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Risk Factor Treatment in Veteran Women at Risk for Cardiovascular Disease

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Abstract

Objectives—Cardiovascular disease (CVD) is the leading cause of death in women. Aggressive management of atherosclerotic risk factors can prevent or delay the onset of CVD. Treatment of modifiable risk factors provides an important opportunity to reduce the burden of CVD in women and decrease future adverse event rates. The aims of this study were to assess current treatment of atherosclerotic risk factors in women found to be at moderate or high-risk for CVD and to examine levels of CVD knowledge and awareness among women found to be at moderate or high-risk for CVD

Methods—In a cross-sectional study, we screened ambulatory female veterans aged 40 to 85 years for the prevalence of PVD and associated atherosclerotic risk factors, and administered a survey to assess the participants' knowledge and awareness of CVD, risk factors, and consequences. Medical records, pharmacy data, and clinician encounter notes were reviewed for documented evidence of CVD risk factors, comorbidities, and corresponding treatment. From a total cohort of 162 women, 108 (66.7%) were categorized as having an increased risk of cardiovascular disease based on a modification of the Framingham cardiovascular risk score which took into account the presence of carotid intimal-medial thickness (cIMT) > 1.0 mm or ankle-brachial index ≤ 0.9 , as determined by a voluntary, one time, non-invasive screening.

Results—In no category of CVD risk factor were 100% of the women receiving adequate medical or behavioral management. Especially surprising to us were the low levels of treatment for women with heart disease, smoking, and previous history of PAD. Over half of the women who were post-menopausal or who have had hysterectomy at the time of this study, continued to use HRT despite warnings about its role in CAD, stroke, and PAD. One third of moderate- to high-risk women had evidence of increased cIMT, which is a known surrogate marker of subclinical heart disease. Knowledge and awareness scores were low, regardless of risk factor level and respectable levels of education.

Conclusions—Our findings show a high prevalence of CVD risk factors and low knowledge levels among ambulatory veteran women. There is a need for improvement in recognition and aggressive management of CVD risk factors, including the use of non-invasive studies as surrogate markers for early diagnosis. Continued efforts to educate women and providers about CVD risk factors, heart-

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healthy behaviors, screening, and treatment are vital to improve the current state of women's health and decrease future adverse cardiac event rates.

Introduction

Cardiovascular disease (CVD) is the leading cause of preventable death in women. One in three women have some form of CVD, and according to the most current mortality data available, more than 500,000 of US women die of CVD each year, exceeding combined deaths for cancer, accidents, and diabetes.¹ In addition to high rates of mortality, staggering numbers of women live for years with some form of CVD, which can exact tolls in terms of quality of life, disability, economic cost, and societal impact. Aggressive education, screening and management of atherosclerotic risk factors can prevent or delay the onset of CVD. Treatment of modifiable risk factors provides an important opportunity to reduce the burden of CVD in women and decrease future adverse event rates.^{2, 3}

Despite recent efforts to heighten public awareness, CVD remains under-diagnosed and under-treated in women due to lack of screening coupled with a lack of awareness on the part of both healthcare providers and patients at risk.^{4, 5} It is especially important for women at risk for CVD to possess knowledge of atherosclerotic risk factors and associated symptoms so that they may seek appropriate medical care for systemic atherosclerosis. Unfortunately, our previous work demonstrated low levels of knowledge and awareness of atherosclerotic disease and risk factors among generally healthy women presenting to a free women's vascular health screening program regardless of risk level for CVD.⁴ We found participating women to be unaware of the significant risks of CVD and the impact of risk factors.

The aims of the current study were to describe the prevalence of atherosclerotic risk factors in veteran women found to be at moderate or high-risk for CVD, assess rates of treatment, and to examine levels of CVD knowledge and awareness among women found to be at moderate or high-risk for CVD.

Methods

A cross-sectional study was conducted December 2004 to March 2006 at Michael E. DeBakey Veterans Affairs Medical Center (MEDVAMC) in Houston, Texas. The study was approved by the Institutional Review Board of both Baylor College of Medicine and the MEDVAMC. As described in an earlier published manuscript⁴, eligible, ambulatory female veterans aged 40 to 85 years providing informed consent were screened for the prevalence of PVD and associated atherosclerotic risk factors. Medical records, pharmacy data, and clinician encounter notes were reviewed for documented evidence of CV risk factors, comorbidities, and corresponding treatment. A self-report questionnaire was administered to assess patient-reported risk factors, comorbid conditions, treatments, and knowledge and awareness of CVD. All participants completed all portions of the study.

Results

From a total cohort of 162 women, 108 (66.7%) were categorized as having an increased risk (e.g. moderate or high-risk) of cardiovascular disease based on a modification of the Framingham (FRS) cardiovascular risk score (Table 1). The FRS is an important public health tool, which has been validated and used to predict cardiovascular risk over a 10-year time period.^{6, 7} The modified, unvalidated risk scoring system used for this study did not weight variables and also took into account the presence of carotid intimal-medial thickness (cIMT) > 1.0 mm or ankle-brachial index (ABI) \leq 0.9, as determined by a voluntary, one time, non-invasive screening. Using this adapted scoring system, women with documented evidence of

2 of these risk factors were classified as “moderate-risk”, and women with 3 or more documented risk factors were classified as “high-risk”. Within this subgroup of 108 women found to be at increased risk for CV disease, the number of risk factors present ranged from 2 to 7. The majority of women (74%) were classified as high-risk with number of risk factors present ranging from 3 to 7 (median 4) (Table 2).

Self-described race/ethnicity, which is considered to be the most reliable source of race/ethnicity information^{8,9}, was obtained for 105 of 108 of the moderate and high-risk participants and coded as Caucasian, black, Hispanic or Latino, Asian, or “Other”.¹⁰ The majority of participants were Caucasian, with no significant differences in the distribution of race/ethnicity data between moderate- and high-risk groups. This information is presented in Table 3.

CVD Risk Factors and Treatment

When we examined at the adequacy of risk factor treatment, there were no apparent differences between women classified as “high” and “moderate”. Thus, data was pooled for both risk groups and analyzed together. The percentages of women with various risk factors as well as the percentage receiving appropriate risk factor therapy are listed in Table 3. In no category were 100% of the women receiving adequate risk factor management. Especially surprising to us were the low levels of treatment for women with heart disease, smoking, and previous history of peripheral arterial disease. Only 31.3% of the 16 women with a previous diagnosis of heart disease were receiving antiplatelet agents. Only 53.4% of current or former smokers had been advised to begin smoking cessation therapy at some point during their care. Of the 20 women with low levels of HDL cholesterol (<40mg/ml), only 30% had been advised to begin an exercise program. Over half (53%) of the women who were post-menopausal or who have had hysterectomy at the time of this study, continued to use HRT. Another interesting finding was that 1/3 of these women had evidence of increased cIMT, which is a known marker of subclinical heart disease.

Knowledge and Awareness

Knowledge and awareness of CV risk factors, treatment, and consequences was assessed using the Knowledge and Awareness Questionnaire (KNAQ). The KNAQ is a 38-item, psychometrically sound (average subscale internal consistency of 0.942) self-report questionnaire designed to assess participant’s knowledge and awareness of cardiovascular disease, risk factors, treatments, and consequences.⁴ Most questions are in a “yes/no/not sure” response format. KNAQ scores were low, regardless of risk category (Table 4).

Information on self-reported levels of education was obtained for 103 of 108 of the moderate and high-risk participants. Participants were asked to choose the highest level of completed education. Overall, the majority of participants had completed at least some college (79%), with no significant differences in levels of education between moderate- and high-risk groups. This information is presented in Table 6.

Discussion

We conducted a cross-sectional screening study of PVD, atherosclerotic risk factors, treatment, and awareness among ambulatory women veterans ages 40–85. Our findings show that women who are at moderate and high risk for CVD had not only a high prevalence of CVD risk factors, but suboptimal rates of treatment, and low levels of knowledge and awareness.

Because the women in our study were self-selected, they may differ in some respects compared with the general population, but in essence, we found very comparable rates of diabetes, obesity, hypertension, and elevated cholesterol to other studies.^{3, 11–16} Another interesting

finding was that 1/3 of these women had evidence of increased cIMT, which is a known surrogate marker of subclinical heart disease.¹⁷ Because women with abnormal cIMT values and/or low ABI values are highly likely to have coronary artery disease, an increased risk for heart disease may exist and be overlooked in some women due to deficiencies of conventional cardiovascular risk factor assessment.^{3, 17–21} Future research is needed to improve screening for CVD risk in women, including the use of non-invasive studies as surrogate markers for diagnosis.

Beyond detection, our data demonstrate a need for improved *management* of CVD risk factors. Specific preventive measures include lifestyle interventions such as smoking cessation and exercise, major risk-factor interventions such as the use of antihypertensives, lipid-level modification, diabetes treatment, and use of preventive pharmacotherapies such as the use of aspirin, beta-blockers, or ACE-inhibitors.^{1, 2} In no risk factor category were 100% of women participating in this study receiving guideline recommended treatment. Although disheartening, our findings are not unusual. In a recent study of high-risk women in a managed care setting, only 33% were receiving recommended lipid lowering therapy.²² In a study of practice patterns in ambulatory care settings across the US, Kayhani et al. found that only 21% of women with a previous history of heart disease or cerebrovascular disease were receiving recommended antiplatelet therapies.¹³ Another interesting finding from our study was that over half (53%) of the women who were post-menopausal or who have had a prior hysterectomy at the time of this study, continued to use HRT despite warnings about its role in CVD, stroke, and peripheral vascular disease.^{23, 24} Our findings are similar to those reported by Ridker et al.³

We found low knowledge levels among women found to be at moderate or high-risk for CVD. Our data are consistent with large population-based telephone surveys of cardiovascular knowledge and awareness reported by Mosca et al⁵, and more recently, reports of knowledge and awareness of peripheral vascular disease in the general population (both men and women) by Hirsch.²⁵ It is especially important for women with an elevated risk for CVD to possess knowledge of risk factors and symptoms that may be associated with CVD, and that they need to seek medical care to determine their risk status and receive treatment. Regrettably, when asked whether they thought they had risk factors for CVD, 53.6% of moderate-risk women and 58.8% of high-risk women responded “no” or “not sure”. Continued efforts are needed to educate women and physicians to improve efforts for detection, prevention, and adequate medical modification and therapy.

Our study had several limitations. First, this study included only women veterans, which may not be representative of the population as a whole. It has been suggested that veteran patients may have more comorbidities and a greater severity of illness than non-VA sector patients, thus, this may account for the high prevalence of CVD risk factors in our study.²⁶ However, as previously stated, our findings are comparable to those reported from large population based studies such as the Atherosclerotic Risk in Communities Study¹¹, the WISEWOMAN screening program¹⁴, and descriptive statistics reported as part of nation-wide survey studies conducted of knowledge and awareness of CVD risk factors.^{2, 25} Furthermore, our risk scoring system is neither validated nor weighted. We simply added the number of atherosclerotic risk factors that each woman possessed. We understand that some risk factors may be more significant than others. Another potential limitation of this study concerns the problem of participant self-report and medical chart data to determine CVD risk factors. Survey methods are prone to information and non-response bias and medical chart data is often incomplete. However, considering the scope of this study, data obtained via patient interview and from the medical record were the most reliable information in the absence of longitudinal patient assessment.

The value of identifying asymptomatic women at risk for CVD is that many of the major risk factors for cardiovascular disease are modifiable. Aggressive screening and treatment, and education about risk factors and heart-healthy behaviors may be important to decrease future adverse cardiac event rates.² Providing a list of risk factors for CVD as well as normal ranges for important laboratory data such as cholesterol and LDL to women may enable them to be more active in their health care and seek screening tests and consult with a health care professional about strategies for prevention and risk factor modification.

Future research is needed to include more women, especially minority women, in cardiovascular research, to inform evidence-based medicine, as historically, this field of research has focused on older, white men. Other research is needed to further examine subclinical cardiovascular risk factors, particularly among younger women, to examine whether early primary prevention efforts warrant preventing cardiovascular morbidity and mortality from the outset. Finally, future research and continued efforts in the arena of public health education is paramount to battling the epidemic of cardiovascular morbidity and mortality among American women.

Conclusion

Treatment of modifiable risk factors provides an important opportunity to reduce the burden of cardiovascular disease in women. This study, along with our previous work, indicates a need to improve detection of atherosclerotic risk factors, to further educate women about the importance of detection and proper treatment, and to encourage communication between women and their healthcare providers to achieve appropriate levels of treatment and management.

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Table 1

Modified Framingham Risk Score

Modified Framingham Risk Score
<ul style="list-style-type: none">• Diagnosis of cardiac disease• Hypertension• Hyperlipidemia• Diabetes mellitus• Cholesterol risk (total cholesterol > 200 mg/ml)• HDL risk (HDL < 40 mg/ml)• Current or former smoker• Abnormal carotid intimal-medial thickness (cIMT > 1.0 mm)• Abnormal ankle-brachial index (ABI < 0.9)

Table 2

Risk Categories (N=108 of original cohort of 162).

Risk Categories	# Risk Factors	% (n)
Moderate	2 risk factors	26% (28)
High	>2 risk factors	74% (80)
Totals		100% (108)

Table 3

Race/Ethnicity of cohort.

Race/Ethnicity	TOTAL N=105	Risk Category	
		Moderate-risk n=26	High-risk n=79
Caucasian/white	69 (65.7)	14 (53.9)	55 (69.6)
Black	28 (26.7)	7 (26.9)	21 (26.6)
Hispanic/Latino	8 (7.6)	5 (19.2)	3 (3.8)

Table 4

Evidence of cardiovascular risk factors and percentage of participants receiving recommended treatment.

Cardiovascular Risk Factor	Total N=108 n(%N)	Moderate Risk n=28 (%n)	High Risk n=80 (%n)	Recommended Treatment	n(%N) receiving treatment
Previous diagnosis heart disease	16 (14.8)	2 (7.1)	14 (17.5)	Antiplatelet therapy	5 (31.3)
Hypertension	67 (62.0)	10 (35.7)	57 (71.3)	Hypertension medication	60 (89.6)
Diabetes mellitus	47 (43.5)	20 (71.4)	27 (33.8)	Diabetes treatment	37 (78.6)
Hyperlipidemia	83 (76.9)	11 (39.3)	72 (90.0)	Lipid lowering medication	64 (76.8)
Cholesterol risk (total cholesterol > 200 mg/ml)	60 (55.6)	12 (42.9)	48 (60.0)		
HDL risk (HDL < 40 mg/ml)	20 (18.5)	1 (3.5)	19(23.8)	Exercise program	6 (30.0)
Current or former smoker	59 (54.6)	13(46.4)	46 (57.5)	Smoking cessation referral	31 (53.4)
* Abnormal cIMT (> 1.0 mm)	31 (28.7)	5 (17.9)	26 (32.5)	None currently indicated	--
* Abnormal ankle- brachial index (ABI ≤9)	7 (6.5)	0 (0.0)	7 (8.8)	Walking therapy	4 (57.1)
** History of peripheral vascular disease	7 (6.5)	2 (7.1)	5 (6.3)		
** Post-menopausal or Hysterectomy	78 (72.2)	20 (74.1)	58 (73.4)	Hormone Replacement Therapy	41 (52.6)

* Modification of Framingham Cardiovascular Risk Profile

** Not included in risk level calculation

Table 5

Knowledge and awareness of cardiovascular disease (CVD), risk factors, and consequences.

<ul style="list-style-type: none">▪ General knowledge of CVD and peripheral vascular disease (e.g. diseases of the arteries outside the heart can put a woman at risk for stroke or heart attack; heart disease is the number 1 killer of women).<ul style="list-style-type: none">• Moderate risk - 42.1% correct• High risk - 46.9% correct▪ Knowledge of specific CV risk factors and consequences (e.g. smoking is a risk factor for CVD + PVD; left untreated, CVD can lead to amputations, etc.)<ul style="list-style-type: none">• Moderate risk - 53.8% correct• High risk - 54.4% - correct

Table 6

Education levels of participating veteran women.

Level of Education	Total N=103	Moderate-risk n=27	High-risk n=76
Some High School	6 (4.5)	1 (3.7)	5 (6.6)
High School Diploma/GED	17 (15.7)	3 (11.1)	14 (18.4)
Some College	43 (43.1)	12 (44.4)	31 (40.8)
College Graduate or Professional Degree	28 (26.1)	9 (33.3)	19 (25.0)
Post-College Degree	9 (9.8)	2 (7.4)	7 (9.2)