotherapy for breast cancer, and stress or depression. These risk factors are either unique to women or are more predominant in women.

Women age 55 or younger who experience depression are at a higher risk for developing CVD and at a higher risk for death from CVD than men.[15] Stress can cause physiologic consequences as well as make it difficult to stick to a healthy lifestyle plan. Stress is often associated with other unhealthy habits like smoking and overeating, which add to the risk of CVD. Stress reduction and treatment of depression are important for maintaining a woman's CV health.

Treatment with certain chemotherapy drugs and radiation therapy for breast cancer can increase a woman's risk of CVD. CVD becomes apparent in these women 7 years after being diagnosed with breast cancer.[16]

Women who experience gestational hypertensive disorders and diabetes have an increased incidence of hypertension and CVD later in life.[17] Gestational diabetes, preeclampsia, and pregnancy-induced hypertension were identified as risk factors for women in the 2011 guidelines, *Effectiveness-Based Guidelines for the Prevention of Cardiovascular Disease in Women*, published by the American Heart Association.[18]

Stress reduction and treatment of depression are important for maintaining a woman's CV health.

Female predominant autoimmune diseases like rheumatoid arthritis, systemic lupus erythematosus, and scleroderma increase the risk of CVD.[6,18] These autoimmune disorders are prevalent in women with CVD.

Inflammatory markers. Systemic inflammation is associated with the development of CVD. Several inflammatory biomarkers can be used to detect inflammation. The inflammatory marker most studied in women is high sensitivity C reactive protein.[19] Although it has been shown to improve risk prediction for CVD in women, it is not currently recommended for routine assessment of risk factors.[18] It is, however, useful in making decisions about statin therapy in intermediate-risk women.[18-21]

Many of the CVD risk factors are linked. Hypertension, smoking, and high cholesterol intake can damage

the endothelium, resulting in atherosclerosis and plaque formation. This plaque ruptures or erodes the vessel resulting in a thrombus and occlusion of the artery. The reverse may also occur where hypertension causes damage to the blood vessels resulting in atherosclerosis. Atherosclerosis causes the heart to overwork and can lead to stroke, heart failure, or MI. Inactivity is associated with obesity; obesity is linked to hyperlipidemia, metabolic syndrome, and hypertension; and regular exercise helps reduce the risk of hypertension, hypercholesterolemia, and being overweight. Clearly, reduction of these risk factors can prevent CVD and improve overall health.

In addition to risk factors, the NP should also be aware of the gender differences in the manifestations of CVD. For example, the most prevalent symptom of MI in men is crushing chest pain, but the symptoms in women are subtler and may include unusual fatigue; shortness of breath; sweating; jaw, arm, and back pain; nausea or vomiting; lightheadedness or dizziness.[11,19]

Although some risk factors are nonmodifiable (female gender, age, family history), many can be modified through healthy lifestyle habits. Not only will this reduce the risk of CVD in women but may also reduce the risk of many cancers and other medical ailments, including osteoarthritis and diabetes mellitus.

Assessment and interventions

Assessment and prevention strategies should start early in a woman's life. Although there is no set age for this assessment to occur, ideally it should start at the onset of adulthood when modifications at this time will have lasting benefit on the slow-growing nature of atherosclerosis. Brown and colleagues acknowledged the importance of the recommendations from The American College of Cardiology/American Heart Association (ACC/AHA) to screen adults between ages 20 and 79 to assess for the CVD risk factors such as smoking, hypertension, diabetes mellitus, total cholesterol, and HDL-C.[6] This assessment should be repeated every 4 to 6 years, and sooner if risk factors are abnormal.

During the NP visit, several patient factors should be considered: age, race, family history, smoking history, medical history (chronic inflammatory conditions, diabetes mellitus, hypertension, hyperlipidemia) as well as hormonal history (pregnancy history, age of menopause), and questions regarding cardiac symptoms.[6] This should be followed by the physical exam, including BMI calculation, BP, heart rate, waist circumference, and depression screening.[22] Other factors the NP must consider when fully assessing a woman's risk of CVD include: preterm delivery, hypertensive pregnancy disorders, gestational diabetes, persistent weight gain following pregnancy, autoimmune disorders, radiation and chemotherapy for breast cancer, depression, and menopause.[23] Although pregnancy-related issues may resolve following delivery (return of normal BP or blood glucose level, for example), they have been found to increase a woman's risk later in life for CVD and development of other diseases. Autoimmune diseases occur more frequently in women than men and have also been shown to increase CVD risk. Some chemotherapy agents and radiation have been found to increase a woman's lifetime risk of CVD, although these regimens have been modified in more recent years to decrease this risk as much as possible.[16]

The role of the NP is to look at the above risk factors and then determine the woman's overall risk. Ideal cardiovascular health for women includes (all untreated) a total cholesterol less than 200 mg/dL, BP less than 120/80 mm Hg, FPG level of less than 100 mg/dL, BMI less than 25, abstinence from smoking, at minimum 150 minutes of moderate exercise per week (or 75 minutes high-intensity exercise), and consuming a healthy diet such as the Dietary Approaches to Stop Hypertension (DASH) diet.[18,24] Working on any one of these factors alone will help reduce overall risk. These are the ideal numbers for cardiovascular health that women should strive to achieve. If treatment is needed to manage abnormal numbers, it should be individualized based on the woman's CVD risk factors and comorbid conditions.

According to the AHA, when classifying the CVD risk in women, those considered "at risk for CVD" have one or more major risk factors.[18] These risk factors include smoking, being treated for hypertension or hyperlipidemia, obesity, inactivity, poor diet (high in processed foods, sugar, fat), metabolic syndrome, poor exercise capacity, family history of premature CVD (first-degree male relatives younger than 55 or first-degree female relatives younger than 65), systemic autoimmune collagen-vascular disease (such as lupus erythematosus or rheumatoid arthritis), advanced subclinical atherosclerosis, or history of preeclampsia, gestational diabetes, or pregnancy-induced hypertension.[18]

The "high risk" category of women should be under closer supervision and at optimal treatment for any treatable risk factors. These patients include ones with

manifestations of CVD, cerebrovascular disease, or peripheral arterial disease; abdominal aortic aneurysm; end-stage or chronic kidney disease; diabetes mellitus; or a 10-year predicted CVD risk of 10% or higher.[18]

Using a tool such as the Atherosclerotic Cardiovascular Disease (ASCVD) Risk Estimator helps evaluate 10-year risk scores in adults ages 40 to 79 who have no history of CVD.[21] However, individual risk factors need to be addressed even if a low score is determined. Advances of this tool, the ASCVD Risk Estimator Plus, compared with previous editions include the consideration of race, both systolic and diastolic BP, LDL (in addition to total cholesterol and HDL-C), history of diabetes mellitus, as well as current medications (statins, antihypertensives, and aspirin). The calculator can be used in younger adults at risk for heart disease and in others to show how the modification of risk factors can improve overall lifetime CV risk.[21] The tool is available for free download to mobile devices as well as computer-based.[25] It not only provides a current 10-year risk assessment but also includes a lifetime risk and optimal risk.

The most important way to prevent heart disease is to live a healthy lifestyle throughout life (exercise, stress reduction, no tobacco use, and achieving ideal weight). The NP should counsel women about these needed lifestyle changes. This might involve referrals to other specialists, including registered dietitians, exercise specialists, and smoking cessation classes.[21] Over the years, the dietary guidelines have been revised various times, but a plant-based diet is still the focus. A healthy diet made up mostly of vegetables, fruits, nuts, whole grains, lean vegetable or animal protein, and fish with a minimum of trans fat, processed meats, refined carbohydrates, and sweetened drinks should be followed.[21]

Dyslipidemia as a risk factor. Compared with men, there are fewer published studies on primary prevention for women, which is thought to be based on less enrollment.[10] However, in 2013, protocols for statin use specifically for women were included in the ACC/AHC guidelines. Now, more women than before are recommended to start statins.[23]

Pharmacologic means of prevention.

Women tend to receive less aggressive treatment for CVD risk factors than men. If both are at the same risk, the woman receives less guidance about prevention as well as less pharmacologic support.[7,10,23] The new ACC/AHA guidelines show that aggressive treatment should be in place for women at risk for CVD.[23,25]

Smoking. Although the use of tobacco products has been shown to increase the risk of CVD in both men and women, it deserves special attention in risk assessment of female patients. Smoking is more responsible for earlier onset (age 45 and younger) of acute coronary syndromes than any other risk factor.[9] (See *Summary of risk assessment, risk stratification, and interventions.*)

Following an evidence-based practice model, the NP should combine the best evidence available with his or her expertise and the female patient's beliefs, culture, and values when making decisions about risk prevention strategies. For example, the evidence supports living a healthy lifestyle, including eating a heart-healthy diet, exercising, smoking cessation, losing weight if BMI is above 25, but if the woman has many risk factors, she may prefer to make one or two lifestyle changes at a time.

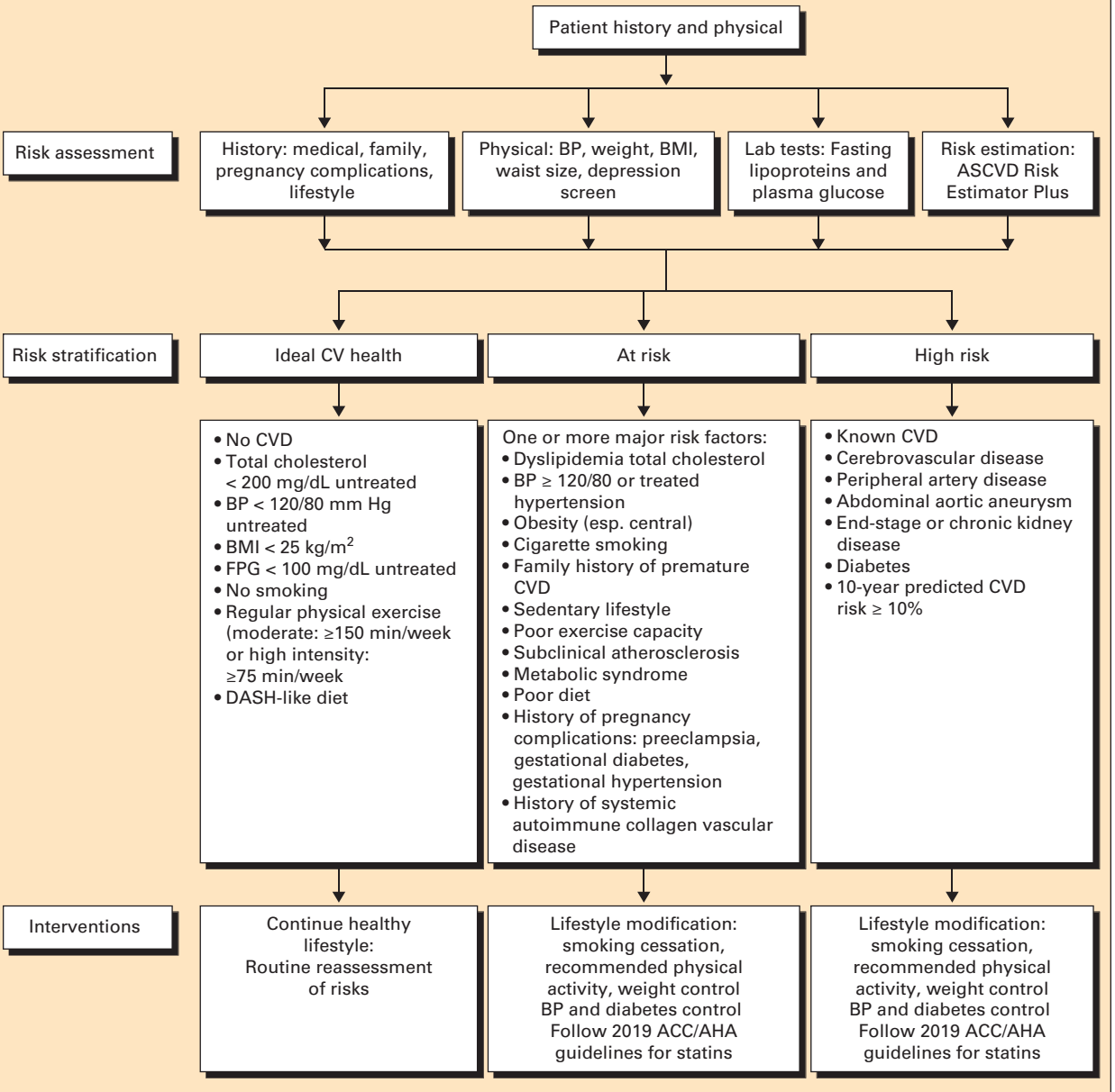
Smoking is more responsible for earlier onset (age 45 and younger) of acute coronary syndromes than any other risk factor.

Despite the best education efforts, some women may choose not to follow the treatment plan. When this happens, it is important to discuss the reasons with the woman, ascertain potential resolutions to the identified issues, and modify the treatment plan.

Progress in research

More information about women's heart disease is now known. Women (like men) are living longer. This allows greater study of the effect of events from their younger years on the years of later life. For example, chemotherapies for breast cancer have helped women live longer; now, fewer women are dying from cancer but are experiencing ill effects from the chemotherapeutic agents on their heart later in life. Research is showing choices made earlier in life or certain diseases have a great effect in the long term; for example, pregnancy disorders can predict future cardiovascular health. More is also now known about the effects of autoimmune disorders on cardiovascular disease; however, the exact mechanism has not been determined. It is thought that inflammation is key to this link.[26]

Summary of risk assessment, risk stratification, and interventions



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Conclusion

Women are at a high risk for CVD. It is important to start screening for risk factors at an early age. The majority of CVD can be prevented. The NP has an important role in assessing, counseling, and treating women at risk, which can decrease the morbidity and mortality associated with this disease. This article can help the NP identify female-specific risk factors and their prevalence along with strategies for prevention of CVD.

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