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State of Cardiovascular Health in Women Veterans

Volume 2: Risk Factors, Diagnoses, and Procedures in Fiscal Year (FY) 2014

Prepared by:
Women's Health Services
Office of Patient Care Services,
Veterans Health Administration
Department of Veterans Affairs
810 Vermont Ave., NW
Washington, DC 20420

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Prepared by:

Women's Health Services
Office of Patient Care Services, Veterans Health Administration
Department of Veterans Affairs
810 Vermont Ave., NW
Washington, DC 20420

Nancy H. Maher, PhD
Alison M. Whitehead, MPH
Claire Duvernoy, MD
Melinda Davis, MD
Basmah Safdar, MD
Susan M. Frayne, MD, MPH
Fay Saechao, MPH
Jimmy Lee, MS
Patricia M. Hayes, PhD
Sally G. Haskell, MD, MS

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List of Acronyms

AAA	Aortic Abdominal Aneurysm
ADUSH	Assistant Deputy Under Secretary for Health
AHA	American Heart Association
AOR	Adjusted Odds Ratio
CABG	Coronary Artery Bypass Graft
CAD	Coronary Artery Disease
CI	Confidence Interval
CPT	Current Procedural Terminology
CV	Cardiovascular
CVD	Cardiovascular Disease
ECHO	Echocardiogram
EKG	Electrocardiogram
FEE IP	Non-VA (Fee) Medical Care Inpatient
FEE OP	Non-VA (Fee) Medical Care Outpatient
FY	Fiscal Year (October 1 to September 30)
HCPCS	Healthcare Common Procedure Coding System
ICD	Implantable Cardioverter-Defibrillator
ICD-9	International Classification of Diseases, Ninth Revision
LDL-C	Low-Density-Lipoprotein Cholesterol
MI	Myocardial Infarction
MV	Men Veterans
PTCA	Percutaneous Transluminal Coronary Angioplasty
PTF	VHA Inpatient Files
PTSD	Posttraumatic Stress Disorder
SE/SF	VHA Outpatient Encounter and Visit Files
TIA	Transient Ischemic Attack
USH	Under Secretary for Health
VA	Department of Veterans Affairs
VHA	Veterans Health Administration
VHA IP	VHA Inpatient
VHA OP	VHA Outpatient
VISN	Veterans Integrated Service Network
WHEI	Women's Health Evaluation Initiative
WHS	Women's Health Services
WV	Women Veterans

Executive Summary

The face of the Veterans Health Administration (VHA) patient population has continued to change since publication in 2013 of the first volume of the State of Cardiovascular Health in Women Veterans. The number of women Veterans using the VHA for their medical care has grown over a four-year period by 30%. In addition to the growing numbers of women, their age distribution is shifting upward. The largest group of women Veterans, those ages 45-64, will require more cardiovascular (CV) care as they continue to age. In addition, the influx of younger women Veterans will warrant more focus on prevention, including prevention of cardiovascular disease (CVD) risk factors and conditions.

A mission of the Department of Veterans Affairs (VA) is to provide equitable, high-quality care for women Veterans, thereby becoming a U.S. leader in health care for women. In the civilian sector, gender disparities between women and men in CV risk management and in CV care and outcomes have been documented.[1,2,3,4] Consequently, VHA Women's Health Services (WHS) identified the need to assess CV care for women Veterans by forming a Cardiovascular Health in Women Veterans workgroup in 2011. The workgroup produced the first volume of this report in 2013.

There are several important improvements in this second volume that give a more complete picture of the prevalence of CVD risk factors, conditions, and procedures in women Veterans using VHA. In addition to outpatient VHA care, this second volume includes inpatient VHA care, as well as Non-VA (Fee) Medical outpatient and inpatient care. This second volume also reports on cardiovascular disease risk factors and conditions both regionally and by age, sex, and ethnicity. Both volumes have been developed through work done by VHA Women's Health Services (WHS) and the Cardiovascular Health in Women Veterans Workgroup, in collaboration with the Women's Health Evaluation Initiative (WHEI), VA Palo Alto.

All data in this report come from centralized, national VHA administrative databases of enrollment, VA outpatient and inpatient care, and non-VA outpatient and inpatient care. The report describes women and men Veterans receiving care through VA in Fiscal Year 2014 (FY14) related to specific CVD risk factors, conditions, and procedures.

This report has several limitations: (1) Data are from FY14 and may not reflect current practices or procedures in the VA healthcare system; (2) Data represent only Veterans who chose to seek their health care through the VHA (whether in-house or through fee basis), rather than all Veterans; (3) Some risk factors, conditions, or procedures may be undercounted for Veterans receiving CV-related care outside VHA; (4) This report does not examine non-Veteran women who use VHA services; (5) Undercounting of conditions based on International Classification of Diseases, Ninth Revision (ICD-9) codes may occur if providers failed to recognize the presence of a condition, or if they failed to code it on the clinical encounter form; and finally, (7) Data are cross-sectional; any associations discussed here do not prove causality.

Periodically, this report mentions gender differences/disparities. Note that other than age-adjusted odds ratios, no statistical testing is done; therefore, it is not known whether these gender differences are statistically significant. Further, any statements about gender differences need to be interpreted in the

context of possible gender differentials in rates of use of non-VA care, and thus in the amount of uncaptured care.

Key Findings

Rapid Growth of VHA Women Veterans Population – The number of women Veterans using VHA has increased significantly between FY10 through FY14, increasing nearly 30%, from 316,903 women Veterans in FY10 to 412,901 in FY14. The rate of growth during this time period has been much faster in women Veterans than in men Veterans.

Shifting Age Distribution and Greater Diversity in VHA Women Veterans – In FY10, there were three age distribution peaks among women Veterans: one between ages 28 and 33, one between ages 47 and 52, and one between ages 85 and 90. By FY14, these age distribution peaks grew larger and shifted upward in age, showing both the growth and aging of the women Veteran patient population. The first peak, occurring in women in their early 30s, reflects the growing numbers of younger women entering the VA system from the latest conflicts in Iraq and Afghanistan. The younger women Veteran patient population (18-44) is significantly more diverse than the oldest group (65+). Nearly 29% of younger women Veteran patients (18-44) are African American and 10% are Hispanic, compared with 10% African American and 2% Hispanic among older women Veteran patients (65+).

High Proportion of Women and Men Veterans with CVD Risk Factors – In FY14, the proportion of both women and men Veterans with at least one diagnosed CVD risk factor was high — at least 56% — across all age groups. Although the proportion of women with a diagnosed, traditional CVD risk factor was generally lower than the proportion in men across all age groups, certain risk factors such as diabetes, high triglycerides, and low high-density lipoprotein, may portend a greater risk to women than to men.[5,6,7,8,9,10]

Other key findings regarding CVD risk factors include the following:

1. Despite the lower frequency of CVD in women, nearly 80% of women Veterans ages 65+ had a diagnosis of a major CVD risk factor. After age 75, there is no significant difference between women and men in the prevalence of most CVD risk factors. In Veterans age 85 +, the prevalence of hypertension was higher in women.
2. More than 50% of women ages 65+ had a diagnosis of dyslipidemia, nearly 24% had a diagnosis of diabetes, and nearly 60% had a diagnosis of hypertension.
3. The prevalence of hypertension in African-American women Veterans was noticeably higher than in other racial/ethnic groups across all age groups; the prevalence of diabetes was higher among most racial/ethnic minority women Veterans compared with white women Veterans across all age groups.
4. Depression and Posttraumatic Stress Disorder (PTSD), although not considered traditional risk factors, are associated with higher CVD risk.[11,12] Women Veterans had a higher frequency of depression across all age groups than men, especially in the 18-44 and 45-64 age groups. This is similar to findings in the general population.[13] Rates of depression peak in the middle age group for women Veterans and then decline in the oldest age group, across all racial/ethnic groups.

5. Men Veterans had higher frequencies of PTSD than women Veterans in the youngest (18-44) and oldest (65+) age groups, but women had a higher frequency of PTSD in the middle age group (17% vs. 13%). Across genders and age groups, American Indian/Alaska Native Veterans have among the highest rates of PTSD. Among women Veterans, the highest rate of PTSD (nearly 26%) is seen among American Indian/Alaska Natives in the youngest (18-44) age group.
6. The most common risk factors for CVD in both women and men Veterans in the two oldest age groups (44-64 and 65+) were dyslipidemia and hypertension. For the youngest age group (18-44), the most common risk factor for women Veterans was depression and the most common risk factor for men was PTSD.

Cardiovascular Conditions Vary by Sex and Race/Ethnicity – Fewer women than men Veterans had a cardiovascular condition for the 45-64 (12.8% vs. 22.7%) and 65+ (32% vs. 42.4%) age groups. Rates of any cardiovascular condition were higher in men Veterans than in women Veterans across all racial/ethnic groups, with Whites and Multi-race having the highest rates among both women and men.

Higher Frequency of Chest Pain, Palpitations, and Valvular Disease in Women Veterans – Women Veterans were more likely to be diagnosed with chest pain/angina, palpitations, and valvular disease across all age groups, with the exception of 85+. Conversely, women Veterans were less than half as likely to be diagnosed with coronary artery disease (CAD) than men Veterans of the same age. This may represent a true lower prevalence of disease, errors in provider coding, or underdiagnosis.

Fewer Women Undergo Coronary Angiography – Among VHA veteran patients with chest pain/angina, similar proportions of women and men received electrocardiograms (EKG), but fewer women received coronary angiography. Men with chest pain consistently underwent more invasive procedures than did women across all age groups. Strikingly, men in all three age groups underwent coronary angiography as much as twice as often as did women, even though women were much more likely to be diagnosed with chest pain/angina. These findings may represent a higher prevalence of non-cardiac chest pain in women or an under-recognition of coronary artery disease in women.

Among VHA veteran patients with a diagnosis of coronary artery disease, in the 45-64 and 65+ age groups, women were more likely than men to receive coronary angiography and other procedures, except for coronary bypass.

This section of the report evaluated procedures received by women and men with specific CV diagnoses. It must be noted that for all estimates of gender differences in frequencies of receipt of a particular procedure within patients with a particular diagnosis, we do not know if these procedures were received specifically for these diagnoses, and we cannot determine time to treatment.

Key Implications for Policy and Practice

If growth continues at its current pace, and especially if market penetration increases among the large group of women Veterans who currently do not use the VHA, increasing demands on VHA cardiovascular care delivery systems for women are anticipated.

In a little more than a decade, the largest group of women Veterans will be nearing their 70s. These women will require more intensive health services as they age, including CVD care. VHA must meet the needs of the 45-64 and 65+ women Veteran population who are at risk for developing CVD by ensuring provision of state-of-the-art CV services, including diagnosis and treatment of CVD. In addition, with the influx of younger women Veterans into VA, prevention and treatment of risk factors for CVD, such as diabetes, hypertension, dyslipidemia, obesity, depression, PTSD, and tobacco use, must be addressed. Younger women Veterans are more ethnically and racially diverse than the older age groups or men, highlighting the need to target prevention and treatment strategies to at-risk populations.

The high proportion of both women and men Veterans with CVD risk factors — from 56% to 82% — warrants strong programs for prevention and treatment in both genders. For both women and men Veterans in the middle (45-64) and older (65+) age groups, hypertension is the most prevalent CVD risk factor across all ethnicities, whereas in the youngest age group (18-44), depression is the most prevalent risk factor among women and PTSD the most prevalent risk factor among men.

Because depression is more common in women than men Veterans, similar to the pattern in the general population, and because of the increasing evidence suggesting that depression is a significant risk factor for CVD, there is a need for gender-focused mental health treatment and further study of the impact of mental health conditions on CV risk.

Women Veterans are more likely than men of the same age group to be diagnosed with chest pain/angina, palpitations, and valvular disease, but they are less likely to be diagnosed with coronary artery disease (CAD). Fewer women with chest pain receive invasive procedures than men to diagnose and treat these conditions, but more women than men with diagnosed CAD receive these procedures. These findings may be related to a higher prevalence of non-cardiac chest pain in women or under-recognition or underdiagnosis of CAD. These findings underscore the need for focused research on chest pain and coronary artery disease diagnosis and treatment in women to both raise awareness of CVD in women Veterans and better understand etiologies and treatment for non-cardiac chest pain among younger women.

Introduction

Background

The face of the Department of Veterans Affairs is changing. Women now make up 15% of active duty military. Further, they are separating from service and using the VA in record numbers. While the number of male Veterans is declining, the number of female Veterans is rising, and the number of female Veterans using VHA for their medical care has nearly doubled in the past decade. VA is ramping up services to ensure that all women receive equitable, high-quality health care throughout their lifespan.

In 2008, the VA Under Secretary for Health (USH) convened a task force to evaluate the care provided to women Veterans. The task force's report noted that women had more fragmented primary care and that there were differences in clinical quality measures for women compared with men. In response to the task force report, VHA WHS developed policy to require the implementation of comprehensive women's health by trained and proficient women's health providers at all sites of care, deployed Women Veteran Program Managers in every healthcare system, and educated thousands of providers in basic and advanced women's health through the WHS Mini-Residency Program.

These changes have transformed primary care for women Veterans so that they now have access to trained and proficient designated women's comprehensive primary care providers at all VHA healthcare systems. From 2008-2014, the VA also saw a significant improvement in gender disparities for many clinical prevention measures. The VA now outperforms most private and public sector healthcare organizations in these quality measures for both women and men.[4]

VA must now move beyond primary care and gender-specific care to ensure that women have equitable access to specialty care services. This is of particular importance for cardiovascular disease (CVD), which is the leading cause of death among women in major developed countries and many developing countries.[14] Nationally (in the civilian sector), gender differences have been identified in CVD symptoms, physiology, quality of care, and outcomes.[1,2,3,4] However, more needs to be learned about the prevalence of CVD or CV care in women Veterans using VA health care.

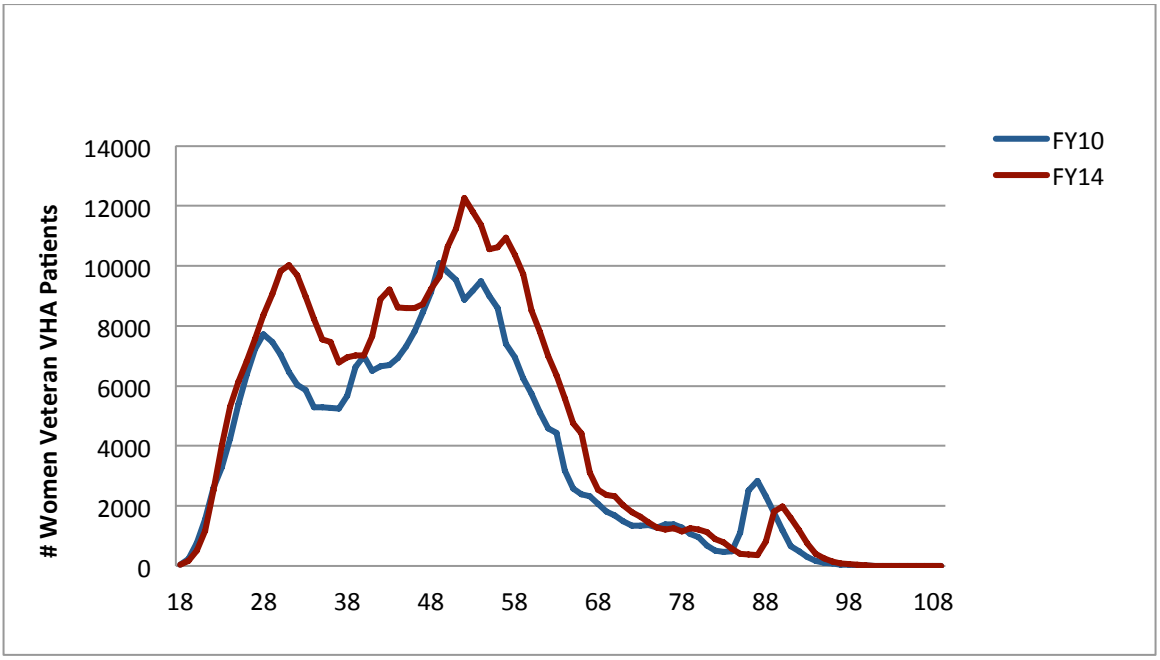
To begin assessing the state of CV care in women Veterans, WHS formed the Cardiovascular Health in Women Veterans Workgroup made up of researchers and subject-matter experts to further evaluate issues related to women Veterans' CV health in 2011. The Workgroup's first report, published in 2013, focused largely on women Veterans' outpatient cardiovascular care. The purpose of this second report, covering FY14, is to provide a more complete assessment of cardiovascular conditions, risk factors, and procedures, both outpatient and inpatient. This report also deals with care received by VA patients both inside and outside the VA.

Growing Population of Women Veterans Using VHA

The number of women Veterans using VHA has grown significantly, increasing nearly 30% between FY10 through FY14, from 316,903 women Veterans in FY10 to 412,901 in FY14. During the same time period, the number of men Veterans using the VA system increased more slowly, from 5,036,990 men Veterans in FY10 to 5,376,749 in FY14, an increase of 7%.

Figure 1 shows the number of women at each age, from 18 to 110 inclusive, at the end of FY10 (the dotted blue line) and at the end of FY14 (the bold red line). In FY10, three peaks are evident: one between ages 28 and 33, one between ages 47 and 52, and one between ages 85 and 90. By 2014, the peaks shifted upward and to the right, showing both the growth and aging of the women Veteran patient population. The first peak occurring in the women's early 30s reflects the growing numbers of younger women entering the VA system from the latest conflicts in Iraq and Afghanistan. The second and highest peak occurs at age 52, with a third peak occurring at age 90. Veterans Integrated Service Network (VISN)-level data are available in Table 6 in Appendix A.

Figure 1. Age distribution among women Veteran VHA patients, FY10 through FY14



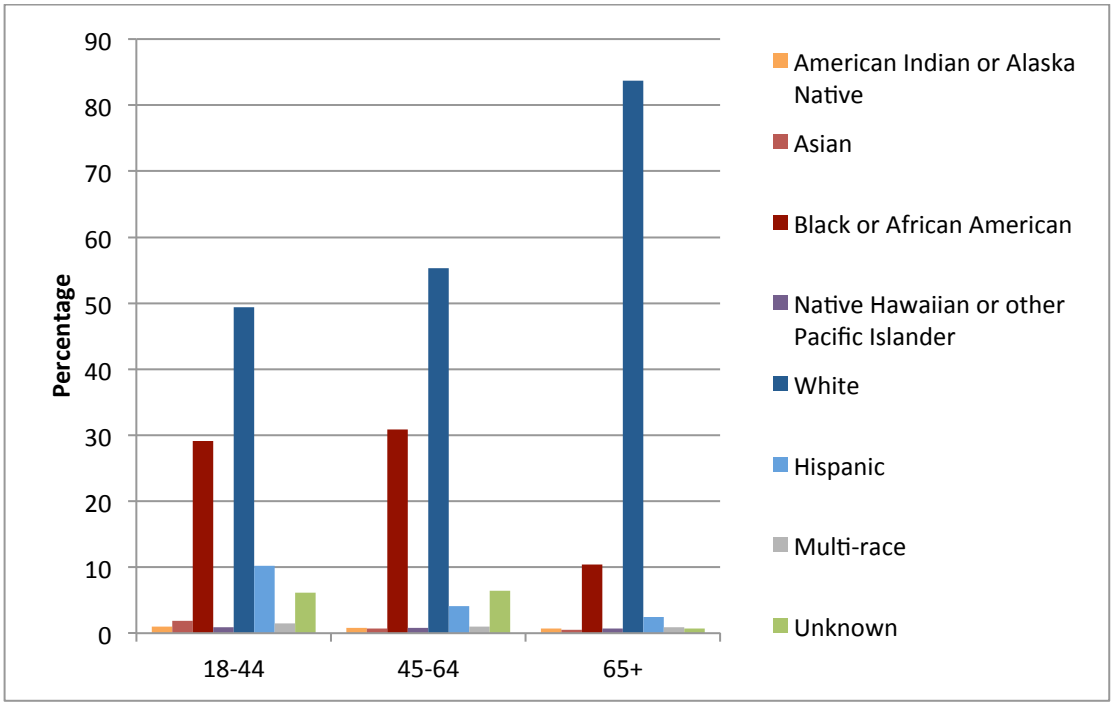
Key: FY – Fiscal Year
Notes: Findings portray women Veteran VHA patients, not the entire women Veteran population. See Appendix B: Technical Appendix.
Cohort: Women Veteran patients with non-missing ages 18-110 years (inclusive) in FY10: N=316,903 FY14: N=412,696
Source: WHEI Master Database

Notes to Interpretation: In a little more than a decade, the largest group of women Veterans will be nearing their 70s. These women will require more intensive health services as they age, including CVD care. VHA must meet the needs of the 45-64 and 65+ women Veteran population who are at risk for developing CVD. In addition, with the influx of younger women Veterans into the VA, prevention and treatment of risk factors for CVD, such as diabetes, hypertension, dyslipidemia, obesity, and tobacco use, must be addressed.

Figure 2 shows the relative distributions of women Veteran patients by race/ethnicity for three different age groups in FY14. For the 65+ cohort, women and Veteran patients are overwhelmingly White (84%), with Black or African Americans making up the second largest race/ethnic group (10%). More racial/ethnic diversity is evident in the younger cohorts. In fact, the most diverse cohort is women Veteran patients ages 18 to 44 (White: 49%; Black/African American: 29%; Hispanic: 10%; and American Indian/Alaska Native, Asian, Multi-race, Native Hawaiian/Other Pacific Islander collectively: 5%). The

increasing diversity of the women Veteran patient population has important implications in preventing the development of and/or mortality from CVD, as Hispanics, Black/African Americans, and American Indian/Alaska Natives have a higher prevalence of certain modifiable risk factors for CVD than do Whites and may encounter additional barriers to care.[15]

Figure 2. Racial/ethnic distribution of women Veteran VHA patients by age, FY14



Key: FY – Fiscal Year
Notes: Findings portray women Veteran VHA patients, not the entire Veteran population. See Appendix B: Technical Appendix.
Cohort: Women Veteran patients with non-missing ages 18-110 years (inclusive) in FY14: N=412,696
Source: WHEI Master Database

Notes to Interpretation: Women Veterans in the younger age groups (18-44 and 45-64 years) are more racially and ethnically diverse compared with those ages 65+. This has implications for prevention of and mortality due to CVD, as Hispanics, Black/African Americans, and American Indian/Alaska Natives have a higher prevalence of certain modifiable risk factors such as hypertension, obesity, and diabetes.

Cardiovascular Disease in Women Veterans

Cardiovascular disease continues to be the number one cause of death for both women and men in the United States.[1] Gender differences have been identified in CVD symptoms, physiology, quality of care, and outcomes.[1,2,3,4] Non-Veteran women with CVD tend to be older than their male counterparts and to have more co-morbid conditions. They also have a worse prognosis after sustaining a CV event, in spite of having less obstructive coronary artery disease (CAD).[16]

Little has been known about the prevalence of CVD risk factors or diagnoses of CV conditions in women Veterans. There is also a paucity of data regarding the type of treatments women Veterans receive for a specific CVD diagnosis. A national telephone survey of women Veterans in 2008 found that black women Veterans were more likely to report a diagnosis of diabetes or hypertension and to be more

obese than white women Veterans, whereas Hispanic women Veterans were more likely to report a diagnosis of diabetes and a habit of daily smoking.[2] Another study found that LDL cholesterol values were higher in women Veterans than in men Veterans and that blood pressure was higher among black women Veterans than white women Veterans.[17] Compared with non-Veteran women, women Veterans using VA for maternity benefits had higher rates of gestational diabetes and hypertensive disorders of pregnancy, both of which have been identified as risks for cardiovascular disease in later life.[18] In a study of Veterans undergoing cardiac catheterization in VHA, women who received catheterization tended to have higher rates of obesity, depression, and PTSD, but less obstructive coronary disease and similar long-term outcomes compared with men.[19]

To begin assessing the state of CV care in women Veterans, WHS formed the Cardiovascular Health in Women Veterans Workgroup made up of researchers and subject-matter experts. To facilitate dissemination of major findings to a broader audience, key sociodemographic and VHA outpatient healthcare data related to CVD risk factors, conditions, procedures, and clinic utilization were organized into the first phase of a series of reports related to CV health in women Veterans; the first report was published in 2014. To further evaluate the state of cardiovascular health in Women Veterans, in addition to data on VA outpatient care, this second volume includes data on VA inpatient care, non-VA outpatient and inpatient care, data by race/ethnicity, and data by geographical region (indicated by Veteran Integrated Service Network [VISN].

Data from our first cardiovascular report indicated that women and men Veterans had high frequencies of CV risk factors, although rates were higher for men than for women. However, women Veterans manifested higher rates of depression across all age groups than men Veterans. Rates of PTSD were highest in the youngest age group, and men were slightly more likely than women to carry that diagnosis. Cardiovascular conditions grew more prevalent in older age groups, and most conditions were more common in men Veterans than in women Veterans, with the exception of chest pain/angina, palpitations, and valvular heart disease.

Among VHA Veteran patients with chest pain, a lower proportion of women than men received EKGs and a lower proportion of women than men received a stress test procedure. However, among women with heart failure or atrial fibrillation, a higher proportion of women than men received at least one echocardiogram or EKG. Access to inpatient as well as Non-VA (Fee) Medical Care data in this volume allows us to provide additional information on diagnoses and procedures performed among women and men Veterans.

The growth and aging of the women Veteran population highlight the need to understand CVD among women Veterans. Although little is known about the prevalence of CVD in women Veterans, CVD is the leading cause of mortality among women in the general population, claiming more lives than cancer, chronic respiratory diseases, Alzheimer's disease, and accidents combined.[7]

In 2007, 421,918 women died of CVD in the United States — about 1 death per minute.[19] Contrary to popular belief, more women die of CVD than men.[20] Although public health campaigns have drawn attention to the under-recognized burden of CVD among women, disparities in knowledge and treatment persist.

In the civilian population, women are less likely to receive evidence-based CVD therapies than men[1] and may be diagnosed later than men, due in part to the more vague and/or atypical nature of CVD symptoms in women.[21] Women have higher mortality following myocardial infarction,[22] as well as a higher incidence of subsequent heart failure.[23] Gender disparities have been identified in risk factors, prevention, treatment, and outcomes in non-Veteran and Veteran populations. After age 65, more women than men have hypertension, and two of every three U.S. women are overweight or obese.[24] Women with diabetes may be less likely to achieve glycosylated hemoglobin control than men.[25] Of particular concern is cholesterol management. Despite American Heart Association (AHA) guidelines that recommend diet and lifestyle modifications and statin therapy to achieve low-density lipoprotein cholesterol (LDL-C) <100 in high-risk women,[14] numerous studies have shown that women are less likely than men to be screened[15,26] and achieve treatment goals.[5,6,7] Similar disparities are found in commercial and Medicare-managed care plans,[27] as well as within the VA healthcare system.[28]

Methods

Overview. This report presents descriptive data on women and men Veterans who received medical care through VHA at least once in FY14, specifically focusing on CVD risk factors, conditions, and procedures. The data for this report were derived from four centralized VHA administrative files: (1) the Assistant Deputy Under Secretary for Health (ADUSH) Monthly Enrollment File; (2) the VHA Outpatient Encounter [SE] File; (3) the VHA Inpatient Files (PTF); and (4) Non-VA (Fee) Medical Care Outpatient and Inpatient files. All data sources are further described in detail in Appendix B: Technical Appendix.

The results reported here represent the aggregate of patient data from each of the four care settings: VHA Outpatient (VHA OP), VHA Inpatient (VHA IP), Non-VA (Fee) Medical Care Outpatient (FEE OP), and Non-VA (Fee) Medical Care Inpatient (FEE IP). The relative contribution to the aggregate data from each of these files for women and men Veterans is shown in parentheses next to the age group and care setting name under each figure in report. Because a Veteran may receive care in any of these settings, he or she may be represented in just one data file or in all four. Table 1 displays the number of women Veteran patients by age group and care setting, and Table 2 displays the number of men Veteran patients by age group and care setting. VISN-level data on women and men Veterans using VA health care are displayed in Table 6 in Appendix A. Both women and men Veteran patients receive most of their care in the VHA outpatient setting.

Table 1. Total number of women Veterans using VHA by type of care (VA outpatient/inpatient vs. non-VA outpatient/inpatient) and by age, FY14

Age	All Users	Total Outpatient	VA Outpatient	VA Inpatient	Non-VA (Fee) Medical Care Outpatient	Non-VA (Fee) Medical Care Inpatient
18-44	175,614	168,089	164,838	8,030	38,568	8,969
45-64	189,557	183,073	181,527	14,823	43,304	7,947
65+	47,525	45,061	44,690	4,604	7,849	2,176

Table 2. Total number of men Veterans using VHA by type of care (VA outpatient/inpatient vs. non-VA outpatient/inpatient) and by age, FY14

Age	All Users	Total Outpatient	VA Outpatient	VA Inpatient	Non-VA (Fee) Medical Care Outpatient	Non-VA (Fee) Medical Care Inpatient
18-44	788,123	754,149	739,419	40,716	125,113	14,007
45-64	1,853,884	1,796,995	1,776,785	180,010	358,773	78,916
65+	2,734,470	2,625,827	2,602,949	220,416	379,638	81,149

Characteristics Examined. This report examines a number of specific cardiovascular risk factors, conditions, and procedures. The specific variables include the following:

- **Risk Factors: "**Any Major CV Risk Factor" is an aggregate variable that includes Depression, Diabetes (non-pregnancy related), Hypertension (non-pregnancy related), Dyslipidemia, Family history of CVD, Morbid Obesity, Obesity, Overweight, Posttraumatic Stress Disorder (PTSD), and Tobacco Use. Individual risk factor variables include Diabetes, Hypertension, Dyslipidemia, Depression, and PTSD.
- **Conditions:** "Any CV Condition" is an aggregate variable that includes Chest pain/Angina, Atrial Fibrillation/Atrial Flutter, Cardiac Arrest, Conduction (Fine), Device (Pacemaker/ICD), Tachycardia/Arrhythmia-Other, Cardiac Conditions-Other, Cardiac Tamponade, Myocarditis, Other Carditis, Pericarditis, Acute Stroke, Other Cerebrovascular Disease, Late Effects of Cerebrovascular Disease, Transient Ischemic Attack (TIA), Acute Myocardial Infarction (MI), Coronary Artery Disease (Non-MI), MI Sequelae, Heart Failure (Non-Pulmonary Heart Disease), Pulmonary Heart Disease, Endocarditis, Valvular Disease (Non-Endocarditis), Peripheral Vascular Disease (Non-Aortic Abdominal Aneurysm), Peripheral Vascular Disease (Aortic Abdominal Aneurysm [AAA]), and Vascular Disease-Other. Individual conditions include Chest pain/Angina, Palpitations, Coronary Heart Disease, Heart Failure, Atrial Fibrillation/Atrial Flutter, Tachycardia/Arrhythmia, and Conduction Disorder.
- **Procedures:** "Any Procedure" is an aggregate variable that includes Electrophysiology Mapping and Ablation, Ambulatory Electrocardiogram (EKG) Monitoring, Cardioversion and Pacing, Coronary Angiography, Coronary Artery Bypass Graft (CABG), Coronary Intervention-PTCA (Percutaneous Transluminal Coronary Angioplasty), Echocardiogram, ECHO Stress Test, Non Imaging Stress Test, Nuclear Stress Test, EKG, ICD/Pacemaker Maintenance, ICD/Pacemaker (Insertion/Replacement/Revision), and Right Heart Catheterization/Swan, Thrombolysis. "Any Stress Test" is an aggregate variable that includes ECHO stress test, Nuclear Stress Test, and Non-imaging Stress Test. "Any Catherization" is an aggregate variable that includes Coronary Angiography and Coronary Intervention-PTCA.
- **Analyses:** The data in this report are mostly descriptive. We compared the frequency of CV risk factors, conditions, and procedures received by women and men Veterans seeking health care through VHA in FY 2014. Note: In most cases, proportions of women and proportions of men are presented, but no test of statistical significance is performed; therefore, it is not known whether unadjusted differences presented here are statistically significant. In some cases, however, logistic

regression was used to determine age-adjusted odds ratios and 95% confidence intervals (CI) for women and men receiving diagnoses and procedures.

The analyses in the diagnoses section are organized as follows:

- Diagnoses of CV risk factors in women and men Veterans, FY14
  - By age group
  - By age, race/ethnicity
  - By VISN
  - Age-adjusted odds ratios (women vs. men)
- Diagnoses of CVD conditions in women and men Veterans, FY14
  - By age group
  - By age, race/ethnicity
  - By VISN
  - Age-adjusted odds ratios (women vs. men)

The analyses in the procedures section are organized as follows:

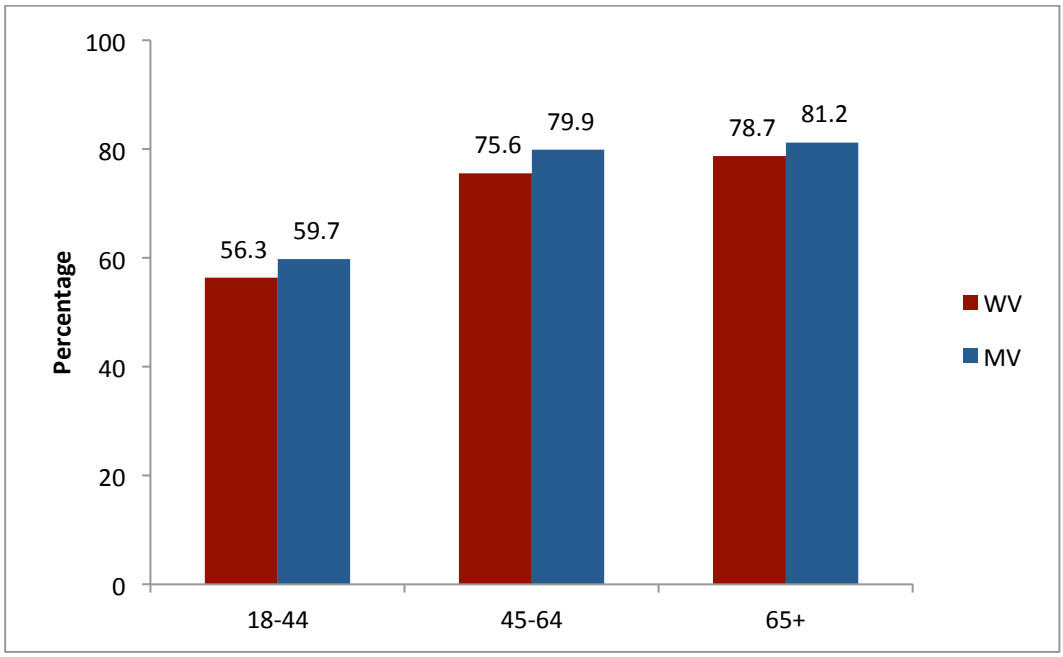
- Frequency of CV procedures received by women and men Veterans who also had at least one instance of a CV condition, FY14
  - By age group
  - By VISN

Results

Cardiovascular Risk Factors

Prevalence of Any Major Cardiovascular Disease Risk Factor. In FY14, both women and men Veteran patients had high frequencies of any major cardiovascular disease (CVD) risk factor across all age groups, with the highest rates seen in the 65+ age group (Figure 3). This included having one or more instances of receiving a diagnosis of dyslipidemia, diabetes, hypertension, depression, PTSD, obesity, morbid obesity or overweight, or having a family history of CVD/stroke or tobacco use. Although lower frequencies were seen in women than men across all age groups, the prevalence of women Veterans with at least one CVD risk factor is of concern: ages 18-44 (56.3%), 45-64 (75.6%) and 65+ (78.7%). VISN-level data for women and men Veterans by age group is displayed in Table 7 in Appendix A.

Figure 3. Proportion of Veterans with any major CVD risk factor by gender and age, FY14



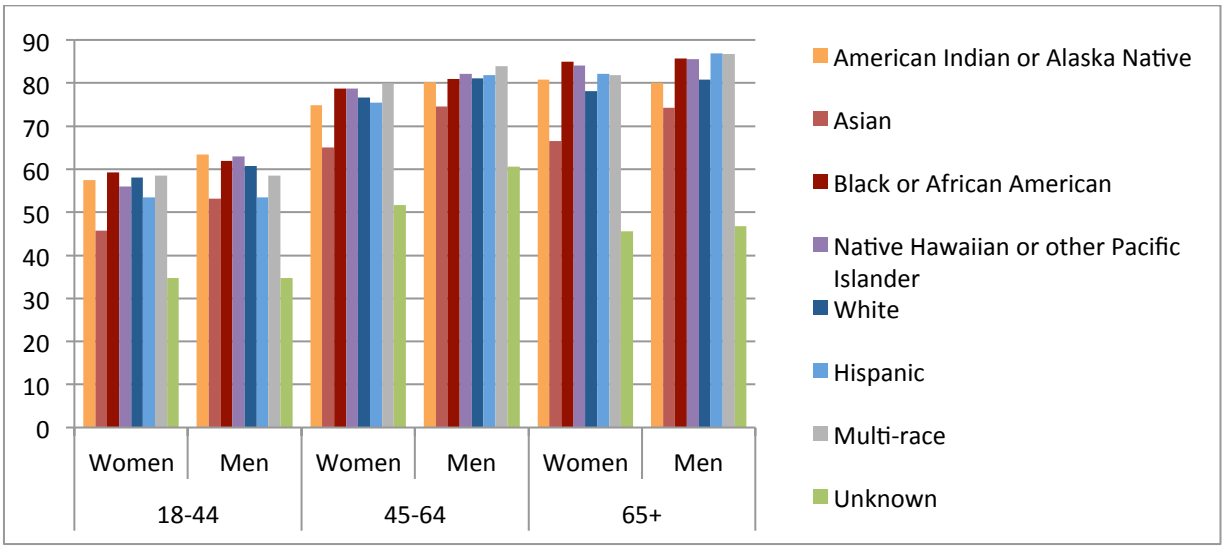
Key: VHA – Veterans Health Administration; WV- Women Veterans; MV – Men Veterans; FY – Fiscal Year
Notes: Any major CV risk factor includes depression, dyslipidemia, diabetes non-pregnancy related, hypertension non-pregnancy related, tobacco use, family history of CVD/stroke, morbid obesity, obesity, overweight, and PTSD. See Appendix B: Technical Appendix for a full list of variables and ICD-9 codes.
Cohort: Women and men Veterans using VHA in FY14: Women: 18-44 (175,614); 45-64 (189,557); 65+ (47,525). Men: 18-44 (788,123); 45-64 (1,853,884); 65+ (2,734,470)
Source: WHEI Master Database

Notes to Interpretation: Findings portray high rates of major CVD risk factors in all age groups, for both women and men Veterans. Women had slightly lower rates than men in every age group.

Proportions of Veterans with at least one instance of any CVD risk factor by age group and care setting:
18-44: VHA OP (W 59.2%, M 63.1%); VHA IP (W 68.0%, M 78.3%); FEE OP (W 5.5%, M 5.3%); FEE IP (W 32.9%, M 59.9%)
45-65: VHA OP (W 78.2%, M 82.3%); VHA IP (W 80.4%, M 84.8%); FEE OP (W 6.0%, M 7.3%); FEE IP (W 52.5%, M 63.3%)
65+: VHA OP (W 82.2%, M 84.2%); VHA IP (W 83.7%, M 85.0%); FEE OP (W 7.6%, M 7.8%); FEE IP (W 49.4%, M 49.4%)

Figure 4 shows the frequencies of any major risk factor by gender, age, and race/ethnicity. Across both genders and all race/ethnicity categories, the frequency of any major CVD risk factor increases with age. Generally speaking, women have lower frequencies of having at least one CVD risk factor across all race/ethnicity groups than do men in the same age group. However, as see in Table 3 on page 31, after age 75, there is no difference between women and men in the prevalence of most CVD risk factors. In Veterans ages 85+, the prevalence of hypertension is higher in women than in men.

Figure 4. Proportion of Veterans with any major CVD risk factor by gender, age, and race/ethnicity, FY14



Key: VHA – Veterans Health Administration; FY – Fiscal Year
Notes: Any major CV risk factor includes depression, dyslipidemia, diabetes non-pregnancy related, hypertension non-pregnancy related, tobacco use, family history of CVD/stroke, morbid obesity, obesity, overweight and PTSD. See Appendix B: Technical Appendix for a full list of variables and ICD-9 codes.
Cohort: Women and men Veterans using VHA in FY14: Women: 18-44 (175,614); 45-64 (189,557); 65+ (47,525). Men: 18-44 (788,123); 45-64 (1,853,884); 65+ (2,734,470)
Source: WHEI Master Database

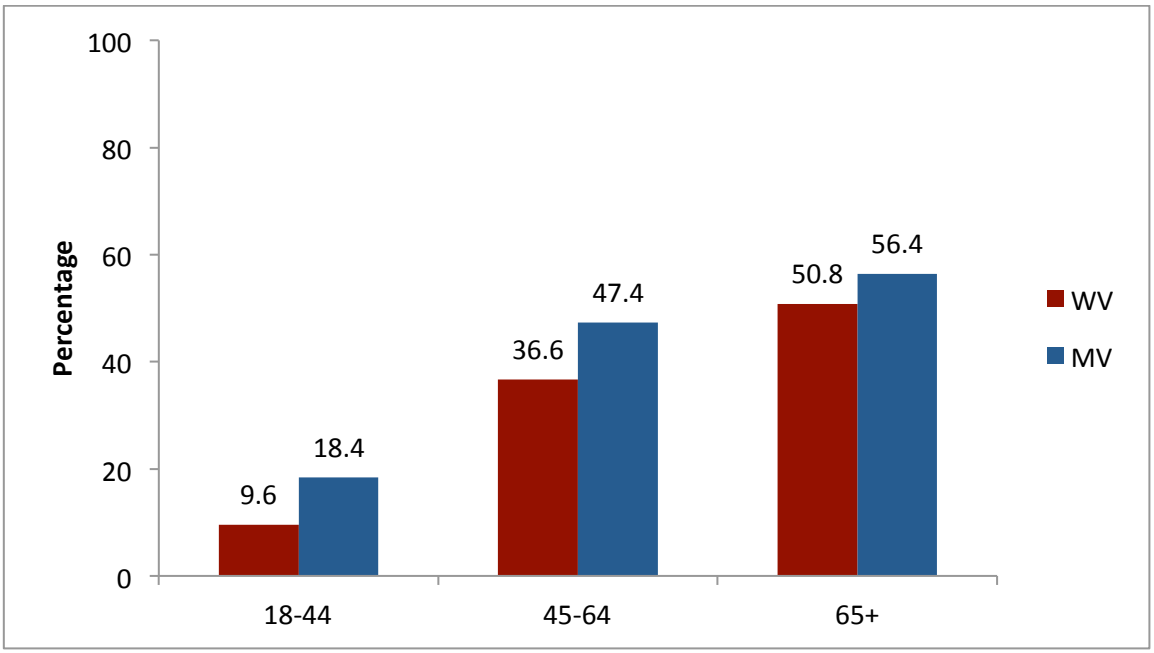
Notes to Interpretation: Across all racial/ethnicity groups, the prevalence of at least one CVD risk factor increases with age in both women and men Veterans. The highest rate is seen in older Hispanic men, whereas the lowest rate is seen in young Asian women.

Proportions of Veterans with at least one instance of any CVD risk factor by age group and care setting:
18-44: VHA OP (W 59.2%, M 63.1%); VHA IP (W 68%, M 78.3%); FEE OP (W 5.5%, M 5.3%); FEE IP (W 32.9%, M 59.9%)
45-65: VHA OP (W 78.2%, M 82.3%); VHA IP (W 80.4%, M 84.8%); FEE OP (W 6%, M 7.3%); FEE IP (W 52.5%, M 63.3%)
65+: VHA OP (W 82.2%, M 84.2%); VHA IP (W 83.7%, M 85%); FEE OP (W 7.6%, M 7.8%); FEE IP (W 49.4%, M 49.4%)

Traditional Risk Factors. Compared with men of the same age, women had fewer diagnoses of dyslipidemia (Figure 5), diabetes (Figure 7), and hypertension (Figure 9) across all age groups. However, like men, the prevalence of each of these traditional risk factors increased with age. The most common CVD risk factor among both women and men was hypertension, especially in the older age group. Further, rates of dyslipidemia, diabetes, and hypertension increased with age across all racial/ethnic

groups in both genders (Figures 6, 8, and 10). VISN-level data for women and men Veterans by age group for the traditional risk factors are displayed in Tables 8, 9, and 10 in Appendix A.

Figure 5. Proportion of Veterans with a diagnosis of dyslipidemia by gender and age, FY14

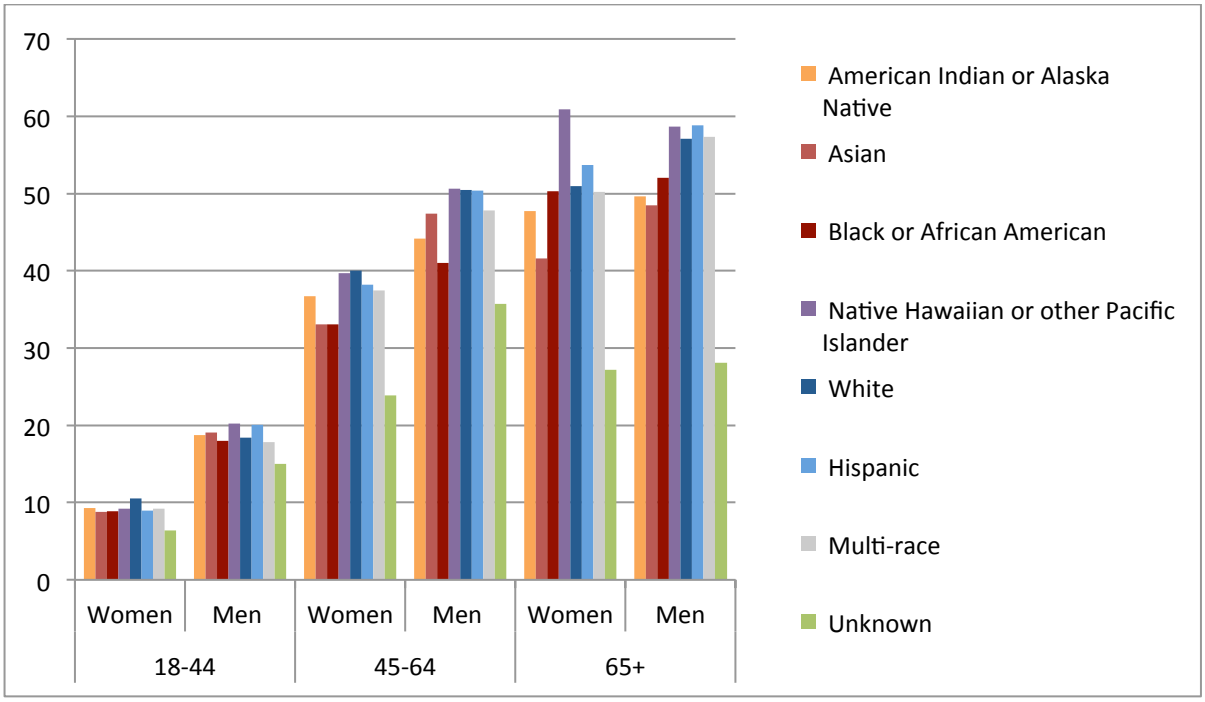


Key: VHA – Veterans Health Administration; WV- Women Veterans; MV – Men Veterans; FY – Fiscal Year
Notes: Presence of dyslipidemia was determined by having at least one instance of an ICD-9 code. See Appendix B: Technical Appendix for details on variable development and a full list of ICD-9 codes used.
Cohort: Women and men Veterans using VHA in FY14: Women: 18-44 (175,614); 45-64 (189,557); 65+ (47,525). Men: 18-44 (788,123); 45-64 (1,853,884); 65+ (2,734,470)
Source: WHEI Master Database

Notes to Interpretation: Findings show increasing rates of dyslipidemia for both women and men Veterans with age. Women have lower rates of dyslipidemia than men, but the difference narrows with increasing age.

Proportions of Veterans with a diagnosis of dyslipidemia by age group and care setting:
18-44: VHA OP (W 10%, M 19.2%); VHA IP (W 9.7%, M 16.8%); FEE OP (W 0%, M 0.1%); FEE IP (W 2.3%, M 10.1%)
45-65: VHA OP (W 37.2%, M 48%); VHA IP (W 33.9%, M 39.5%); FEE OP (W 0.1%, M 0.1%); FEE IP (W 18.7%, M 27.5%)
65+: VHA OP (W 52.1%, M 57.9%); VHA IP (W 44.2%, M 45.8%); FEE OP (W 0.2%, M 0.1%); FEE IP (W 25.6%, M 26.8%)

Figure 6. Proportion of Veterans with a diagnosis of dyslipidemia by gender, age, and race/ethnicity, FY14

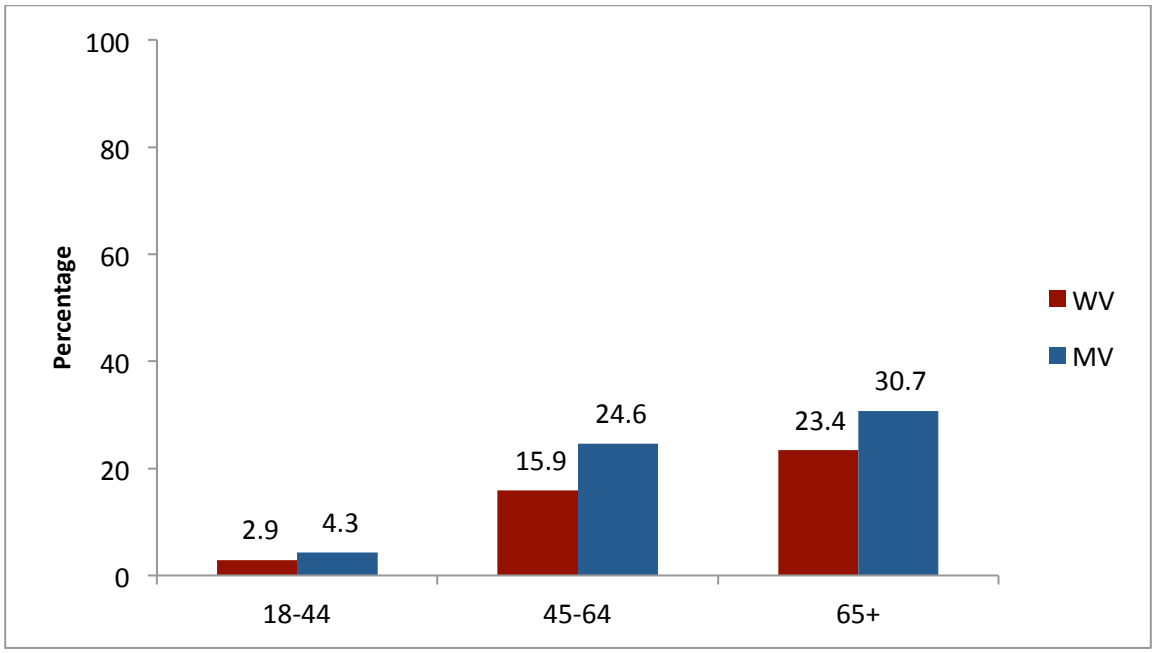


Key: VHA – Veterans Health Administration; FY – Fiscal Year
Notes: Presence of dyslipidemia was determined by having at least one instance of an ICD-9 code. See Appendix B: Technical Appendix for details on variable development and a full list of ICD-9 codes used.
Cohort: Women and men Veterans using VHA in FY14: Women: 18-44 (175,614); 45-64 (189,557); 65+ (47,525). Men: 18-44 (788,123); 45-64 (1,853,884); 65+ (2,734,470)
Source: WHEI Master Database

Notes to Interpretation: Findings show increasing rates of dyslipidemia across all racial/ethnic groups for both women and men Veterans with increasing age. The highest rates of dyslipidemia are found among older Hispanic and Native Hawaiian/Pacific Islander women and men.

Proportions of Veterans with at least one instance of any CVD risk factor by age group and care setting:
18-44: VHA OP (W 59.2%, M 63.1%); VHA IP (W 68%, M 78.3%); FEE OP (W 5.5%, M 5.3%); FEE IP (W 32.9%, M 59.9%)
45-65: VHA OP (W 78.2%, M 82.3%); VHA IP (W 80.4%, M 84.8%); FEE OP (W 6%, M 7.3%); FEE IP (W 52.5%, M 63.3%)
65+: VHA OP (W 82.2%, M 84.2%); VHA IP (W 83.7%, M 85%); FEE OP (W 7.6%, M 7.8%); FEE IP (W 49.4%, M 49.4%)

Figure 7. Proportion of Veterans with a diagnosis of diabetes by gender and age, FY14

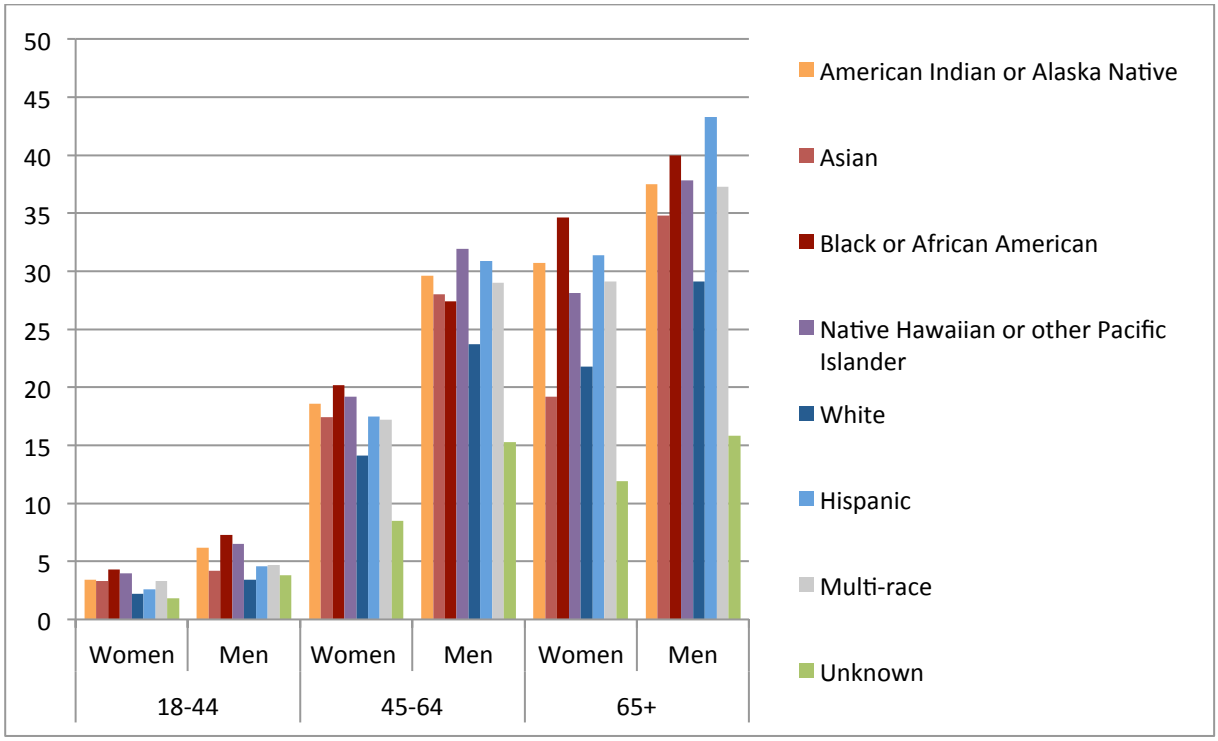


Key: VHA – Veterans Health Administration; WV- Women Veterans; MV – Men Veterans; FY – Fiscal Year
Notes: Presence of diabetes was determined by having at least one instance of an ICD-9 code. See Appendix B: Technical Appendix for details on variable development and a full list of ICD-9 codes used.
Cohort: Women and men Veterans using VHA in FY14: Women: 18-44 (175,614); 45-64 (189,557); 65+ (47,525). Men: 18-44 (788,123); 45-64 (1,853,884); 65+ (2,734,470)
Source: WHEI Master Database

Notes to Interpretation: Findings show a lower proportion of women Veterans with diabetes than men Veterans, as well as increasing rates of diabetes with increasing age.

Proportions of Veterans with a diagnosis of diabetes by age group and care setting:
18-44: VHA OP (W 3%, M 4.5%); VHA IP (W 5.6%, M 7.2%); FEE OP (W 0.4%, M 0.7%); FEE IP (W 2.4%, M 7.2%)
45-65: VHA OP (W 16.3%, M 25.2%); VHA IP (W 22.4%, M 30.8%); FEE OP (W 1.9%, M 3.6%); FEE IP (W 14.7%, M 23.2%)
65+: VHA OP (W 24.3%, M 31.7%); VHA IP (W 30.7%, M 37.4%); FEE OP (W 3.5%, M 4.7%); FEE IP (W 18.8%, M 22.8%)

Figure 8. Proportion of Veterans with a diagnosis of diabetes by gender, age, and race/ethnicity, FY14

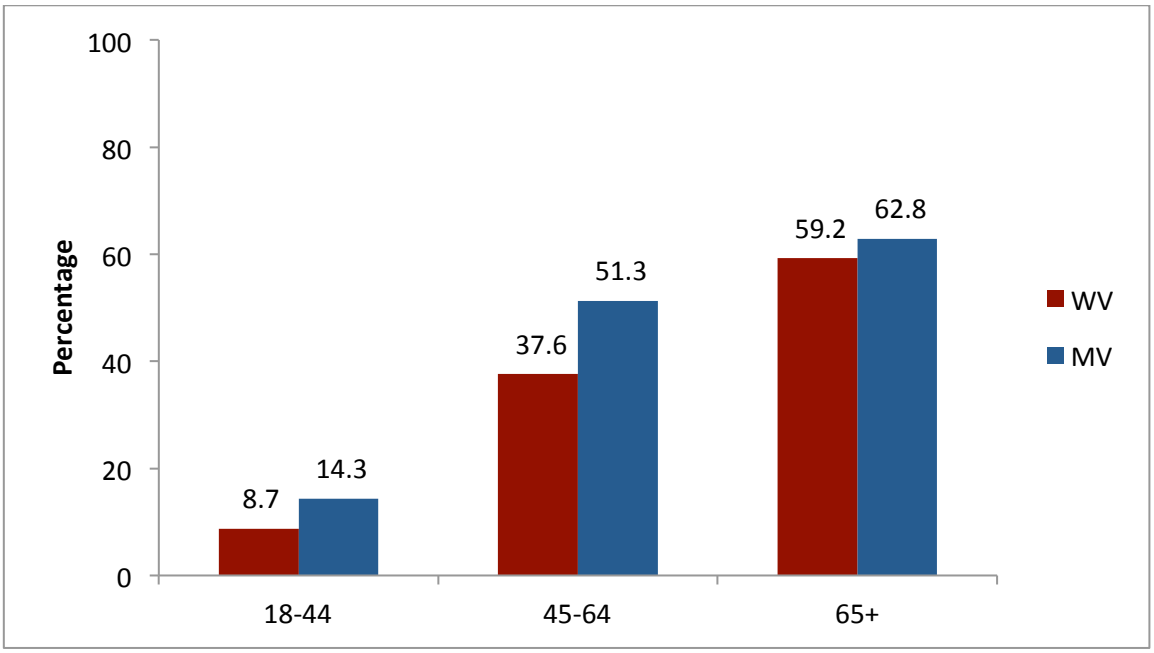


Key: VHA – Veterans Health Administration; FY – Fiscal Year
Notes: Presence of diabetes was determined by having at least one instance of an ICD-9 code. See Appendix B: Technical Appendix for details on variable development and a full list of ICD-9 codes used.
Cohort: Women and men Veterans using VHA in FY14: Women: 18-44 (175,614); 45-64 (189,557); 65+ (47,525). Men: 18-44 (788,123); 45-64 (1,853,884); 65+ (2,734,470)
Source: WHEI Master Database

Notes to Interpretation: Findings show increasing rates of diabetes with age across all racial/ethnic groups for both women and men Veterans. The highest rates of diabetes are found among older Hispanic and Black/African-American women and men.

Proportions of Veterans with a diagnosis of diabetes by age group and care setting:
18-44: VHA OP (W 3%, M 4.5%); VHA IP (W 5.6%, M 7.2%); FEE OP (W 0.4%, M 0.7%); FEE IP (W 2.4%, M 7.2%)
45-65: VHA OP (W 16.3%, M 25.2%); VHA IP (W 22.4%, M 30.8%); FEE OP (W 1.9%, M 3.6%); FEE IP (W 14.7%, M 23.2%)
65+: VHA OP (W 24.3%, M 31.7%); VHA IP (W 30.7%, M 37.4%); FEE OP (W 3.5%, M 4.7%); FEE IP (W 18.8%, M 22.8%)

Figure 9. Proportion of Veterans with a diagnosis of hypertension by gender and age, FY14

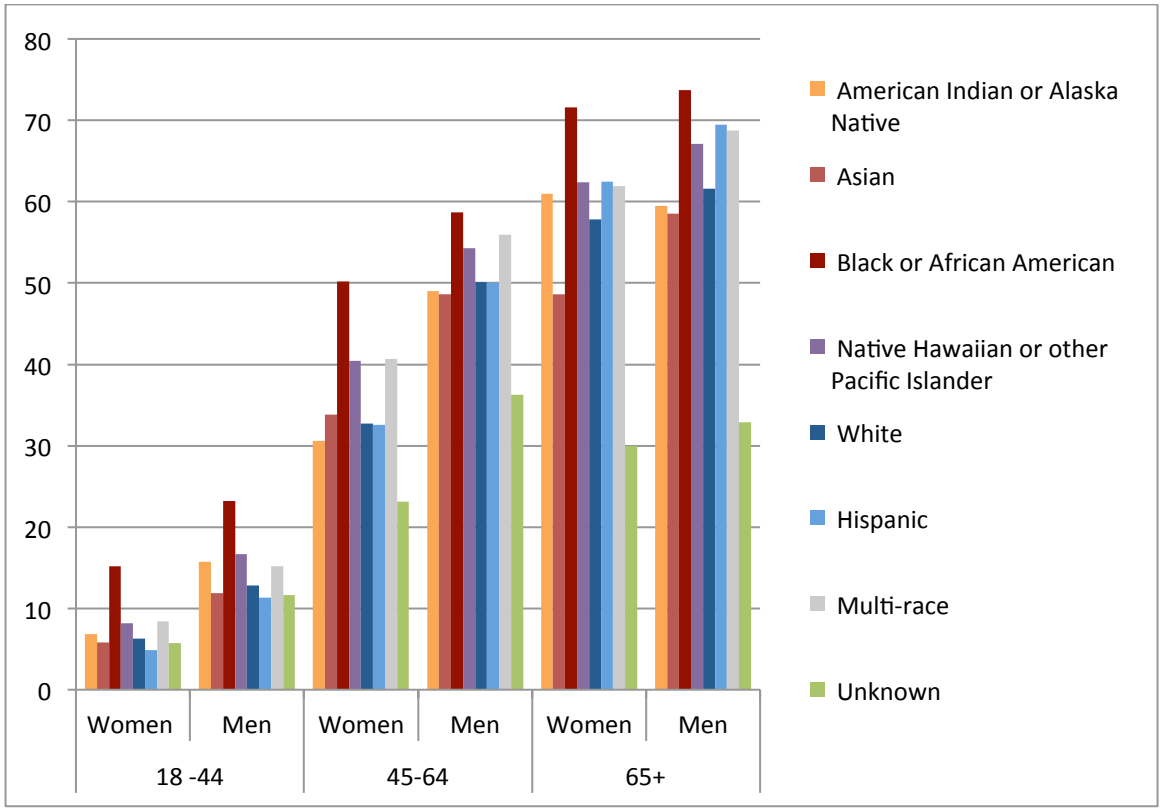


Key: VHA – Veterans Health Administration; WV- Women Veterans; MV – Men Veterans; FY – Fiscal Year
Notes: Presence of hypertension was determined by having at least one instance of an ICD-9 code. See Appendix B: Technical Appendix for details on variable development and a full list of ICD-9 codes used. Non-pregnancy related codes only.
Cohort: Women and men Veterans using VHA in FY14: Women: 18-44 (175,614); 45-64 (189,557); 65+ (47,525). Men: 18-44 (788,123); 45-64 (1,853,884); 65+ (2,734,470)
Source: WHEI Master Database

Notes to Interpretation: Findings show increasing proportions of hypertension with age for both women and men Veterans. Women Veterans had lower rates of hypertension than men Veterans, but the difference narrowed in the highest age group. By ages 85+, the prevalence of hypertension was higher in women Veterans than in men Veterans. Hypertension was the most prevalent of all major CVD risk factors.

Proportions of Veterans with a diagnosis of hypertension by age group and care setting:
18-44: VHA OP (W 8.9%, M 14.7%); VHA IP (W 15.2%, M 23%); FEE OP (W 0.4%, M 0.6%); FEE IP (W 5.6%, M 21.4%)
45-65: VHA OP (W 38.1%, M 51.9%); VHA IP (W 48.3%, M 61%); FEE OP (W 1.2%, M 1.7%); FEE IP (W 32.6%, M 46.9%)
65+: VHA OP (W 61.1%, M 64.5%); VHA IP (W 68.5%, M 70.9%); FEE OP (W 2.4%, M 2.1%); FEE IP (W 39.8%, M 40.8%)

Figure 10. Proportion of Veterans with a diagnosis of hypertension by gender, age, and race/ethnicity, FY14



Key: VHA – Veterans Health Administration; FY – Fiscal Year
Notes: Presence of hypertension was determined by having at least one instance of an ICD-9 code. See Appendix B: Technical Appendix for details on variable development and a full list of ICD-9 codes used. Non-pregnancy related codes only.
Cohort: Women and men Veterans using VHA in FY14: Women: 18-44 (175,614); 45-64 (189,557); 65+ (47,525). Men: 18-44 (788,123); 45-64 (1,853,884); 65+ (2,734,470)
Source: WHEI Master Database

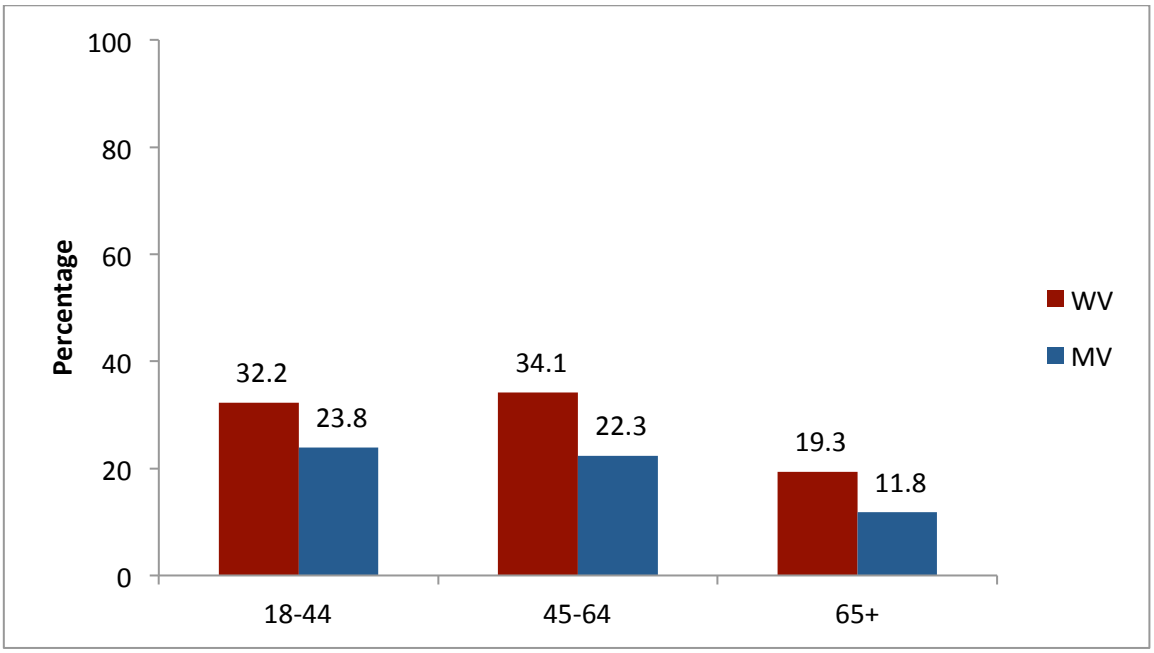
Notes to Interpretation: Findings show increasing rates of hypertension across all racial/ethnic groups for both women and men Veterans with age. The highest rates of hypertension are found among Black/African Americans in all age groups in both women and men Veterans.

Proportions of Veterans with a diagnosis of hypertension by age group and care setting:
18-44: VHA OP (W 8.9%, M 14.7%); VHA IP (W 15.2%, M 23%); FEE OP (W 0.4%, M 0.6%); FEE IP (W 5.6%, M 21.4%)
45-65: VHA OP (W 38.1%, M 51.9%); VHA IP (W 48.3%, M 61%); FEE OP (W 1.2%, M 1.7%); FEE IP (W 32.6%, M 46.9%)
65+: VHA OP (W 61.1%, M 64.5%); VHA IP (W 68.5%, M 70.9%); FEE OP (W 2.4%, M 2.1%); FEE IP (W 39.8%, M 40.8%)

Depression and PTSD: Depression and PTSD are non-traditional risk factors for CVD and are not listed as official risk factors in guidelines.[11,28] However, it has been recently proposed that depression be elevated to the status of an official CVD risk factor. In both the Women's Health Initiative and the Nurse's Health Study, depression is associated with increased ischemic heart disease (IHD) risk and IHD mortality.[29] In young women (age< 55 years), depressive symptoms were associated with increased risk of death compared with men in the same age group.[30] Women Veterans had higher rates of depression in FY14 than men across all age groups.

In our analysis, the highest rates of depression were seen in women in the 18-44 age group (32.2%) and in the 45-64 age group (34.1%) (Figure 11). Across all racial/ethnic groups, the rates of depression diagnosis are higher in women Veterans than in men in each age group, with the highest rates seen in the multi-ethnic category among both women and men Veterans across all age groups (Figure 12). This highlights the need for VA to study the impact of mental illness on CVD risk and to ensure the provision of services focused on the treatment and prevention of CVD in women Veterans with mental health conditions.

Figure 11. Proportion of Veterans with a diagnosis of depression by gender and age, FY14

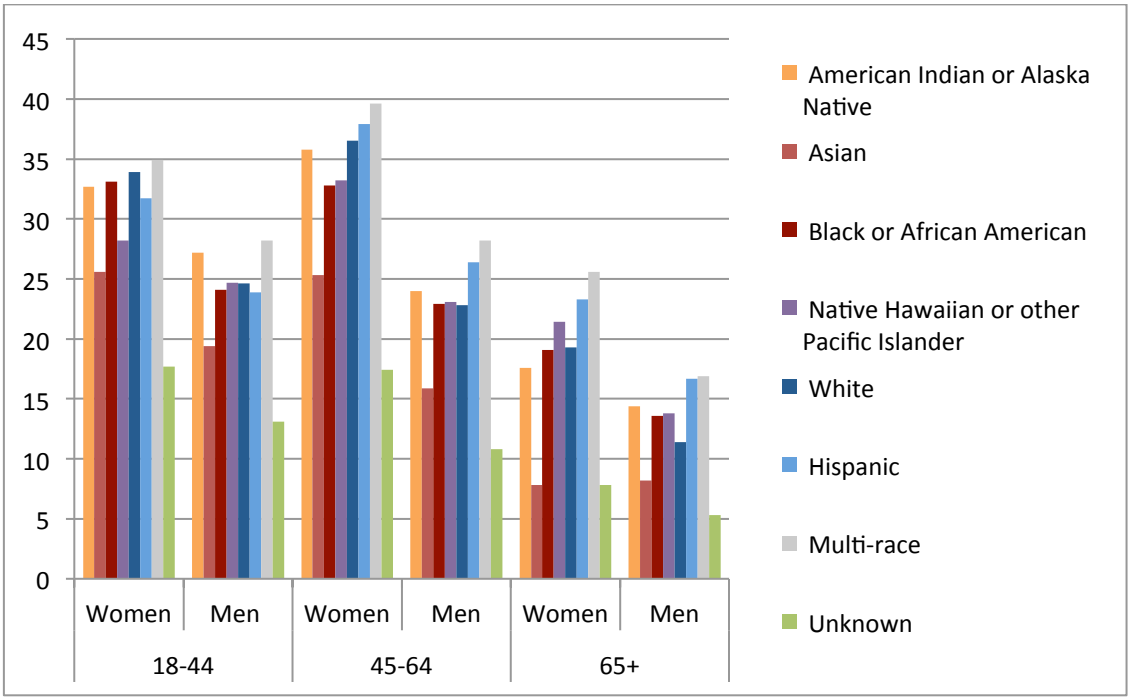


Key: VHA – Veterans Health Administration; WV- Women Veterans; MV – Men Veterans; FY – Fiscal Year
Notes: Presence of depression was determined by having at least one instance of an ICD-9 code. See Appendix B: Technical Appendix for details on variable development and a full list of ICD-9 codes used.
Cohort: Women and men Veterans using VHA in FY14: Women: 18-44 (175,614); 45-64 (189,557); 65+ (47,525). Men: 18-44 (788,123); 45-64 (1,853,884); 65+ (2,734,470)
Source: WHEI Master Database

Notes to Interpretation: In contrast to rates of traditional CVD risk factors, the proportion of women Veterans with depression was higher than that of men Veterans across all age groups. The rate was highest among women ages 45-64 and declined substantially in older women and men Veterans.

Proportions of Veterans with a diagnosis of depression by age group and care setting:
18-44: VHA OP (W 33.8%, M 24.9%); VHA IP (W 37.2%, M 36.4%); FEE OP (W 1.8%, M 2%); FEE IP (W 13.4%, M 26.8%)
45-65: VHA OP (W 34.8%, M 22.5%); VHA IP (W 32.8%, M 24.4%); FEE OP (W 1.9%, M 1.2%); FEE IP (W 20.1%, M 15.4%)
65+: VHA OP (W 19.6%, M 11.9%); VHA IP (W 19.4%, M 13.5%); FEE OP (W 0.9%, M 0.4%); FEE IP (W 11.8%, M 8.2%)

Figure 12. Proportion of Veterans with a diagnosis of depression by gender, age, and race/ethnicity, FY14



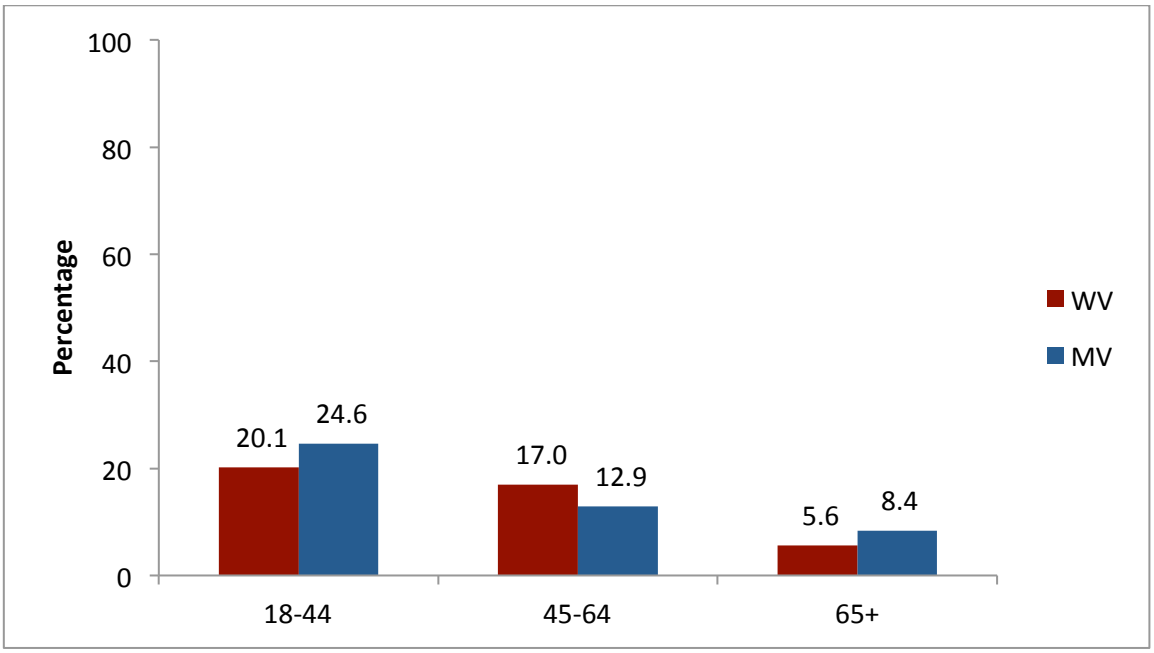
Key: VHA – Veterans Health Administration; FY – Fiscal Year
Notes: Presence of depression was determined by having at least one instance of an ICD-9 code. See Appendix B: Technical Appendix for details on variable development and a full list of ICD-9 codes used.
Cohort: Women and men Veterans using VHA in FY14: Women: 18-44 (175,614); 45-64 (189,557); 65+ (47,525). **Men:** 18-44 (788,123); 45-64 (1,853,884); 65+ (2,734,470)
Source: WHEI Master Database

Notes to Interpretation: Across all racial/ethnic groups, the rates of depression are higher in women Veterans than in men Veterans in each age group. For both women and men, the highest rates of depression are seen among multi-race Veterans for each age group. Depression rates peak in women Veterans ages 45-64 across all racial/ethnic groups and decline in 65+ women Veterans.

Proportions of Veterans with a diagnosis of depression by age group and care setting:
18-44: VHA OP (W 33.8%, M 24.9%); VHA IP (W 37.2%, M 36.4%); FEE OP (W 1.8%, M 2%); FEE IP (W 13.4%, M 26.8%)
45-65: VHA OP (W 34.8%, M 22.5%); VHA IP (W 32.8%, M 24.4%); FEE OP (W 1.9%, M 1.2%); FEE IP (W 20.1%, M 15.4%)
65+: VHA OP (W 19.6%, M 11.9%); VHA IP (W 19.4%, M 13.5%); FEE OP (W 0.9%, M 0.4%); FEE IP (W 11.8%, M 8.2%)

Trauma exposure and PTSD symptoms may increase the risk of CVD in women.[31] Men Veterans had higher rates of PTSD in the 18-44 age group (24.6% vs. 20.1%) and in the 65+ age group (8.4% vs. 5.6%), whereas women Veterans had a higher rate in the 45-64 age group (17% vs. 12.9%) (Figure 13). The highest rates of PTSD occurred among American Indian/Alaska Native women and men Veterans in the 18-44 age group (Figure 14). The rates of PTSD decline across all racial/ethnic groups among both women and men Veterans with age (Figure 14). VISN-level data for women and men Veterans by age group for rates of depression and PTSD diagnosis are displayed in Tables 11 and 12 in Appendix A.

Figure 13. Proportion of Veterans with a diagnosis of PTSD by gender and age, FY14



Key: VHA – Veterans Health Administration; WV- Women Veterans; MV – Men Veterans; PTSD – Posttraumatic Stress Disorder; FY – Fiscal Year

Notes: Presence of PTSD was determined by having at least one instance of an ICD-9 code. See Appendix B: Technical Appendix for details on variable development and a full list of ICD-9 codes used.

Cohort: Women and men Veterans using VHA in FY14: Women: 18-44 (175,614); 45-64 (189,557); 65+ (47,525). Men: 18-44 (788,123); 45-64 (1,853,884); 65+ (2,734,470)

Source: WHEI Master Database

Notes to Interpretation: Findings show the highest rates of PTSD among the youngest age group of Veterans. In the middle age group, a higher proportion of women than men had PTSD, whereas men had higher rates in both the youngest and oldest age groups.

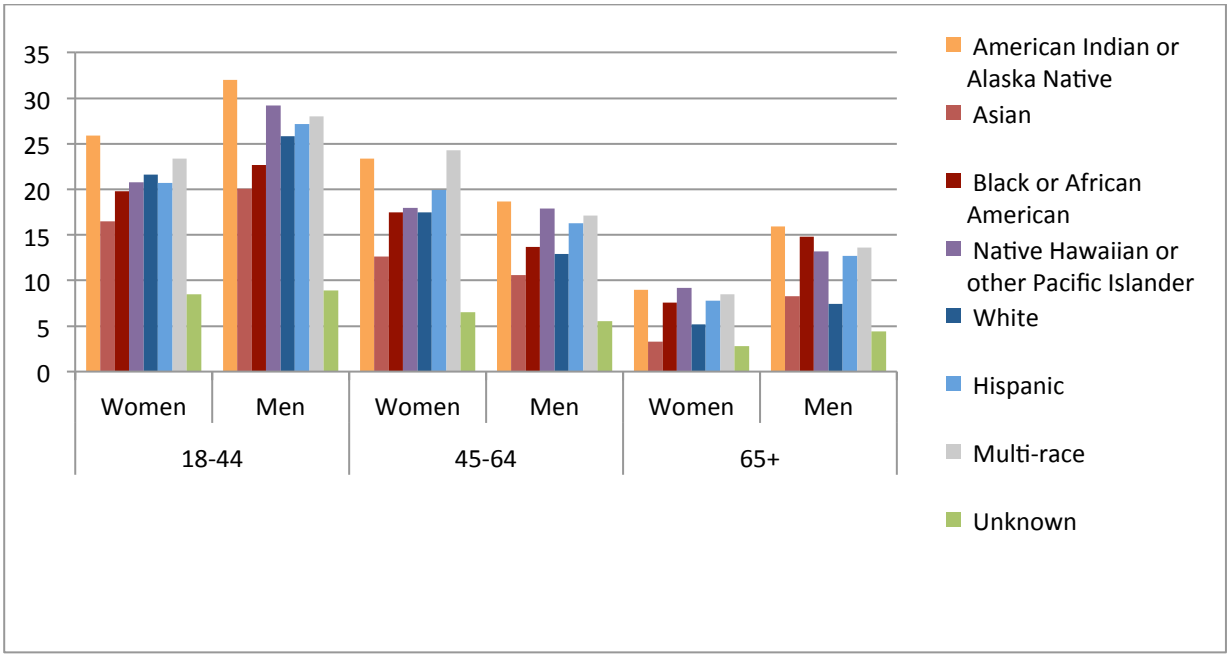
Proportions of Veterans with a diagnosis of PTSD by age groups and care settings:

18-44: VHA OP (W 21.1%, M 25.8%); VHA IP (W 33.6%, M 40%); FEE OP (W 1.4%, M 2%); FEE IP (W 8.7%, M 25.4%)

45-65: VHA OP (W 17.4%, M 13%); VHA IP (W 22%, M 13.4%); FEE OP (W 1%, M 0.7%); FEE IP (W 8.8%, M 7.8%)

65+: VHA OP (W 5.8%, M 8.5%); VHA IP (W 5.4%, M 7.9%); FEE OP (W 0.6%, M 0.6%); FEE IP (W 2.3%, M 5.1%)

Figure 14. Proportion of Veterans with a diagnosis of PTSD by gender, age, and race/ethnicity, FY14



Key: VHA – Veterans Health Administration; PTSD – Posttraumatic Stress Disorder; FY – Fiscal Year

Notes: Presence of PTSD was determined by having at least one instance of an ICD-9 code. See Appendix B: Technical Appendix for details on variable development and a full list of ICD-9 codes used.

Cohort: Women and men Veterans using VHA in FY14: Women: 18-44 (175,614); 45-64 (189,557); 65+ (47,525). Men: 18-44 (788,123); 45-64 (1,853,884); 65+ (2,734,470)

Source: WHEI Master Database

Notes to Interpretation: Findings show the highest rates of PTSD among American Indian/Alaska Native women and men Veterans in the 18-44 age group. Rates of PTSD decline with age across all racial/ethnic groups among both women and men Veterans.

Proportions of Veterans with a diagnosis of PTSD by age groups and care settings:

18-44: VHA OP (W 21.1%, M 25.8%); VHA IP (W 33.6%, M 40%); FEE OP (W 1.4%, M 2%); FEE IP (W 8.7%, M 25.4%)

45-65: VHA OP (W 17.4%, M 13%); VHA IP (W 22%, M 13.4%); FEE OP (W 1%, M 0.7%); FEE IP (W 8.8%, M 7.8%)

65+: VHA OP (W 5.8%, M 8.5%); VHA IP (W 5.4%, M 7.9%); FEE OP (W 0.6%, M 0.6%); FEE IP (W 2.3%, M 5.1%)

Risk Factors in Women Compared with Men, FY14

Because age will vary within age groups, from younger to older, age-adjusted odds ratios were used to give a more accurate comparison between the cohorts of women and men Veterans. Table 3 shows the age-adjusted odds ratios for cardiovascular risk factors for women compared with men Veterans, overall and by age group. Because the prevalence of most traditional CV risk factors increases with age, the 65+ age group is further subdivided into the following smaller age increments: 65-74, 75-84, and 85+ years. Women were less likely than men to be diagnosed for most CV risk factors. This could be due either to higher prevalence of CV risk factors among men Veterans or to lower screening or reporting of CVD risk factors among women Veterans. Across all age groups, women were less likely than men to be diagnosed with dyslipidemia and diabetes but more likely to be diagnosed with depression. For two CV risk factors—hypertension and PTSD—women were less likely to be diagnosed than men in all but one age group (hypertension, 85+: AOR=1.11; PTSD, 45-64: AOR=1.44).

Table 3. Age-adjusted odds ratios (and 95% CI) for cardiovascular risk factors in women vs. men, FY14

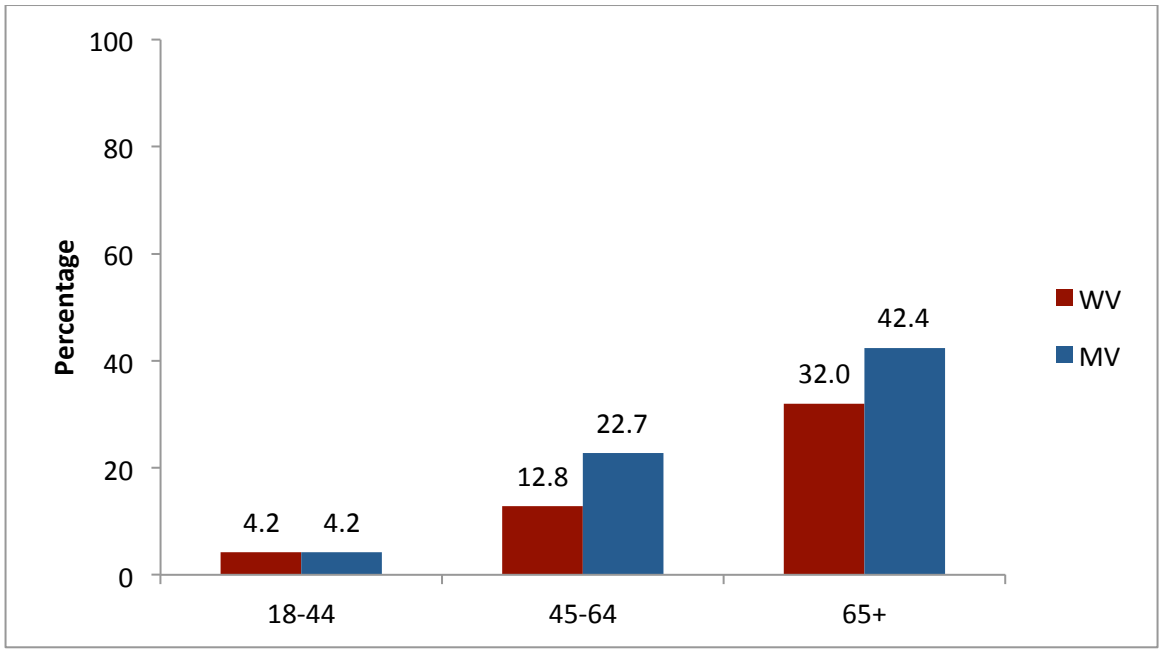
	Total Women	18-44	45-64	65-74	75-84	85+
Any Major Cardiovascular Risk Factor	0.81	0.87	0.90	0.84	0.96	1.02
	(0.80-0.81)	(0.86-0.88)	(0.89-0.91)	(0.82-0.87)	(0.92-1.01)	(0.97-1.06)
Dyslipidemia	0.61	0.47	0.74	0.83	0.86	0.87
	(0.61-0.62)	(0.46-0.47)	(0.73-0.75)	(0.81-0.85)	(0.83-0.90)	(0.84-0.91)
Diabetes	0.57	0.70	0.69	0.72	0.74	0.67
	(0.57-0.58)	(0.68-0.72)	(0.68-0.70)	(0.70-0.74)	(0.70-0.77)	(0.63-0.71)
Hypertension	0.63	0.57	0.68	0.78	0.99	1.11
	(0.63-0.64)	(0.56-0.58)	(0.675-0.69)	(0.76-0.80)	(0.95-1.03)	(1.07-1.15)
Depression	1.64	1.52	1.74	1.87	1.98	1.47
	(1.63-1.65)	(1.51-1.54)	(1.72-1.76)	(1.81-1.92)	(1.88-2.09)	(1.38-1.57)
PTSD	0.92	0.77	1.44	0.65	0.99	0.16
	(0.91-0.92)	(0.76-0.78)	(1.42-1.45)	(0.62-0.67)	(0.86-1.13)	(0.12-0.22)

Notes to Interpretation: The numbers appearing in parentheses represent 95% confidence intervals.

Cardiovascular Conditions

Prevalence of Any Cardiovascular Condition, FY14. Fewer women than men Veterans in FY14 had a documented CV condition in the 45-64 (12.8% vs. 22.7%) and 65+ (32% vs. 42.4%) age groups. The same proportion of women and men in the 18-44 age group had any CV condition (4.2% vs. 4.2%) (Figure 15). Rates of any cardiovascular condition were higher in men Veterans than in women Veterans across all racial/ethnic groups (Figure 16). Table 13 in Appendix A displays VISN-level data for Veterans with any CVD condition by sex and age in FY14.

Figure 15. Proportion of Veterans with at least one instance of any cardiovascular condition, FY14

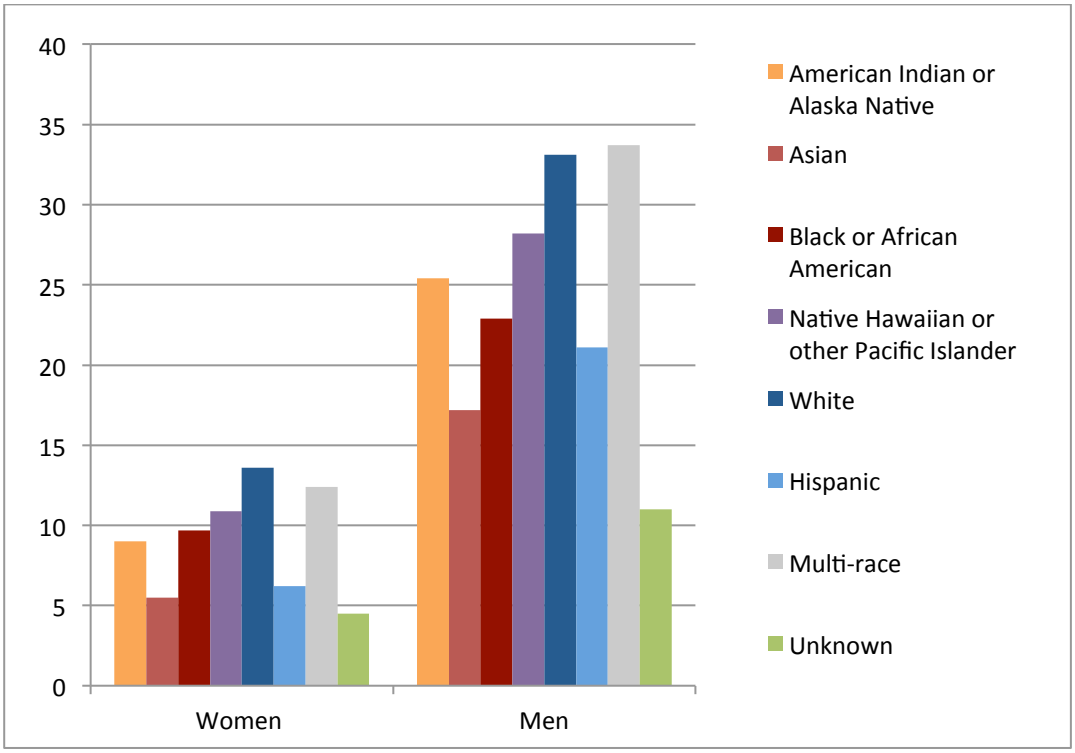


Key: VHA – Veterans Health Administration; WV- Women Veterans; MV – Men Veterans; FY – Fiscal Year
Notes: See Appendix B: Technical Appendix for details on variable development and a full list of ICD-9 codes used.
Cohort: Women and men Veterans using VHA in FY14: Women: 18-44 (175,614); 45-64 (189,557); 65+ (47,525). Men: 18-44 (788,123); 45-64 (1,853,884); 65+ (2,734,470)
Source: WHEI Master Database

Notes to Interpretation: Findings show increasing proportions of Veterans with CV conditions with increasing age. The highest proportion of Veterans with any CV condition occurs in the 65+ age group. Women Veterans in both the 45-64 and 65+ age groups were less likely than men Veterans to have one or more CV conditions. This is in contrast to the 18-44 age group, where the same proportion of women and men had any CV condition.

Proportions of Veterans with a diagnosis of any CV condition by age group and care settings:
18-44: VHA OP (W 3.9%, M 3.9%); VHA IP (W 8.9%, M 10.9%); FEE OP (W 0.8%, M 1.2%); FEE IP (W 7.3, M 18.7%)
45-65: VHA OP (W 12%, M 22%); VHA IP (W 24.9%, M 42.1%); FEE OP (W 2.7%, M 6%); FEE IP (W 28.5%, M 47.3%)
65+: VHA OP (W 31.9%, M 43%); VHA IP (W 54.7%, M 66.2%); FEE OP (W 7%, M 8.3%); FEE IP (W 44.1%, M 51.4%)

Figure 16. Proportion of Veterans with any cardiovascular condition by gender and race/ethnicity, FY14



Key: VHA – Veterans Health Administration; FY – Fiscal Year
Notes: See Appendix B: Technical Appendix for details on variable development and a full list of ICD-9 codes used.
Cohort: Women and men Veterans using VHA in FY14: Women: 18-44 (175,614); 45-64 (189,557); 65+ (47,525). Men: 18-44 (788,123); 45-64 (1,853,884); 65+ (2,734,470)
Source: WHEI Master Database

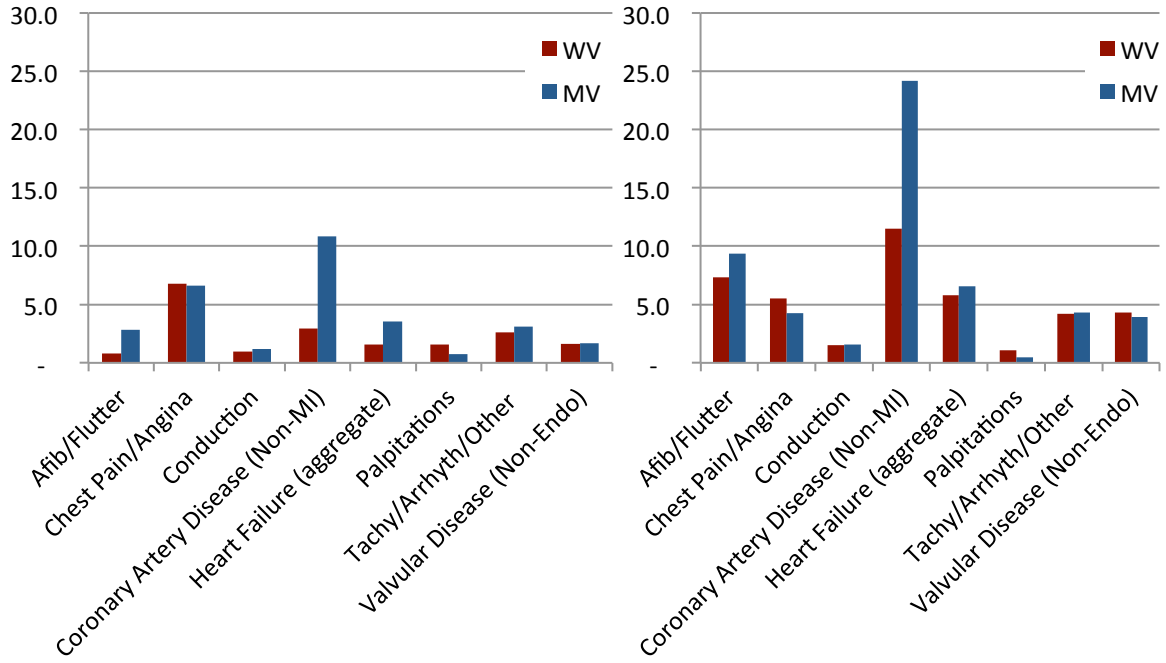
Notes to Interpretation: Findings show increased proportions of men Veterans with any CV condition as compared with women Veterans across all racial/ethnic groups. Whites and multi-race patients had the highest proportions diagnosed with any CV condition in both women and men Veterans.

Proportions of Veterans with a diagnosis of any CVD condition by age group and care setting:
18-44: VHA OP (W 3.9%, M 3.9%); VHA IP (W 8.9%, M 10.9%); FEE OP (W 0.8%, M 1.2%); FEE IP (W 7.3, M 18.7%)
45-65: VHA OP (W 12%, M 22%); VHA IP (W 24.9%, M 42.1%); FEE OP (W 2.7%, M 6%); FEE IP (W 28.5%, M 47.3%)
65+: VHA OP (W 31.9%, M 43%); VHA IP (W 54.7%, M 66.2%); FEE OP (W 7%, M 8.3%); FEE IP (W 44.1%, M 51.4%)

Prevalence of Specific Cardiovascular Conditions, FY14. Women had higher rates than men in all age groups for chest pain/angina and palpitations, but lower rates of coronary artery disease, atrial fibrillation/atrial flutter, tachycardia and other arrhythmias, and heart failure. For the purposes of this report, specific CV condition data are only shown for the 45-64 (Figure 17) and 65+ age groups (Figure 18).

Figure 17. Proportion of Veterans ages 45-64 with a diagnosis of cardiovascular conditions, FY14 (left)

Figure 18. Proportion of Veterans ages 65+ with a diagnosis of cardiovascular conditions, FY14 (right)



Key: VHA – Veterans Health Administration; WV- Women Veterans; MV – Men Veterans; FY – Fiscal Year
Notes: Due to small percentages, the vertical axis scales were changed from 100% to 30%. Presence of CV conditions was determined by having at least one instance of an ICD-9 code. See Appendix B: Technical Appendix for details on variable development and a full list of ICD-9 codes used.
Cohort: Women and men Veterans using VHA in FY14: Women: 18-44 (175,614); 45-64 (189,557); 65+ (47,525). Men: 18-44 (788,123); 45-64 (1,853,884); 65+ (2,734,470)
Source: WHEI Master Database

Notes to Interpretation: Findings show increasing proportions of Veterans diagnosed with all CV conditions with increasing age, except for chest pain/angina and palpitations. The most common condition in women Veterans in the 45-64 age group was chest pain/angina. The most common condition in women Veterans in the 65+ age group was coronary artery disease. This contrasts with men Veterans in whom coronary artery disease was the most common condition in both age groups.

Proportions of Veterans with a diagnosis of any CVD condition by age group and care setting:
18-44: VHA OP (W 3.9%, M 3.9%); VHA IP (W 8.9%, M 10.9%); FEE OP (W 0.8%, M 1.2%); FEE IP (W 7.3, M 18.7%)
45-65: VHA OP (W 12%, M 22%); VHA IP (W 24.9%, M 42.1%); FEE OP (W 2.7%, M 6%); FEE IP (W 28.5%, M 47.3%)
65+: VHA OP (W 31.9%, M 43%); VHA IP (W 54.7%, M 66.2%); FEE OP (W 7%, M 8.3%); FEE IP (W 44.1%, M 51.4%)

In the age-adjusted analysis, women were more likely to be diagnosed with chest pain/angina, palpitations, and valvular disease across all age groups, with the exception of valvular disease in the 85+ age group (Table 4). Conversely, women Veterans were less than half as likely to be diagnosed with coronary artery disease than men Veterans of the same age. This may represent a true lower disease prevalence, errors in provider coding, or underdiagnosis. For conduction disorders, there was no

significant difference in the prevalence among women vs. men in the 65-74, 75-84, and the 85+ age groups. For tachycardia, there were no significant differences in the prevalence among women vs. men in the 75-84 and the 85+ age groups. Finally, for atrial fibrillation and valvular disease, there was no significant difference in the prevalence among women vs. men for the 85+ age group.

Table 4. Age-adjusted odd ratios (and 95% CI) for cardiovascular conditions in women vs. men, FY14

	Total Women	18-44	45-64	65-74	75-84	85+
Any Cardiovascular Disease Condition (Aggregate Variable)	0.60	1.00	0.64	0.59	0.67	0.72
	(0.59-0.602)	(0.98-1.03)	(0.63-0.65)	(0.58-0.61)	(0.64-0.69)	(0.69-0.75)
Chest Pain / Angina	1.03	1.04	1.07	1.27	1.60	1.28
	(1.02-1.05)	(1.01-1.08)	(1.05-1.09)	(1.21-1.34)	(1.47-1.75)	(1.15-1.43)
Palpitations	2.04	1.85	2.19	2.56	2.78	1.74
	(1.98-2.10)	(1.77-1.95)	(2.10-2.28)	(2.32-2.84)	(2.27-3.40)	(1.23-2.46)
Coronary Artery Disease	0.29	0.41	0.34	0.38	0.42	0.47
	(0.29-0.30)	(0.37-0.45)	(0.33-0.35)	(0.37-0.40)	(0.40-0.45)	(0.44-0.49)
Heart Failure (Non-Pulmonary Heart Disease)	0.55	0.61	0.50	0.71	0.91	0.93
	(0.53-0.56)	(0.56-6.8)	(0.49-0.52)	(0.67-0.75)	(0.84-0.98)	(0.87-0.995)
Atrial Fibrillation / Atrial Flutter	0.46	0.392	0.368	0.57	0.797	0.958
	(0.45-0.47)	(0.34-0.46)	(0.35-0.39)	(0.54-0.61)	(0.75-0.85)	(0.91-1.01)
Tachycardia / Arrhythmia/ Other	0.963	1.272	0.961	0.915	1.038	0.951
	(0.94-0.98)	(1.22-1.33)	(0.93-0.99)	(0.86-0.98)	(0.95-1.14)	(0.87-1.04)
Valvular Disease (Non-Endocarditis)	1.05	1.527	1.188	1.085	1.103	1.085
	(1.02-1.08)	(1.42-1.64)	(1.14-1.23)	(1.01-1.16)	(1.01-1.20)	(0.999-1.18)
Conduction Disorders	0.862	0.879	0.901	0.944	0.952	1.035
	(0.83-0.89)	(0.81-0.95)	(0.86-0.95)	(0.85-1.05)	(0.81-1.11)	(0.9-1.19)
Arrhythmia / Conduction Disorder / Afib and Aflutter - Other	0.74	1.056	0.731	0.703	0.825	0.883
	(0.73-0.75)	(1.02-1.10)	(0.71-0.75)	(0.67-0.74)	(0.78-0.87)	(0.84-0.93)

Notes to Interpretation: The numbers appearing in parentheses represent 95% confidence intervals.

Cerebrovascular Disease and Peripheral Vascular Disease. The rates for both women and men Veteran patients in the 45-64 and 65+ age groups were low for cerebrovascular or peripheral vascular diseases (Figures 19, 20). Women Veterans had lower rates than men in both age groups, and the prevalence increased with age. In the 65+ group, the rates of cerebrovascular disease in women and men were similar, but remained slightly lower in women Veterans (7.3% vs. 7.5%).

Figure 19. Proportion of Veterans ages 45-64 with a diagnosis of cerebrovascular or peripheral vascular disease, FY14 (left)

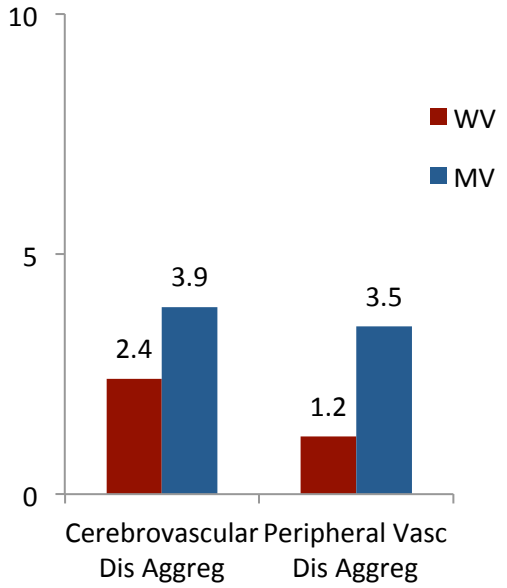
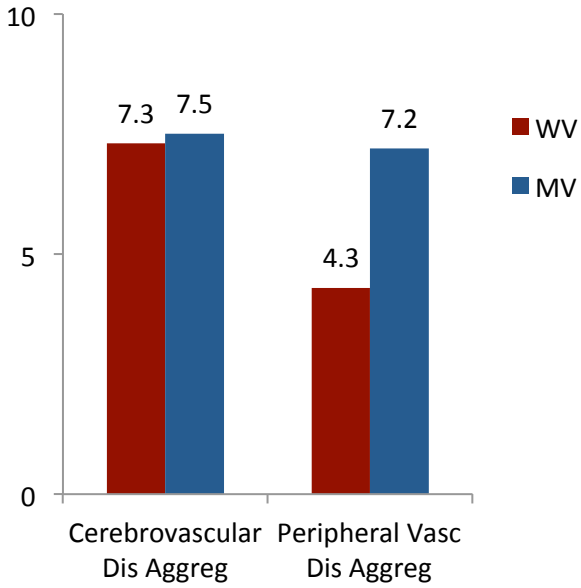


Figure 20. Proportion of Veterans ages 65+ with a diagnosis of cerebrovascular or peripheral vascular disease, FY14 (right)



Key: Aggreg – Aggregate; Dis – Disease; VHA – Veterans Health Administration; WV- Women Veterans; MV – Men Veterans; FY – Fiscal Year

Notes: Due to small percentages, the vertical axis scales were changed from 100% to 10%. Presence of cerebrovascular disease and peripheral vascular disease were determined by having at least one instance of an ICD-9 code. See Appendix B: Technical Appendix for details on variable development and a full list of ICD-9 codes used.

Cohort: Women and men Veterans using VHA in FY14: Women: 18-44 (175,614); 45-64 (189,557); 65+ (47,525). Men: 18-44 (788,123); 45-64 (1,853,884); 65+ (2,734,470)

Source: WHEI Master Database

Notes to Interpretation: Findings show that rates of cerebrovascular and peripheral vascular disease increased with increasing age for both women and men. Women Veterans had lower rates of peripheral vascular disease compared with men Veterans for both age groups. Women ages 45-64 had lower rates of cerebrovascular disease than men, but similar rates in the 65+ age group.

In the age-adjusted analysis, cerebrovascular disease was less common in women Veterans ages 45-64 and 65-74 compared with men, but rates were similar among other age groups. Women Veterans were less likely to have a diagnosis of peripheral vascular disease than men across all age groups (Table 5).

Table 5. Age-adjusted odds ratios (and 95% CI) for cerebrovascular and peripheral vascular disease in women vs. men, FY14

	Total Women	18-44	45-64	65-74	75-84	85+
Cerebrovascular Disease	0.73	1.08	0.79	0.90	1.06	1.04
	(0.72-0.75)	(0.99-1.17)	(0.77-0.82)	(0.85-0.95)	(0.99-1.13)	(0.98-1.11)
Peripheral Vascular Disease	0.39	0.80	0.46	0.49	0.68	0.70
	(0.37-0.40)	(0.70-0.92)	(0.44-0.48)	(0.46-0.53)	(0.62-0.74)	(0.64-0.76)

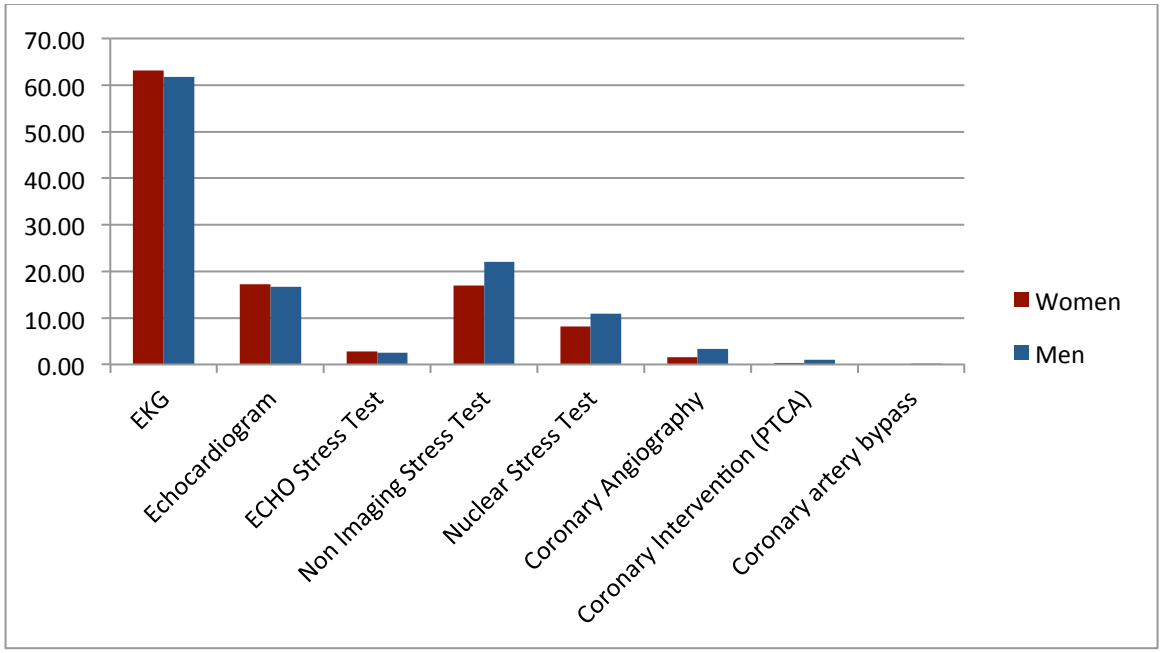
Notes to Interpretation: The numbers appearing in parentheses represent 95% confidence intervals.

Procedures Received by VA patients with a Cardiovascular Disease Diagnosis in FY14

In this section, we evaluated procedures received by patients with specific CVD diagnoses. We were not able to ascertain whether these were new diagnoses or to determine time to treatment. The data were stratified by age and unadjusted. It is important to note that even within age groups, there may be differences in average age for women compared with men, which may affect rates at which certain procedures were performed.

Cardiovascular Procedures Received by Veteran VHA Patients with Chest Pain/Angina, FY14. The most commonly performed cardiovascular procedure in Veteran patients with at least one instance of Chest Pain/Angina was an EKG. This was true for both women and men Veteran patients and in all three age groups (Figures 21-23). Men consistently underwent more invasive procedures than did women across all age groups. Strikingly, men in all three age groups underwent coronary angiography as much as twice as often than did women even though women were much more likely to be diagnosed with chest pain/angina.

Figure 21. Proportion of Veteran VHA patients ages 18-44 with at least one instance of chest pain/angina receiving cardiovascular procedures by sex, FY14

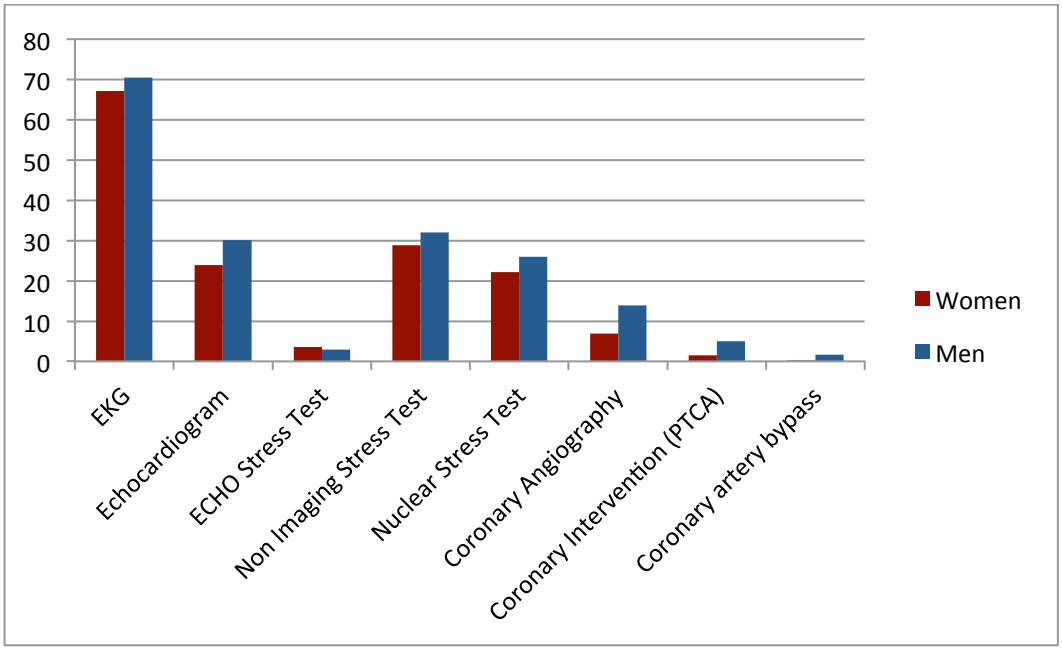


Key: VHA – Veterans Health Administration; FY – Fiscal Year
Notes: Presence of any cardiovascular procedure was determined by having at least one instance of a CPT or ICD9 procedure code. See Appendix B: Technical Appendix for details on variable development and a full list of CPT and ICD9 codes used.
Cohort: Women and men Veterans using VHA in FY14: Women: 18-44 (175,614); 45-64 (189,557); 65+ (47,525). Men: 18-44 (788,123); 45-64 (1,853,884); 65+ (2,734,470)
Source: WHEI Master Database

Notes to Interpretation: Electrocardiogram (EKG) was the most commonly performed procedure among both women and men ages 18-44 with at least one instance of chest pain/angina. The next most commonly performed procedure in both women and

men was non-imaging stress test and echocardiogram. A higher proportion of men than women underwent all procedures, with the exceptions of EKG , echocardiogram, and echo stress test.

Figure 22. Proportion of Veteran VHA patients ages 45-64 with at least one instance of chest pain/angina receiving cardiovascular procedures by age group and sex, FY14



Key: VHA – Veterans Health Administration; FY – Fiscal Year

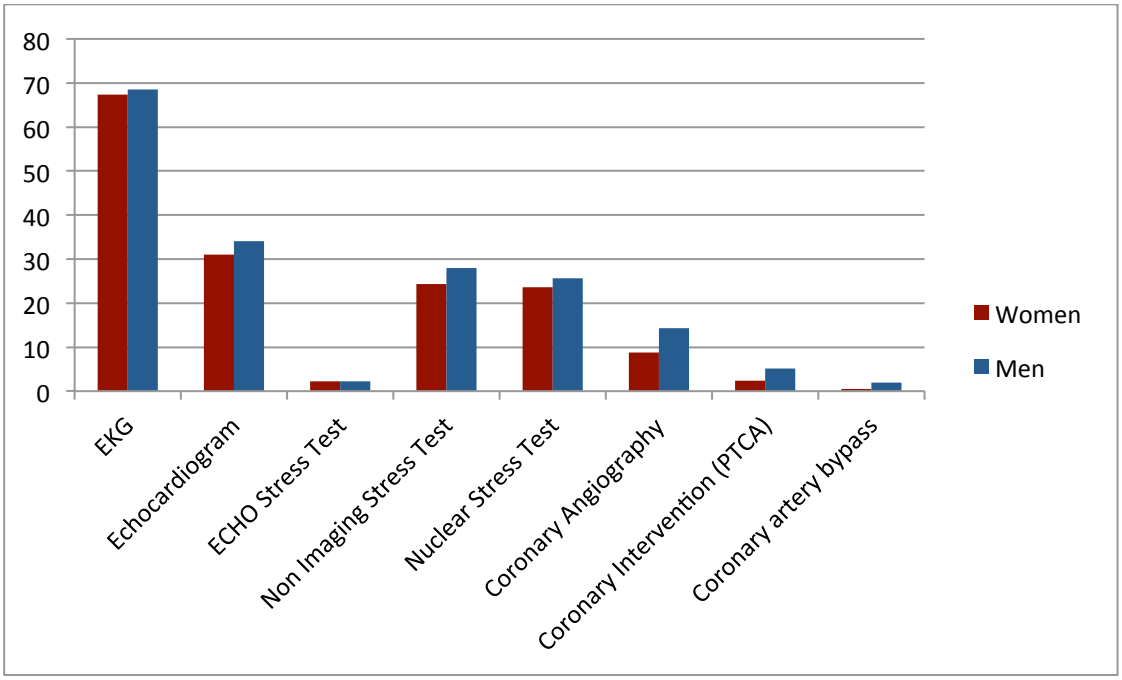
Notes: Presence of any cardiovascular procedure was determined by having at least one instance of a CPT or ICD9 Procedure code. See Appendix B: Technical Appendix for details on variable development and a full list of CPT and ICD9 codes used.

Cohort: Women and men Veterans using VHA in FY14: Women: 18-44 (175,614); 45-64 (189,557); 65+ (47,525). Men: 18-44 (788,123); 45-64 (1,853,884); 65+ (2,734,470)

Source: WHEI Master Database

Notes to Interpretation: Electrocardiogram (EKG) was the most commonly performed procedure among both women and men age 45-64 with at least one instance of chest pain/angina. The next most commonly performed procedures in both women and men were non-imaging stress test and echocardiogram, respectively. Men had higher rates for all other procedures, except for ECHO stress test. Men also had nearly twice the rate of coronary angiography and coronary intervention than did women.

Figure 23. Proportion of Veteran VHA patients ages 65+ with at least one instance of chest pain/angina receiving cardiovascular procedures by sex, FY14

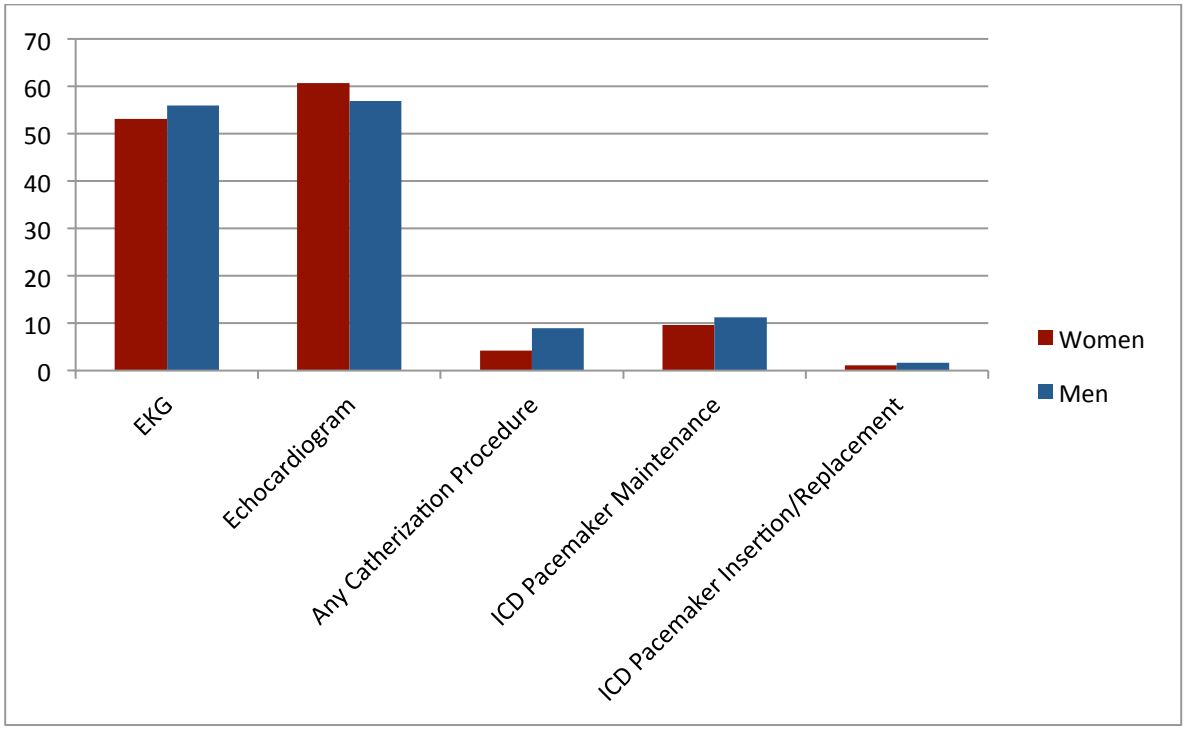


Key: VHA – Veterans Health Administration; FY – Fiscal Year
Notes: Presence of any cardiovascular procedure was determined by having at least one instance of a CPT or ICD9 Procedure code. See Appendix B: Technical Appendix for details on variable development and a full list of CPT and ICD9 codes used.
Cohort: Women and men Veterans using VHA in FY14: Women: 18-44 (175,614); 45-64 (189,557); 65+ (47,525). Men: 18-44 (788,123); 45-64 (1,853,884); 65+ (2,734,470)
Source: WHEI Master Database

Notes to Interpretation: Electrocardiogram (EKG) was the most commonly performed procedure among both women and men age 65 years or older with at least one instance of chest pain/angina. The next most commonly performed procedures in both women and men were the echocardiogram, the non-imaging stress test, and the nuclear stress test. Men underwent all procedures at a higher rate, with the exception of the ECHO stress test.

Cardiovascular Procedures Received by Veteran VHA Patients with Heart Failure, FY14. In both women and men Veterans with heart failure, the most commonly performed procedure was an electrocardiogram (EKG) in the 45-64 and 65+ age groups, whereas in the 18-44 age group, the most commonly performed procedure was an echocardiogram (Figures 24-26). The proportions of Veterans receiving ICD/Pacemaker maintenance were higher in men Veteran patients across all age groups compared with their women Veteran counterparts. Rates of other cardiovascular procedures were very similar in both women and men across all age groups, with the exception of any catheterization procedure, which was performed twice as often in men than in women in the youngest age group.

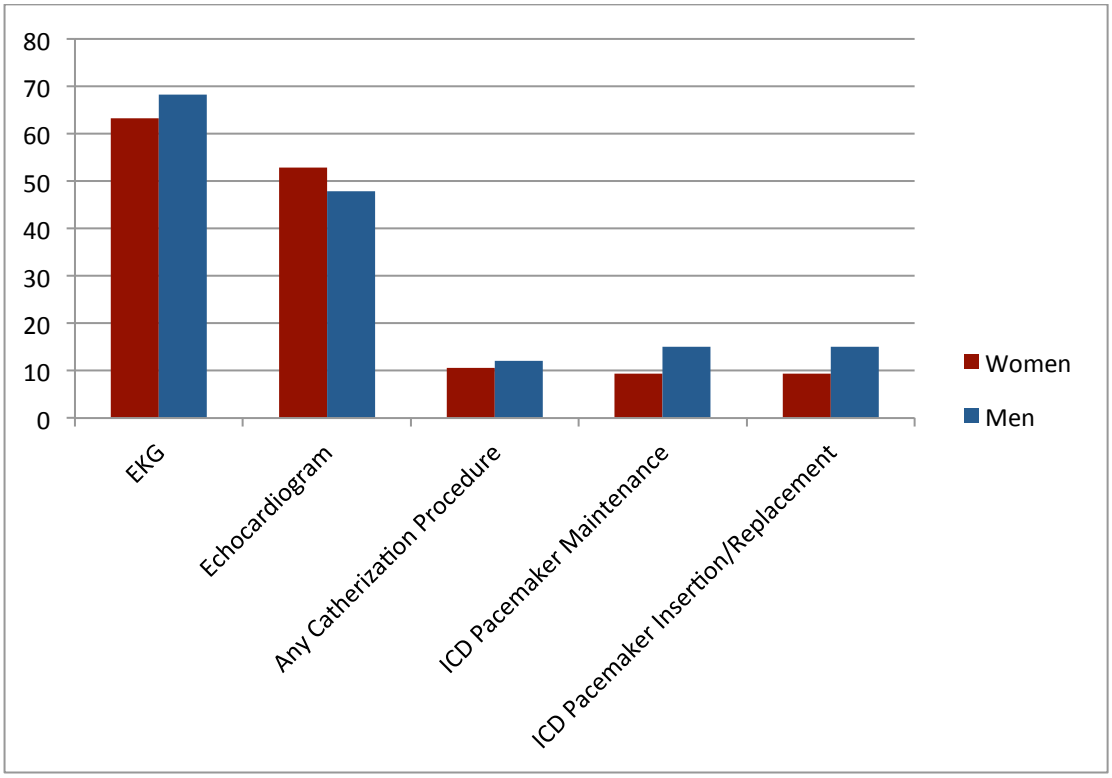
Figure 24. Proportion of Veteran VHA patients ages 18-44 with at least one instance of heart failure receiving cardiovascular procedures by sex, FY14



Key: VHA – Veterans Health Administration; FY – Fiscal Year
Notes: Presence of any cardiovascular procedure was determined by having at least one instance of a CPT or ICD9 Procedure code. See Appendix B: Technical Appendix for details on variable development and a full list of CPT and ICD9 codes used.
Cohort: Women and men Veterans using VHA in FY14: Women: 18-44 (175,614); 45-64 (189,557); 65+ (47,525). Men: 18-44 (788,123); 45-64 (1,853,884); 65+ (2,734,470)
Source: WHEI Master Database

Notes to Interpretation: Echocardiogram was the most commonly performed procedure among women and men with at least one instance of heart failure. The next most commonly performed procedure in both women and men was EKG. Men had slightly higher rates of all procedures, with the exception of echocardiogram.

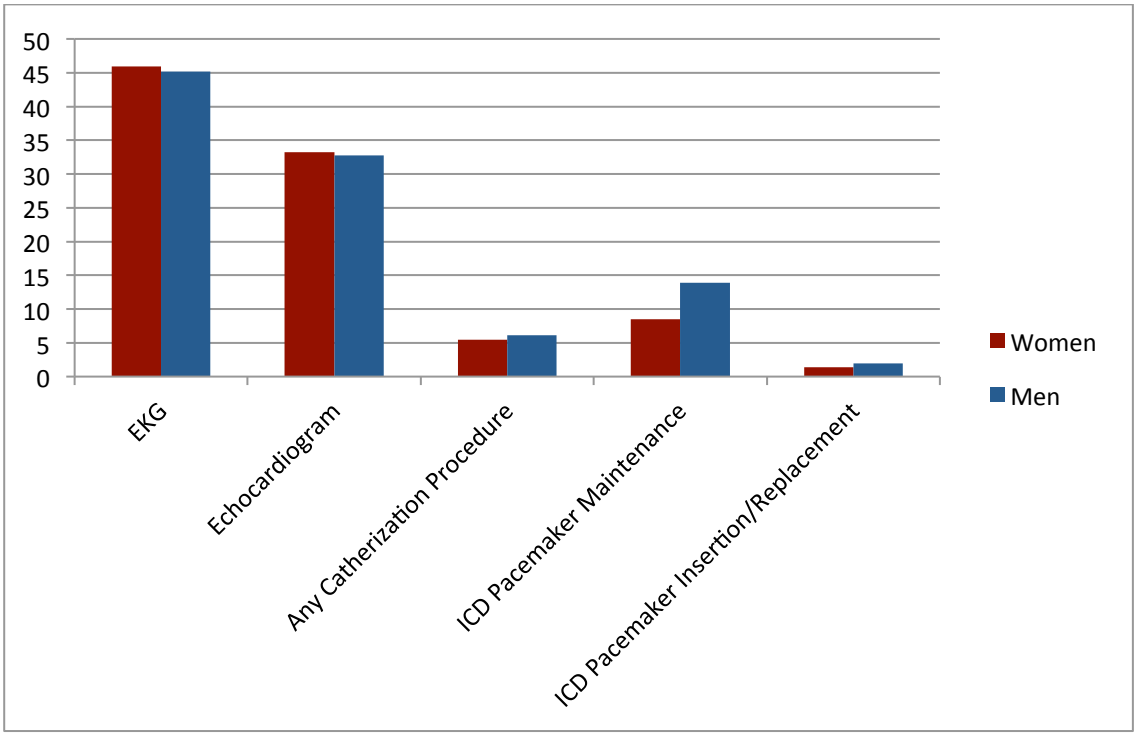
Figure 25. Proportion of Veteran VHA patients ages 45-64 with at least one instance of heart failure receiving cardiovascular procedures by sex, FY14



Key: VHA – Veterans Health Administration; FY – Fiscal Year
Notes: Presence of any cardiovascular procedure was determined by having at least one instance of a CPT or ICD9 Procedure code. See Appendix B: Technical Appendix for details on variable development and a full list of CPT and ICD9 codes used.
Cohort: Women and men Veterans using VHA in FY14: Women: 18-44 (175,614); 45-64 (189,557); 65+ (47,525). Men: 18-44 (788,123); 45-64 (1,853,884); 65+ (2,734,470)
Source: WHEI Master Database

Notes to Interpretation: Electrocardiogram (EKG) was the most commonly performed procedure among both women and men ages 45-64 with at least one instance of heart failure, followed by echocardiogram. Men Veteran patients underwent all procedures at slightly higher rates, with the exception of echocardiogram.

Figure 26. Proportion of Veteran VHA patients ages 65+ with at least one instance of heart failure receiving cardiovascular procedures by sex, FY14

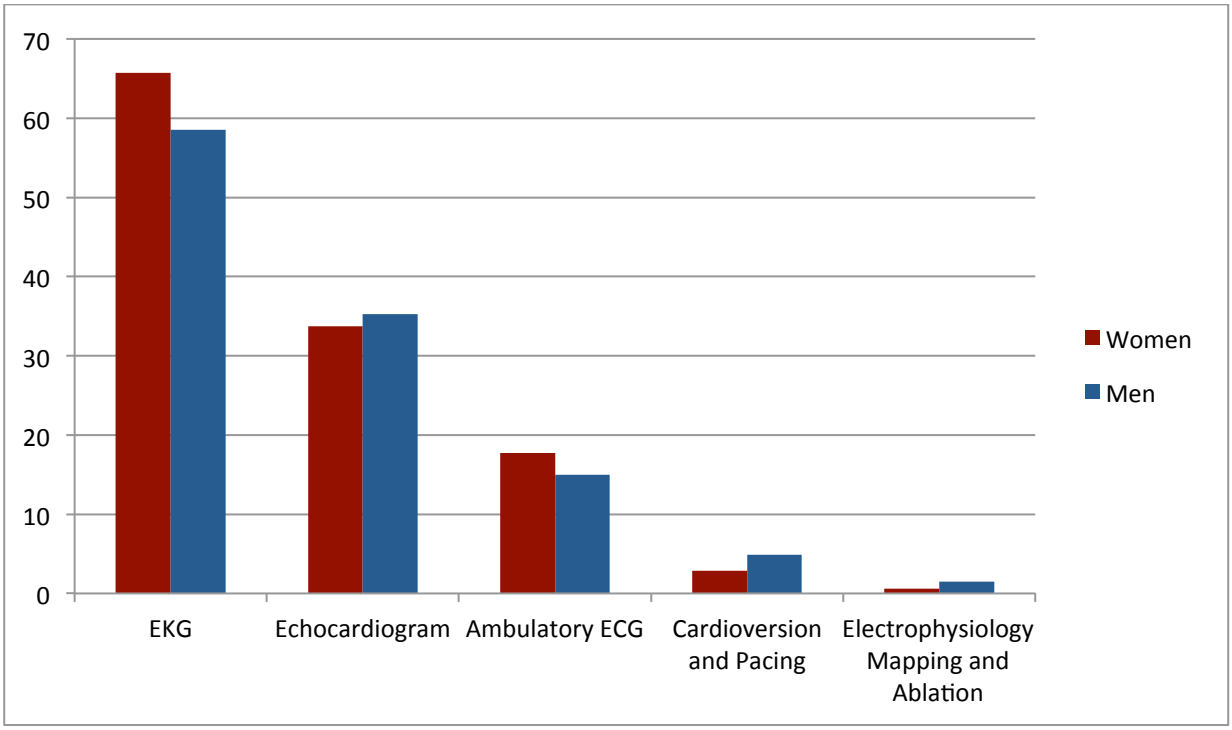


Key: VHA – Veterans Health Administration; FY – Fiscal Year
Notes: Presence of any cardiovascular procedure was determined by having at least one instance of a CPT or ICD9 Procedure code. See Appendix B: Technical Appendix for details on variable development and a full list of CPT and ICD9 codes used.
Cohort: Women and men Veterans using VHA in FY14: Women: 18-44 (175,614); 45-64 (189,557); 65+ (47,525). Men: 18-44 (788,123); 45-64 (1,853,884); 65+ (2,734,470)
Source: WHEI Master Database

Notes to Interpretation: Electrocardiogram (EKG) was the most commonly performed procedure among men and women Veteran patients age 65 years or older with at least one instance of heart failure. All procedures were performed at similar rates in both women and men, with the exception of ICD pacemaker maintenance, which was performed twice as often in men than in women.

Cardiovascular Procedures Received by Veteran VHA Patients with Atrial Fibrillation/ Atrial Flutter, FY14. Across all age groups, the most common CV procedure performed on patients with at least one instance of Atrial Fibrillation/Atrial Flutter in FY14 was electrocardiogram (EKG) in both women and men Veteran patients (Figures 27-29). The next most common procedure was echocardiogram, followed by ambulatory EKG monitoring. Although rates of procedures were similar among women and men, women were slightly more likely to receive ambulatory EKG across all age groups.

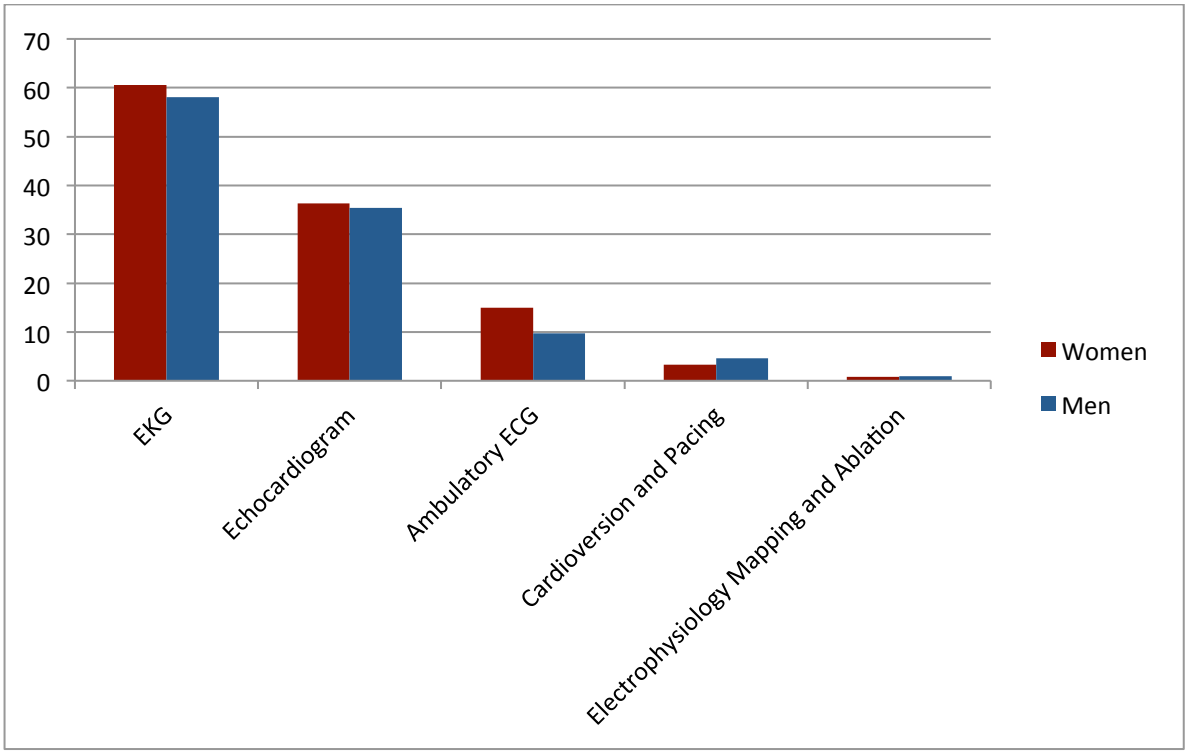
Figure 27. Proportion of Veteran VHA patients ages 18-44 with at least one instance of atrial fibrillation/atrial flutter receiving cardiovascular procedures by sex, FY14



Key: VHA – Veterans Health Administration; FY – Fiscal Year
Notes: Presence of any cardiovascular procedure was determined by having at least one instance of a CPT or ICD9 Procedure code. See Appendix B: Technical Appendix for details on variable development and a full list of CPT and ICD9 codes used.
Cohort: Women and men Veterans using VHA in FY14: Women: 18-44 (175,614); 45-64 (189,557); 65+ (47,525). Men: 18-44 (788,123); 45-64 (1,853,884); 65+ (2,734,470)
Source: WHEI Master Database

Notes to Interpretation: Among both women and men Veterans ages 18-44 with at least one instance of atrial fibrillation/atrial flutter, electrocardiogram (EKG) by far was the most commonly performed procedure, followed by echocardiogram and ambulatory ECG. Proportions of women and men with cardioversion and pacing as well as with electrophysiology mapping and ablation were similar.

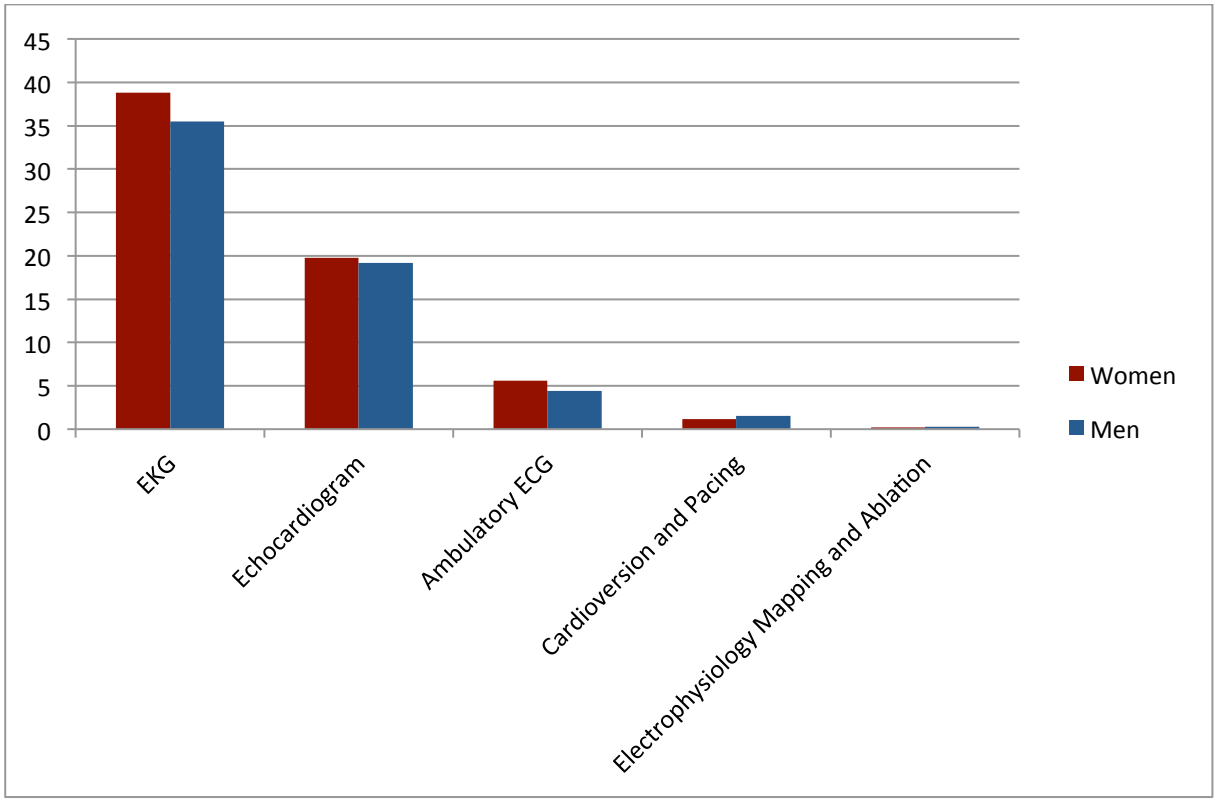
Figure 28. Proportion of Veteran VHA patients ages 45-64 with at least one instance of atrial fibrillation/atrial flutter receiving cardiovascular procedures by sex, FY14



Key: VHA – Veterans Health Administration; FY – Fiscal Year
Notes: Presence of any cardiovascular procedure was determined by having at least one instance of a CPT or ICD9 Procedure code. See Appendix B: Technical Appendix for details on variable development and a full list of CPT and ICD9 codes used.
Cohort: Women and men Veterans using VHA in FY14: Women: 18-44 (175,614); 45-64 (189,557); 65+ (47,525). Men: 18-44 (788,123); 45-64 (1,853,884); 65+ (2,734,470)
Source: WHEI Master Database

Notes to Interpretation: Among both women and men Veterans ages 45-64 with at least one instance of atrial fibrillation/atrial flutter, electrocardiogram (EKG) was the most commonly performed procedure, followed by echocardiogram and ambulatory ECG. Proportions of women and men with cardioversion and pacing as well as with electrophysiology mapping and ablation were similar.

Figure 29. Proportion of Veteran VHA patients ages 65+ with at least one instance of atrial fibrillation/atrial flutter receiving cardiovascular procedures by sex, FY14



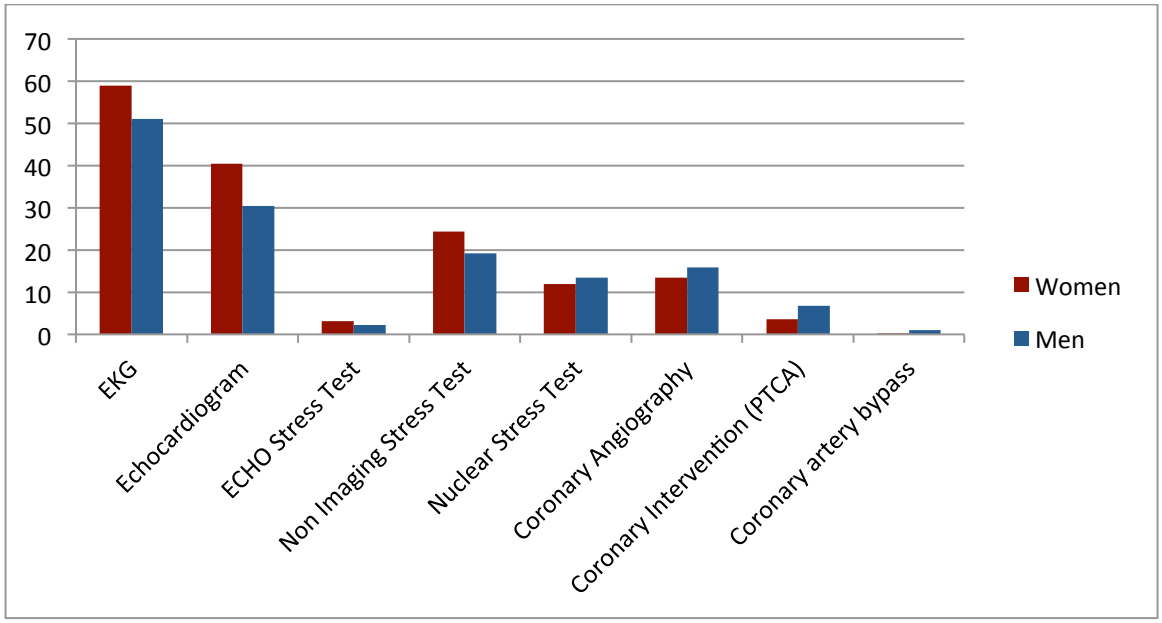
Key: VHA – Veterans Health Administration; FY – Fiscal Year
Notes: Presence of any cardiovascular procedure was determined by having at least one instance of a CPT or ICD9 Procedure code. See Appendix B: Technical Appendix for details on variable development and a full list of CPT and ICD9 codes used.
Cohort: Women and men Veterans using VHA in FY14: Women: 18-44 (175,614); 45-64 (189,557); 65+ (47,525). Men: 18-44 (788,123); 45-64 (1,853,884); 65+ (2,734,470)
Source: WHEI Master Database

Notes to Interpretation: Among both women and men Veterans age 65 years or older with at least one instance of atrial fibrillation/atrial flutter, electrocardiogram (EKG) was performed twice as often as the next most common procedure. Slightly higher proportions of women than men received EKG, echocardiogram, and ambulatory ECG.

Cardiovascular Procedures Received by Veteran VHA Patients with Coronary Artery Disease, FY14.

Across all age groups, electrocardiogram (EKG) was the most common procedure among women and men Veteran patients with coronary artery disease in FY14 (Figures 30-32). Younger men Veterans with coronary artery disease underwent a higher rate of coronary angiography compared with any other group. Among women Veterans, those in the youngest age group had the highest proportion undergoing non-invasive cardiovascular procedures, whereas those in the middle age group (45-64) had the highest proportion receiving invasive cardiovascular procedures. Invasive cardiovascular procedures include coronary angiography, coronary artery bypass, and coronary intervention (PTCA); non-invasive cardiovascular procedures include EKG, echocardiogram, ECHO stress test, non-imaging stress test, and nuclear stress test.

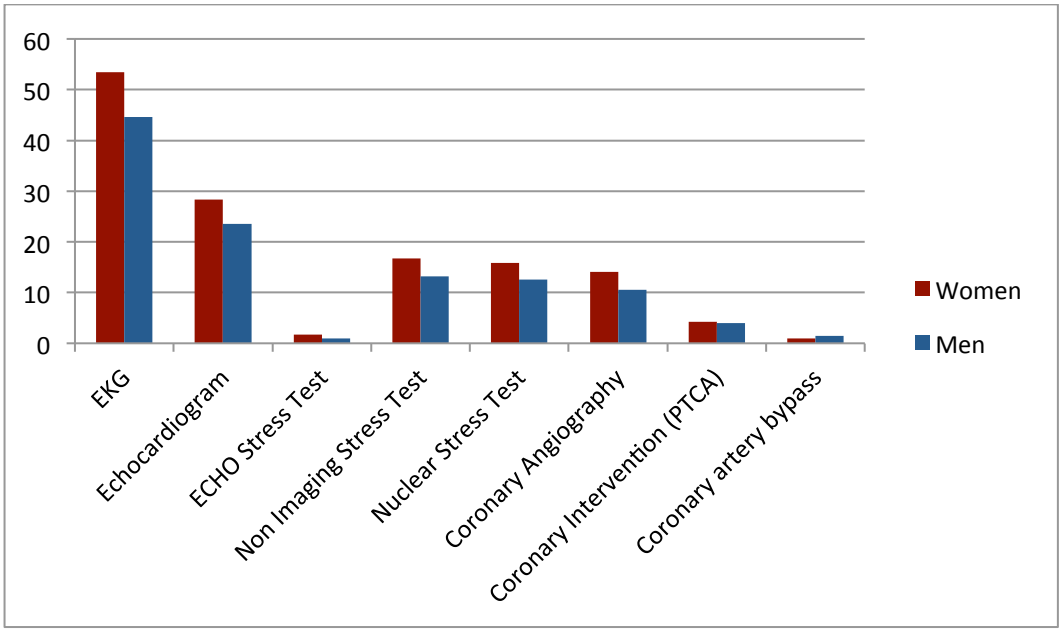
Figure 30. Proportion of Veteran VHA patients ages 18-44 with at least one instance of coronary artery disease receiving cardiovascular procedures by sex, FY14



Key: VHA – Veterans Health Administration; FY – Fiscal Year
Notes: See Appendix B: Technical Appendix for details on variable development and a full list of CPT and ICD9 codes used.
Cohort: Women and men Veterans using VHA in FY14: Women: 18-44 (175,614); 45-64 (189,557); 65+ (47,525). Men: 18-44 (788,123); 45-64 (1,853,884); 65+ (2,734,470)
Source: WHEI Master Database

Notes to Interpretation: Among women and men Veteran patients ages 18-44 with coronary artery disease, electrocardiogram (EKG) was the most commonly performed procedure. The proportion of men having an invasive cardiovascular procedure was slightly higher than that for women, whereas the proportion of women having a non-invasive procedure was slightly higher than that for men, with the exception of the nuclear stress test.

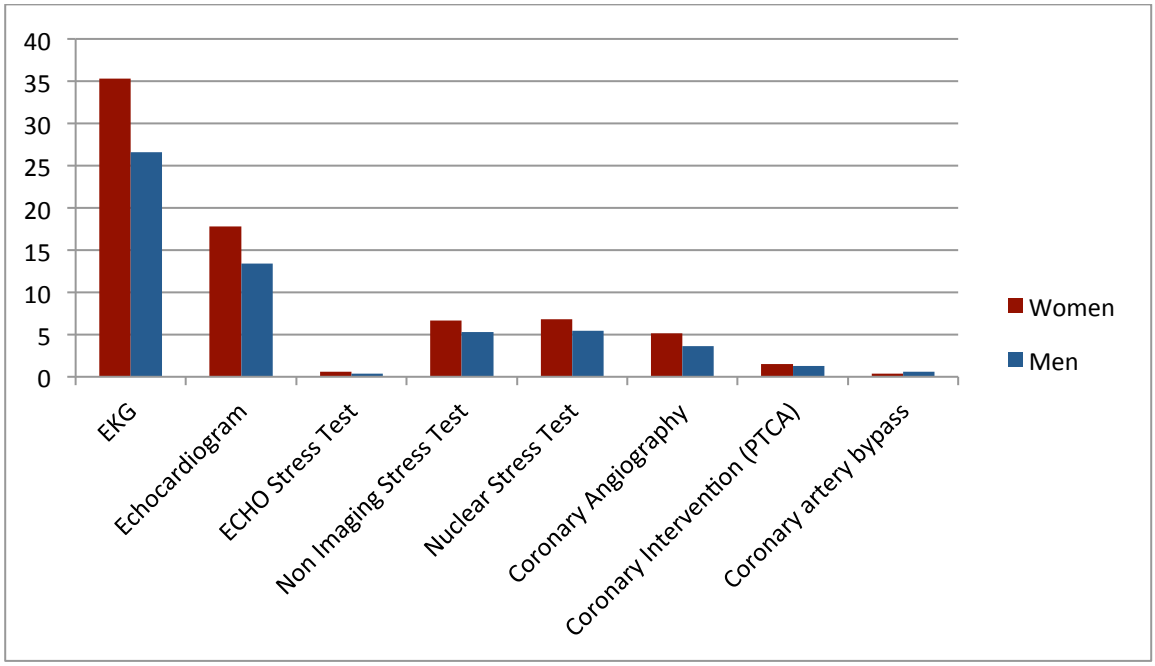
Figure 31. Proportion of Veteran VHA patients ages 45-64 with at least one instance of coronary artery disease receiving cardiovascular procedures by sex, FY14



Key: VHA – Veterans Health Administration; FY – Fiscal Year
Notes: See Appendix B: Technical Appendix for details on variable development and a full list of CPT and ICD9 codes used.
Cohort: Women and men Veterans using VHA in FY14: Women: 18-44 (175,614); 45-64 (189,557); 65+ (47,525). Men: 18-44 (788,123); 45-64 (1,853,884); 65+ (2,734,470)
Source: WHEI Master Database

Notes to Interpretation: Among women and men Veteran patients ages 45-64 with coronary artery disease, electrocardiogram (EKG) was the most commonly performed procedure. The proportion of women having any cardiovascular procedures was slightly higher than for men, with the exception of coronary artery bypass.

Figure 32. Proportion of Veteran VHA patients ages 65+ with at least one instance of coronary artery disease receiving cardiovascular procedures by sex, FY14



Key: VHA – Veterans Health Administration; FY – Fiscal Year

Notes: Presence of any cardiovascular procedure was determined by having at least one instance of a CPT or ICD9 Procedure code. See Appendix B: Technical Appendix for details on variable development and a full list of CPT and ICD9 codes used.

Cohort: Women and men Veterans using VHA in FY14: Women: 18-44 (175,614); 45-64 (189,557); 65+ (47,525). Men: 18-44 (788,123); 45-64 (1,853,884); 65+ (2,734,470)

Source: WHEI Master Database

Notes to Interpretation: Among women and men Veteran patients age 65 years or older with coronary artery disease, electrocardiogram (EKG) was the most commonly performed procedure. The proportion of women having any cardiovascular procedure was slightly higher than for men, with the exception of coronary artery bypass.

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Appendix A: Veterans Integrated Service Network (VISN)-Level Data

Table 6. Total number of Veterans using VHA by sex, age, and VISN, FY14

Number of Veterans by VISN, FY14						
VISN	W 18-44	M 18-44	W 45-64	M 45-64	W 65+	M 65+
1	4,876	30,284	5,575	64,040	2,591	132,969
2	3,077	17,047	3,468	38,938	1,154	65,881
3	4,647	21,265	3,442	41,543	958	91,580
4	6,309	33,167	7,545	83,990	2,483	163,840
5	6,421	19,916	7,163	46,868	1,188	58,628
6	15,260	49,915	16,459	124,042	2,254	140,446
7	17,866	55,296	19,863	146,798	2,502	152,211
8	14,957	62,862	18,362	169,626	5,102	284,760
9	7,012	37,800	9,424	101,206	1,828	129,220
10	4,939	27,395	6,481	74,706	1,598	107,946
11	6,283	35,629	7,443	92,422	1,949	132,736
12	6,379	31,144	6,254	72,515	1,804	126,195
15	5,825	29,620	6,691	76,164	1,712	115,632
16	17,296	70,040	17,360	168,485	3,558	212,359
17	14,981	55,265	12,660	98,782	2,239	111,067
18	8,182	38,413	9,289	82,268	2,784	118,946
19	7,378	33,640	7,029	61,614	1,861	85,567
20	9,194	43,702	10,460	95,209	3,123	122,576
21	7,294	36,294	7,752	90,025	2,888	138,500
22	12,296	60,254	9,291	101,362	2,700	129,677
23	6,654	37,609	7,251	89,661	2,274	171,765

Note: Table reflects VISN structure in FY14. Since FY16, VISNs 2 and 3 have combined, 18 and 22 have combined, and VISN 11 has been absorbed into VISNs 10 and 12.

Table 7. Veterans with any major CVD risk factor by sex, age, and VISN, FY14

Veterans with any Major CVD Risk Factor by Sex, Age and VISN, FY14

(% with Risk Factor out of total in VISN for each age and sex)

VISN	WV 18-44	MV 18-44	WV 45-64	MV 45-64	WV 65+	MV 65+
1	59.3	60.8	76.1	81.7	79.2	82.7
2	62.3	64.3	79.0	83.8	83.5	85.2
3	51.6	52.3	74.8	79.3	77.5	81.9
4	60.6	64.3	78.5	83.9	81.8	85.0
5	49.5	53.7	66.6	73.6	68.6	71.5
6	57.9	62.2	76.8	81.3	81.1	84.4
7	60.4	63.2	78.0	80.9	81.7	83.4
8	58.6	63.4	78.9	83.7	83.0	84.9
9	62.6	65.9	80.9	83.4	83.5	85.2
10	59.6	61.2	78.5	83.3	82.9	84.8
11	61.0	62.5	80.2	82.6	85.3	83.3
12	55.9	59.8	76.4	81.6	81.9	84.7
15	59.7	64.2	79.4	83.4	82.1	84.9
16	61.2	65.5	79.4	82.7	82.3	84.1
17	60.3	64.3	77.4	82.5	82.1	84.1
18	55.1	59.4	71.6	76.1	76.1	77.8
19	55.4	56.2	72.2	74.1	74.6	73.7
20	56.4	58.5	72.7	76.2	76.6	76.5
21	49.5	54.1	69.8	71.2	72.4	70.1
22	51.3	54.4	73.7	76.2	76.2	78.1
23	56.1	59.3	74.9	80.7	79.2	81.3

Note: Table reflects VISN structure in FY14. Since FY16, VISNs 2 and 3 have combined, 18 and 22 have combined, and VISN 11 has been absorbed into VISNs 10 and 12.

Table 8. Veterans with Dyslipidemia by sex, age, and VISN, FY14

Veterans with Dyslipidemia by Sex, Age and VISN, FY14

(% with Dyslipidemia out of total in VISN for each age and sex)

VISN	WV 18-44	MV 18-44	WV 45-64	MV 45-64	WV 65+	MV 65+
1	7.6	16.8	36.5	50.2	51.5	58.1
2	12.5	21.6	45.7	55.1	58.3	62.5
3	5.9	12.3	33.4	42.7	49.9	57.2
4	11.7	18.7	39.7	51.9	56.0	62.6
5	6.6	14.7	26.1	39.7	43.0	49.0
6	7.3	14.8	31.3	43.8	50.8	56.6
7	9.9	19.1	35.8	46.4	53.0	57.2
8	12.7	25.7	43.0	54.4	58.6	62.1
9	13.2	20.9	42.9	51.8	57.5	60.2
10	7.8	15.9	37.1	49.5	51.8	59.8
11	11.6	19.3	42.3	50.5	58.7	59.0
12	7.7	16.5	36.4	47.7	53.3	59.9
15	12.7	22.3	44.9	54.2	56.4	63.1
16	12.7	22.7	41.4	49.4	55.1	58.1
17	12.9	24.5	42.2	52.8	56.9	60.6
18	9.3	17.8	33.1	42.0	45.7	49.3
19	7.6	13.1	33.4	39.6	44.4	44.8
20	6.0	13.3	27.4	37.9	41.1	44.9
21	7.0	13.7	31.9	40.0	44.2	46.9
22	6.7	15.7	33.1	43.7	46.4	52.4
23	9.4	20.0	38.8	51.8	49.7	58.5

Note: Table reflects VISN structure in FY14. Since FY16, VISNs 2 and 3 have combined, 18 and 22 have combined, and VISN 11 has been absorbed into VISNs 10 and 12.

Table 9. Veterans with Diabetes by sex, age, and VISN, FY14

Veterans with Diabetes by Sex, Age and VISN, FY14

(% with Diabetes out of total in VISN for each age and sex)						
VISN	**WV 18-44**	**MV 18-44**	**WV 45-64**	**MV 45-64**	**WV 65+**	**MV 65+**
1	2.3	2.9	13.7	22.5	21.5	28.9
2	3.1	3.6	15.9	24.3	23.5	31.0
3	1.8	2.9	16.7	25.0	23.2	29.1
4	3.0	4.1	15.9	25.8	24.5	31.5
5	2.9	4.8	14.8	23.3	21.7	28.6
6	3.5	5.2	17.3	26.2	25.2	35.0
7	3.5	5.7	18.1	25.9	27.7	34.5
8	3.3	4.5	15.3	24.6	22.7	31.6
9	3.8	5.2	18.9	27.7	26.3	34.9
10	2.7	4.7	17.6	26.3	27.2	33.9
11	3.4	4.3	18.1	26.1	28.5	32.8
12	2.1	3.5	15.5	24.1	22.3	29.3
15	3.2	4.5	17.5	27.4	27.6	33.0
16	3.8	5.5	18.8	27.5	27.6	34.6
17	3.2	5.6	16.4	28.5	26.1	35.7
18	2.9	4.5	13.7	23.5	21.1	29.3
19	2.1	2.9	12.5	19.8	21.8	25.9
20	2.3	3.7	14.4	21.9	23.9	28.1
21	2.0	3.2	12.2	20.8	18.4	24.4
22	2.1	3.4	13.9	23.5	21.1	28.6
23	2.3	3.4	14.1	22.0	21.3	27.0

Note: Table reflects VISN structure in FY14. Since FY16, VISNs 2 and 3 have combined, 18 and 22 have combined, and VISN 11 has been absorbed into VISNs 10 and 12.

Table 10. Veterans with Hypertension by sex, age, and VISN, FY14

Veterans with Hypertension by Sex, Age and VISN, FY14

(% with Hypertension out of total in VISN for each age and sex)						
VISN	WV 18-44	MV 18-44	WV 45-64	MV 45-64	WV 65+	MV 65+
1	4.9	10.4	30.4	47.0	59.7	62.6
2	7.4	13.2	34.7	50.9	63.0	65.8
3	6.5	10.1	37.3	50.6	59.9	63.9
4	7.5	13.6	37.3	51.7	60.9	64.1
5	8.3	14.3	35.1	48.9	54.5	58.7
6	10.8	16.8	42.0	55.0	60.9	68.0
7	13.0	19.3	45.3	56.3	63.3	66.6
8	10.0	16.5	39.1	53.8	62.1	66.0
9	12.8	21.1	44.8	59.2	65.5	69.9
10	8.1	14.5	39.2	55.1	65.5	67.1
11	9.6	14.9	40.7	54.6	67.9	65.8
12	6.6	11.3	37.4	51.2	64.1	66.1
15	8.8	16.8	40.1	55.8	62.7	66.5
16	12.5	18.7	43.5	56.5	62.5	66.6
17	9.2	16.0	39.4	54.3	61.3	66.7
18	7.0	13.3	30.4	45.6	54.1	57.3
19	5.9	10.6	29.4	42.2	52.8	52.6
20	6.3	12.5	31.0	45.0	55.5	55.6
21	4.7	10.7	30.0	42.9	53.9	52.4
22	5.6	10.9	33.8	47.3	57.0	59.2
23	5.9	12.1	31.2	48.2	57.4	60.7

Note: Table reflects VISN structure in FY14. Since FY16, VISNs 2 and 3 have combined, 18 and 22 have combined, and VISN 11 has been absorbed into VISNs 10 and 12.

Table 11. Veterans with Depression by sex, age, and VISN, FY14

Veterans with Depression by Sex, Age and VISN, FY14

(% with Depression out of total in VISN for each age and sex)

VISN	WV 18-44	MV 18-44	WV 45-64	MV 45-64	WV 65+	MV 65+
1	35.4	24.7	37.6	25.6	18.1	12.3
2	36.4	24.8	38.8	23.4	21.8	12.0
3	26.6	17.8	31.2	20.4	14.0	9.0
4	34.6	26.2	36.1	24.5	17.6	10.8
5	26.9	20.0	27.2	20.1	15.2	9.9
6	32.3	24.1	33.4	22.3	22.7	13.0
7	35.6	26.7	35.3	23.8	21.6	13.7
8	31.7	24.6	34.0	23.0	18.4	11.7
9	36.4	29.0	37.6	25.2	20.5	14.5
10	35.0	25.6	35.4	23.1	19.6	11.8
11	37.8	28.3	39.3	23.5	21.1	11.8
12	32.7	24.7	35.4	23.5	18.1	11.3
15	34.8	27.1	37.1	23.9	20.7	12.2
16	35.4	27.1	36.8	24.2	21.1	13.9
17	36.0	26.0	34.5	23.7	22.6	13.4
18	32.9	25.0	34.4	22.3	22.5	12.9
19	33.9	24.8	36.4	23.2	22.2	12.8
20	34.1	24.9	37.0	22.5	22.3	12.4
21	27.8	20.8	30.7	18.6	16.4	10.0
22	30.4	20.7	34.1	20.8	19.8	12.7
23	34.3	24.7	38.1	22.3	19.3	10.7

Note: Table reflects VISN structure in FY14. Since FY16, VISNs 2 and 3 have combined, 18 and 22 have combined, and VISN 11 has been absorbed into VISNs 10 and 12.

Table 12. Veterans with PTSD by sex, age, and VISN, FY14

Veterans with PTSD by Sex, Age and VISN, FY14

(% with PTSD out of total in VISN for each age and sex)

VISN	WV 18-44	MV 18-44	WV 45-64	MV 45-64	WV 65+	MV 65+
1	28.7	29.6	25.3	17.4	5.8	8.7
2	24.5	27.6	20.6	13.5	6.0	7.8
3	19.9	23.8	20.7	16.4	5.0	9.5
4	19.8	24.0	15.6	12.8	3.9	6.7
5	16.2	20.7	13.4	11.8	4.2	7.5
6	20.4	26.5	17.9	15.2	7.1	11.6
7	22.5	28.4	18.2	16.4	6.2	12.5
8	18.1	21.9	15.9	11.3	4.9	7.0
9	22.2	26.8	15.2	12.9	5.4	9.4
10	21.2	23.9	17.8	10.2	4.5	6.5
11	18.6	24.5	14.5	10.3	3.6	6.3
12	21.1	23.9	18.4	12.2	5.4	6.5
15	22.4	28.0	18.4	13.1	6.0	7.5
16	19.5	25.7	15.5	13.0	5.6	9.9
17	22.0	28.0	16.4	14.0	6.2	10.9
18	23.8	28.2	19.5	14.9	7.1	10.4
19	24.5	29.0	21.6	14.7	7.3	8.9
20	25.4	27.1	22.6	14.5	8.6	9.5
21	19.6	23.9	19.1	12.9	6.1	9.4
22	22.0	24.2	20.8	14.2	7.4	11.5
23	18.9	21.6	16.2	9.7	4.6	4.4

Note: Table reflects VISN structure in FY14. Since FY16, VISNs 2 and 3 have combined, 18 and 22 have combined, and VISN 11 has been absorbed into VISNs 10 and 12.

Table 13. Veterans with any CVD condition by sex, age, and VISN, FY14

Veterans with any CVD Condition by Sex, Age and VISN, FY14 *(% with CVD Condition out of total in VISN for each age and sex)*						
VISN	WV 18-44	MV 18-44	WV 45-64	MV 45-64	WV 65+	MV 65+
1	4.3	3.8	12.2	22.7	35.2	44.8
2	5.0	4.7	14.0	25.0	37.4	46.7
3	4.6	4.7	14.1	22.9	34.4	43.5
4	4.9	5.0	14.7	26.0	36.1	47.7
5	3.4	4.0	9.6	18.8	26.0	37.4
6	4.2	4.0	12.4	22.2	31.6	43.8
7	4.5	4.8	12.4	21.5	29.9	41.0
8	5.2	5.6	14.7	24.0	33.8	44.0
9	5.6	5.5	15.6	27.6	35.2	47.2
10	5.4	5.4	16.5	28.0	36.5	47.7
11	5.1	4.4	15.2	25.3	35.6	43.7
12	4.8	4.5	15.5	25.3	35.6	46.9
15	4.1	4.4	13.9	26.4	31.8	45.8
16	4.5	4.8	13.6	24.6	30.6	43.7
17	4.1	4.0	11.6	21.5	30.5	41.5
18	3.9	4.1	12.1	20.8	30.2	38.8
19	4.1	3.9	12.6	20.3	30.5	37.5
20	3.7	3.7	12.0	20.2	32.1	37.7
21	3.7	3.8	11.4	19.1	30.6	35.0
22	3.4	3.6	11.3	19.3	29.6	36.9
23	4.2	3.9	13.5	23.8	33.8	43.7

Note: Table reflects VISN structure in FY14. Since FY16, VISNs 2 and 3 have combined, 18 and 22 have combined, and VISN 11 has been absorbed into VISNs 10 and 12.

Appendix B: Technical Appendix

Data Sources

Data for this report came from centralized VHA administrative data files from FY00 through FY14. The source files used are:

ADUSH Enrollment Files1: Monthly and fiscal year-end datasets maintained by the office of the ADUSH, containing records of sociodemographic characteristics and other person-level variables (e.g., sex, Veteran status, VHA user status, date of birth, etc.).

MDPPRD.MDP.SAS.NED.MAIN.mmmyy.PSSG (Oct 2001-Sept 2006)

MDPPRD.MDP.SAS.NED.MAIN.mmmyy.VSA.PSSG (Oct 2006-Feb 2009)

MDPPRD.MDP.SAS.ESR.MAIN.mmmyy.VSA.PSSG (Mar 2009-Current)

SE/SF2: VHA Outpatient datasets (SAS Medical Dataset from VHA's National Patient Care Database). The SE file contains a record for every encounter the patient makes with VHA (e.g., clinic visits, telephone encounters, lab tests, radiology encounters, etc.); there can be more than one encounter on a given day. The SF file rolls up records of SE file encounters into one record per day of care.

MDPPRD.MDP.SAS.SEyy (SE)

MDPPRD.MDP.SAS.SFyy (SF)

PTF[3]: VHA Inpatient datasets (SAS Medical Dataset from VHA's National Patient Care Database), which contain a record for every inpatient stay at a VA facility. Inpatient data are broken down into separate data files based on care setting. The files used in this report include Acute Care, Extended Care, and Observation Care:

- Acute Care (P): Data on a patient's entire inpatient stay for acute care at a medical center bed section lasting at least 24 hours. This includes information on patient demographics, disposition of discharge, and date of death.

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[1] VIReC. VIReC Research User Guide: VHA Assistant Deputy Under Secretary for Health (ADUSH) Enrollment Files, 2nd Edition. Hines, IL: US Department of Veterans Affairs Health Services Research & Development Service, VA Information Resource Center; September 2013.

[2] VIReC. VIReC Research User Guide: Fiscal Year 2014 VHA Medical SAS Outpatient Datasets and Inpatient Encounters Dataset. Hines, IL: US Department of Veterans Affairs Health Services Research and Development Service, VA Information Resource Center; May 2015.

[3] VIReC. VIReC Research User Guide: Fiscal Year 2014 VHA Medical SAS Inpatient Datasets. 2nd ed. Hines, IL: US Department of Veterans Affairs Health Services Research & Development Service, VA Information Resource Center; November 2015.

- Extended Care (X): Data on a patient's inpatient stay in VA community living centers, domiciliaries, and VA-contracted community nursing homes.
- Observation Care (O): Data on a patient's extended monitoring, evaluation, and treatment during a hospital stay (defined as less than 48 hours).

For each care setting, there are additional detail datasets. The files used in this report include Main and Bedsection:

- Main (M): Data on a patient's entire inpatient stay, including admission and discharge dates, station, diagnosis codes, and demographic information.
- Bed Section (B): Data on a portion of an inpatient stay defined by the treating physician's specialty, and includes diagnostic and length-of-stay information.

For each care setting and type of patient stay dataset described above, there is a corresponding Census dataset that includes records on VHA medical center patients with an inpatient stay during a given fiscal year who were not discharged during that year:

MDPPRD.MDP.SAS.PMyy

MDPPRD.MDP.SAS.PByy

MDPPRD.MDP.SAS.XMyy

MDPPRD.MDP.SAS.XByy

MDPPRD.MDP.SAS.PMOyy

MDPPRD.MDP.SAS.PBOyy

MDPPRD.MDP.SAS.CENSUS.PMyy

MDPPRD.MDP.SAS.CENSUS.PByy

MDPPRD.MDP.SAS.CENSUS.XMyy

MDPPRD.MDP.SAS.CENSUS.XByy

MDPPRD.MDP.SAS.CENSUS.PMOyy

MDPPRD.MDP.SAS.CENSUS.PBOyy

Non-VA (Fee) Medical Care Medical Care files[4]: Non-VA (Fee) Medical Care Medical Care encounter files contain records of all claims paid by VHA during the fiscal year for which a patient received care from non-VHA healthcare providers. The Fee Inpatient file includes hospital stays (INPT) and inpatient

[4] Gidwani R, Hong J, Murrell S. Fee Basis Data: A Guide for Researchers. Menlo Park, CA. VA Palo Alto, Health Economics Resource Center; November 2015.

ancillary services and physician charges (ANCIL), whereas the Fee Outpatient file includes outpatient services (MED):

MDPPRD.MDP.SAS.FEN.FYyy.MED

MDPPRD.MDP.SAS.FEN.FYyy.INPT

MDPPRD.MDP.SAS.FEN.FYyy.INPT.ANCIL

All programming was performed using SAS 9.2©, and all programs were independently validated by at least one other analyst. Data presented in this report were analyzed for program evaluation purposes.

Cohort Creation

This report presents basic data on women and men Veterans, who, according to the ADUSH Enrollment File, received VHA care at least once in the year being examined (FY14). The demographic variables used to describe the cohort (Veterans, patients, sex, age, and race/ethnicity) are described in greater detail in Sourcebook: Volume 3.[5]

Algorithm for Cardiovascular Risk Factor and Condition Variables

Phase 1. Mapping ICD-9-CM Codes to Risk Factors and Conditions. The Women Veterans Cardiovascular Health Workgroup identified the following cardiovascular (CV) risk factors and conditions for analysis in this report. The workgroup mapped CV conditions to International Classification of Diseases, Ninth Revision, Clinical Modification (ICD-9-CM) codes, by modifying the Agency for Healthcare Research and Quality's 2011 version of the Clinical Classification Software condition classifications.[6] Key modifications included splitting out large groups into finer condition categories (e.g., other nutritional, endocrine, and metabolic disorders were divided into various conditions including obesity) and renaming some groups (e.g., "disorders of lipid metabolism" was changed to "dyslipidemia").

[5] Frayne SM, Phibbs CS, Saechao F, Maisel NC, Friedman SA, Finlay A, Berg E, Balasubramanian V, Dally SK, Ananth L, Romodan Y, Lee J, Iqbal S, Hayes PM, Zephyrin L, Whitehead A, Torgal A, Katon JG, Haskell S. Sourcebook: Women Veterans in the Veterans Health Administration. Volume 3. Sociodemographics, Utilization, Costs of Care, and Health Profile. Women's Health Evaluation Initiative, Women's Health Services, Veterans Health Administration, Department of Veterans Affairs, Washington DC. February 2014. Available at: http://www.womenshealth.va.gov/WOMENSHEALTH/docs/Sourcebook_Vol_3_FINAL.pdf

[6] HCUP CCS. Healthcare Cost and Utilization Project (HCUP). August 2012. Agency for Healthcare Research and Quality, Rockville, MD. www.hcup-us.ahrq.gov/toolssoftware/ccs/ccs.jsp

Cardiovascular Risk Factor Variable ICD-9-CM Codes

The specific ICD-9-CM codes from the utilization files used to create variables for each type of risk factor are listed here. Note that some of the variables listed are only included in the aggregate diagnosis definitions (See Section D for Aggregate Variable definitions).

RISK FACTOR VARIABLE	ICD-9-CM DIAGNOSIS CODES
Diabetes (Non-Pregnancy Related)	24900, 24901, 24910, 24911, 24920, 24921, 24930, 24931, 24940, 24941, 24950, 24951, 24960, 24961, 24970, 24971, 24980, 24981, 24990, 24991, 25000, 25001, 25002, 25003, 25010, 25011, 25012, 25013, 25020, 25021, 25022, 25023, 2503, 25030, 25031, 25032, 25033, 25040, 25041, 25042, 25043, 25050, 25051, 25052, 25053, 2506, 25060, 25061, 25062, 25063, 2507, 25070, 25071, 25072, 25073, 2508, 25080, 25081, 25082, 25083, 25090, 25091, 25092, 25093, 3572, 36201, 36202, 36203, 36204, 36205, 36206, 36207, 36641
Diabetes (Pregnancy Related)	64800, 64801, 64802, 64803, 64804, 64880, 64881, 64882, 64883, 64884
Hypertension (Non-Pregnancy Related)	36211, 401, 4010, 4011, 4019, 402, 4020, 4021, 4029, 403, 4030, 4031, 4039, 404, 4040, 4041, 4049, 405, 4050, 4051, 4059, 40200, 40201, 40210, 40211, 40290, 40291, 40300, 40301, 40310, 40311, 40390, 40391, 40400, 40401, 40402, 40403, 40410, 40411, 40412, 40413, 40490, 40491, 40492, 40493, 40501, 40509, 40511, 40519, 40591, 40599, 4372
Hypertension (Pregnancy Related)	64200, 64201, 64202, 64203, 64204, 64210, 64211, 64212, 64213, 64214, 64220, 64221, 64222, 64223, 64224, 64230, 64231, 64232, 64233, 64234, 64240, 64241, 64242, 64243, 64244, 64250, 64251, 64252, 64253, 64254, 64260, 64261, 64262, 64263, 64264, 64270, 64271, 64272, 64273, 64274, 64290, 64291, 64292, 64293, 64294
Dyslipidemia	272, 2720, 2721, 2722, 2723, 2724, 2727, 2728, 2729
Depressive Disorders	29620, 29621, 29622, 29623, 29624, 29625, 29626, 29630, 29631, 29632, 29633, 29634, 29635, 29636, 3004, 3090, 3091, 311
Device (Pacemaker/ICD)	99601, 99604, V450 , V4500, V4501, V4502, V4509, V533 , V5331, V5332, V5339
PTSD	30981
Tobacco Use	3051, 30510, 30511, 30512
Family History of CVD Disease, Stroke	V171, V173, V174, V1741, V1749

Cardiovascular Condition Variable ICD-9-CM Codes. The specific ICD-9-CM codes from the utilization files used to create the variables for each type of condition examined are listed here. Note that some of the variables listed are only included in the aggregate diagnosis definitions (See Section D for Aggregate Variable definitions).

CONDITION VARIABLE	ICD-9-CM DIAGNOSIS CODES
Chest pain/angina	413, 4130, 4131, 4139, 78650, 78651, 78659
Coronary Artery Disease (Non-MI)	411, 4111, 4118, 41181, 41189, 414, 4140, 41400, 41401, 41402, 41403, 41404, 41405, 41406, 41407, 41410, 41411, 41412, 41419, 4142, 4143, 4144, 4148, 4149, 4292, 99603, V4581, V4582,
Palpitations	7851
Atrial fibrillation/Atrial flutter	42731, 42732
Tachycardia/Arrhythmia-Other	4270, 4271, 4272, 42760, 42761, 42769, 42781, 42789, 4279, 7850,
Conduction Disorders (Fine)	33701, 4260, 42610, 42611, 42612, 42613, 4262, 4263, 4264, 4266, 4267, 4269, 42650, 42651, 42652, 42653, 42654, 42681, 42682, 42689, 74686, 79431
Acute Stroke	4330, 43300, 43301, 4331, 43310, 43311, 4332, 43320, 43321, 4333, 43330, 43331, 4338, 43380, 43381, 4339, 43390, 43391, 4340, 43400, 43401, 4341, 43410, 43411, 4349, 43490, 43491, 436, 34660, 34661, 34662, 34663
Heart Failure (Non-Pulmonary Heart Disease)	39891, 4250, 4251, 42511, 42518, 4252, 4253, 4254, 4255, 4257, 4258, 4259, 4280, 4281, 4282, 42820, 42821, 42822, 42823, 4283, 42830, 42831, 42832, 42833, 4284, 42840, 42841, 42842, 42843, 4289, 4291, 4293, 42983, V421, V432, V4322
Valvular Disease	3940, 3941, 3942, 3949, 3950, 3951, 3952, 3959, 3960, 3961, 3962, 3963, 3968, 3969, 3970, 3971, 3979, 4240, 4241, 4242, 4243, 4295, 4296, 42981, 74600, 74601, 74602, 74609, 7463, 7464, 7465, 7466, 74683, 7852, 99602, 99671, V422, V433
Acute Myocardial Infarction (MI)	410, 4100, 41000, 41001, 41002, 4101, 41010, 41011, 41012, 4102, 41020, 41021, 41022, 4103, 41030, 41031, 41032, 4104, 41040, 41041, 41042, 4105, 41050, 41051, 41052, 4106, 41060, 41061, 41062, 4107, 41070, 41071, 41072, 4108, 41080, 41081, 41082, 4109, 41090, 41091, 41092
MI Sequelae	4110, 412, 4297, 42971, 42979
Coronary Artery Disease (Non-MI)	411, 4111, 4118, 41181, 41189, 414, 4140, 41400, 41401, 41402, 41403, 41404, 41405, 41406, 41407, 41410, 41411, 41412, 41419, 4142, 4143, 4144, 4148, 4149, 4292, 99603, V4581, V4582
Cardiac Arrest	42741, 42742, 4275, V1253

CONDITION VARIABLE	ICD-9-CM DIAGNOSIS CODES
Pericarditis	11503, 11513, 11593, 3641, 3910, 393, 4200, 42090, 42091, 42099, 4231, 4232, 4238, 4239, 7421
Pregnancy Complicated by Other Cardiovascular Conditions	64850, 64851, 64852, 64853, 64854, 64860, 64861, 64862, 64863, 64864, 66810, 66811, 66812, 66813, 66814
Pulmonary Heart Disease	4150, 4160, 4161, 4168, 4169
Endocarditis	11281, 11504, 11514, 11594, 3642, 3911, 4210, 4211, 4219, 42490, 42491, 42499, 7422
Myocarditis	1303, 3282, 3643, 3912, 3980, 4220, 42290, 42291, 42292, 42293, 42299, 4290, 7423
Morbid Obesity	27801, V854 , V8541, V8542, V8543, V8544, V8545
Obesity	2780, 27800, 27803, 79391, V8530, V8531, V8532, V8533, V8534, V8535, V8536, V8537, V8538, V8539,
Overweight	27802, V8521, V8522, V8523, V8524, V8525
Other Carditis	3640, 3918, 3919, 3920, 39890, 39899, 7420
Cardiac Tamponade	4233
Cardiac Conditions-Other	2127, 4230, 42982, 42989, 4299, 7450, 74510, 74511, 74512, 74519, 7452, 7453, 7454, 7455, 74560, 74561, 74569, 7457, 7458, 7459, 7461, 7462, 7467, 74681, 74682, 74684, 74685, 74687, 74689, 7469, 7470, 79430, 79439, 99600, 99609, 99661, 99672, 99683, V1365, V151, V717
Late Effects of Stroke	438, 4380, 43810, 43811, 43812, 43813, 43814, 43819, 43820, 43821, 43822, 43830, 43831, 43832, 43840, 43841, 43842, 43850, 43851, 43852, 43853, 4386, 4387, 43881, 43882, 43889, 4389, V1254
Other Cerebrovascular Disease	4370, 4371, 4373, 4374, 4375, 4376, 4378, 4379, 99702
Transient Ischemic Attack (TIA)	435, 4350, 4351, 4352, 4353, 4358, 4359
Peripheral Vascular Disease (Non-Aortic Abdominal Aneurysm)	4400, 4401, 4402, 44020, 44021, 44022, 44023, 44024, 44029, 4403, 44030, 44031, 44032, 44381, 44389, 4404, 4408, 4409, 4410, 44100, 44101, 4421, 4422, 4423, 4429, 44281, 44283, 44284, 44289, 443, 4431, 44321, 44322, 44323, 44324, 44329, 4438, 4439, 44421, 44422, 44481, 44489, 44501, 44502, 44581, 44589, 4471, 5570, 5571, 5579, 7476, V434
Peripheral Vascular Disease (Aortic Abdominal Aneurysm)	441, 44102, 44103, 4411, 4412, 4413, 4414, 4415, 4416, 4417, 4419

Phase 2. Creating Person-Level Variables for Each Risk Factor and Condition Within Each Data Source. For each of the 39 CV risk factor and condition categories examined in this report, we created person-level count and indicator variables for the VHA and Non-VA (Fee) Medical Care Medical Care outpatient files and person-level indicator variables for the VHA and Non-VA (Fee) Medical Care Medical Care inpatient files. Creating the person-level variables required a series of steps.

Modifying the raw record-level VHA and Non-VA (Fee) Medical Care Medical Care outpatient files involved reshaping the raw datasets three times (elongation, removal of duplicates, and person-level file creation) with intermediary variables to help carry-over information.

Note: Only records with Face-to-Face Clinic Stop codes were read in, as these represent settings where a clinician could legitimately record a diagnosis (See Table below for VHA Outpatient Face-to-Face Clinic Stop Codes and the Online Appendix for Non-VA (Fee) Medical Care Medical Care Outpatient Face-to-Face CPT Codes).

Face-to-Face Clinic Stop Codes (VHA Outpatient)
102, 110, 116, 117, 118, 119, 120, 121, 123, 124, 125, 130, 131, 135, 136, 137, 142, 144, 149, 153, 156, 157, 158, 159, 160, 162, 165, 170, 171, 172, 173, 174, 175, 176, 177, 179, 180, 184, 185, 186, 187, 188, 190, 191, 195, 196, 197, 198, 201, 202, 203, 204, 205, 206, 207, 208, 209, 210, 211, 213, 214, 215, 217, 218, 220, 222, 225, 230, 231, 240, 250, 290, 291, 301, 302, 303, 304, 305, 306, 307, 308, 309, 310, 311, 312, 313, 314, 315, 316, 317, 318, 319, 320, 321, 322, 323, 327, 328, 329, 330, 331, 332, 333, 334, 335, 336, 337, 339, 340, 345, 346, 347, 348, 349, 350, 351, 352, 353, 354, 369, 370, 372, 373, 394, 401, 402, 403, 404, 405, 406, 407, 408, 409, 410, 411, 412, 413, 414, 415, 416, 418, 419, 420, 422, 426, 427, 429, 430, 431, 432, 433, 434, 435, 436, 437, 438, 439, 440, 444, 445, 446, 447, 448, 450, 457, 481, 490, 491, 502, 503, 504, 505, 506, 507, 508, 509, 510, 511, 512, 513, 514, 516, 519, 522, 523, 524, 525, 529, 531, 533, 534, 535, 538, 539, 540, 547, 548, 550, 552, 553, 554, 557, 558, 560, 561, 562, 564, 565, 566, 567, 568, 571, 572, 573, 574, 575, 576, 577, 580, 582, 583, 586, 587, 588, 590, 591, 592, 593, 595, 596, 598, 599, 602, 603, 604, 606, 607, 608, 610, 644, 645, 648, 651, 656, 680, 681, 690, 692, 693, 701, 704, 706, 707, 708, 710, 713, 714, 716, 718, 720

Step 1. The VHA outpatient utilization file contains the diagnosis variables DXLSF and DXF2-DXF10, while the Non-VA (Fee) Medical Care Medical Care outpatient utilization file contains the diagnosis variables DXLSF and DX1-DX25. Because the outpatient utilization files may contain multiple diagnoses in a single record, we reshaped the dataset such that there was only one diagnosis variable (DX) instead of multiple. The elongation of the dataset resulted in a separate record for every non-missing diagnosis value.

Step 2. We next removed duplicate records where information on all fields (e.g., same person, date [VHA: VIZDAY; Non-VA (Fee) Medical Care Medical Care: TREATDAY], VISN, station, CL (VHA) or CPT [Non-VA (Fee) Medical Care Medical Care], and the newly formed variable DX) was equivalent. This step was necessary to avoid overcounting the instances of a diagnosis code in the outpatient data.

Note: It was not necessary to process duplicates or overlapping admissions in the VHA inpatient files nor in the Non-VA (Fee) Medical Care Medical Care inpatient files because we were only interested in whether there was at least one instance of the condition in the fiscal year.

Step 3. Based on our operationalization of the CV risk factor and condition groups, defined by ICD-9-CM diagnoses codes, we created an intermediary variable (long record level variable) for each diagnosis group that indicated if the record contained a diagnosis code that was mapped to a CV risk factor or condition. These intermediary indicator variables were then summed among records with the same values of person, date, station, CL (VHA outpatient) or CPT [Non-VA (Fee) Medical Care Medical Care outpatient], creating a person-level count variable indicating how often each patient received the corresponding ICD-9-CM diagnoses codes in the FY14 Medical SAS outpatient Event dataset (SE) and Non-VA (Fee) Medical Care Medical Care outpatient services (MED) file. The counts include diagnoses in the same risk factor or condition category made during different clinic visits or with different procedure codes. For example, a patient whose only CV diagnoses in FY14 were two coronary artery disease diagnoses made in the same Cardiology Clinic visit would receive a count of one, whereas a patient who received a coronary artery disease diagnosis in a Cardiology Clinic visit and a second coronary artery disease diagnosis in Primary Care visit on the same day would receive a count of two.

For each of the 39 CV risk factor and condition variables, we also created person-level variables indicating if an ICD-9-CM diagnosis code that was mapped to the risk factor or condition appeared at least once in any VHA outpatient utilization record (yes/no) and any Non-VA (Fee) Medical Care Medical Care outpatient utilization record (yes/no).

Step 3 yielded two person-level, file-specific count variables for each condition, and four person-level, file-specific indicator variables for each condition.

Phase 3. Creating Person-Level Variables for Each Risk Factor and Condition Across Data Sources. The final person-level variable for each risk factor and condition presented throughout this report was created by searching within each of the four person-level, file-specific databases for any indication of presence of the cardiovascular risk factor or condition. During this step, new "total" sum variables were created that sum the count of each risk factor and condition across the four VHA settings. The "total" sum variables were then used to create "yes/no" indicator variables equaling 1 if the "total" sum variables were 1 or more. For example, the diagnosis of coronary artery disease in the VHA outpatient file but no similar diagnosis in the remaining utilization files would still be considered a positive indicator of coronary artery disease for that patient.

For this report, a patient is considered to have a cardiovascular risk factor or condition if he/she had at least one instance of an ICD-9-CM diagnosis code mapped to the risk factor or condition in a VHA/Non-VA (Fee) Medical Care Medical Care outpatient or inpatient file in FY14.

Algorithm for Aggregate Cardiovascular Risk Factor and Aggregate Condition Variables. The Women Veterans Cardiovascular Health Workgroup identified 15 aggregate risk factor and condition variables based on a common diagnostic characteristic. The table below lists the mapping of

risk factors to the Aggregate Cardiovascular Risk Factor variable and the mapping of conditions to the Aggregate Cardiovascular Conditions variables.

AGGREGATE VARIABLES	RISK FACTORS/CONDITIONS
Any Major Cardiovascular Risk Factors	Depression, Diabetes (Non-Pregnancy Related), Diabetes (Pregnancy Related), Dyslipidemia, Family History of CVD, Hypertension (Non-Pregnancy Related), Hypertension (Pregnancy Related), Morbid Obesity, Obesity, Overweight, Post-Traumatic Stress Disorder, Tobacco Use
Any Cardiovascular Disease Condition	Atrial Fibrillation/Atrial Flutter, Cardiac Arrest, Conduction (Fine), Device (Pacemaker/ICD), Tachycardia/Arrhythmia-Other, Cardiac Conditions-Other, Cardiac Tamponade, Myocarditis, Other Carditis, Pericarditis, Acute Stroke, Other Cerebrovascular Disease, Late Effects of Cerebrovascular Disease, Transient Ischemic Attack (TIA), Acute MI, Coronary Artery Disease (Non-MI), MI Sequelae, Heart Failure (Non-Pulmonary Heart Disease), Pulmonary Heart Disease, Endocarditis, Valvular Disease (Non-Endocarditis), Peripheral Vascular Disease (Non-Aortic Abdominal Aneurysm), Peripheral Vascular Disease (Aortic Abdominal Aneurysm (AAA)), Vascular Disease-Other
Cardiovascular Disease-Other	Other Pregnancy Complications
Symptoms	Chest Pain/Angina, Palpitations
Arrhythmia/Conduction/ Disorder/Atrial Fibrillation and Atrial Flutter	Atrial Fibrillation and Atrial Flutter, Cardiac Arrest, Conduction, Device (Pacemaker/ICD), Tachycardia/Arrhythmia-Other
Cardiac Conditions-Other	Cardiac Conditions-Other, Cardiac Tamponade, Conduction, Myocarditis, Other Carditis, Pericarditis
Cerebrovascular Disease	Acute Stroke, Late Effects of Stroke, Other Cerebrovascular Disease, TIA
Coronary Artery Disease	Acute MI, Coronary Artery Disease (Non-MI), MI Sequelae
Diabetes Mellitus	Diabetes (Non-Pregnancy Related), Diabetes (Pregnancy Related)
Heart Failure	Heart Failure (Non-Pulmonary Heart Disease), Pulmonary Heart Disease
Hypertension	Hypertension (Non-Pregnancy Related), Hypertension (Pregnancy Related)
Overweight/Obesity	Morbid Obesity, Obesity, Overweight
Valvular Disease	Endocarditis, Valvular Disease (Non-Endocarditis)
Vascular Disease	Peripheral Vascular Disease (Non-AAA), Peripheral Vascular Disease (AAA), Vascular Disease-Other
Peripheral Vascular Disease	Peripheral Vascular Disease (Non-AAA), Peripheral Vascular Disease (AAA)

Using the final person-level databases described in Section C above, we created a person-level indicator variable (yes/no) for each aggregate risk factor and aggregate condition indicating whether the patient had at least one risk factor or condition that was mapped to the aggregate risk factor or aggregate condition group. For example, a patient who received a diagnosis code mapped to the condition of Morbid Obesity would also be included in the proportion with the aggregate cardiovascular condition of Overweight/Obesity.

Algorithm for Cardiovascular Procedure Variables

Phase 1. Mapping CPT/HCPCS and ICD-9-CM Codes to Cardiovascular Procedures. We follow a similar algorithm for the development of procedural variables, replacing diagnostic fields for procedural ones. Because procedural codes are recorded differently in the VHA and Non-VA (Fee) Medical Care data, the workgroup operationalized CV procedures using both Healthcare Common Procedure Coding System (HCPCS, also known as Current Procedural Terminology or CPT codes) Level I and Level II codes and ICD-9-CM codes.

The table below lists the procedural code variables used in the different utilization settings. The VHA and Non-VA (Fee) Medical Care outpatient files both use CPT codes to describe procedures performed in the outpatient settings. The VHA inpatient files employ both procedural and surgical ICD-9-CM codes to describe inpatient procedures. Finally, the Non-VA (Fee) Medical Care inpatient files use both CPT and ICD-9-CM codes: CPT codes are applied to the CPT1 variable in Inpatient Ancillary file and ICD-9-CM codes are applied to the variables SURG9CD1-SURG9CD25 in the Inpatient file.

Type of Setting	Datasets	Procedure Variables	Type of Code
Non-VA (Fee) Medical Care Outpatient	Fy14_fee_op_clean.sas7bdat (WHEI's cleaned version of the FEN.FY14.MED file)	CPT1	CPT
VHA Outpatient	Se14.sas7bdat	CPT1-CPT20	CPT
Non-VA (Fee) Medical Care Inpatient	Fenipancil14.sas7bdat	CPT1	CPT
	Feninpt14.sas7bdat	SURG9CD1-SURG9CD25	ICD9
VHA Inpatient	PP14.sas7bdat	PROCDE1-PROCDE5	ICD9
	XP14.sas7bdat	PROCDE1-PROCDE5	ICD9
	PPO14.sas7bdat	PROCDE1-PROCDE5	ICD9
	PS14.sas7bdat	SURG9CD1-SURG9CD5	ICD9
	XS14.sas7bdat	SURG9CD1-SURG9CD5	ICD9
	Census_PP14.sas7bdat	PROCDE1-PROCDE5	ICD9
	Census_XP14.sas7bdat	PROCDE1-PROCDE5	ICD9
	Census_PPO14.sas7bdat	PROCDE1-PROCDE5	ICD9
	Census_PS14.sas7bdat	SURG9CD1-SURG9CD5	ICD9
	Census_XS14.sas7bdat	SURG9CD1-SURG9CD5	ICD9

The Women Veterans Cardiovascular Health Workgroup identified the following 15 cardiovascular (CV) procedure variables for analysis in this report.

PROCEDURE VARIABLE	CPT/HCPCS and ICD-9-CM CODES
Electrophysiology Mapping and Ablation	CPT: 93650, 93651, 93652 ICD-9-CM: 3726, 3727
Ambulatory Electrocardiogram Monitoring	CPT: 93224, 93225, 93226, 93227, 93228, 93229, 93230, 93231, 93232, 93233, 93235, 93236, 93237, 93268, 93270, 93271, 93272, S0345, S0346, S0347 ICD-9-CM: 8950
Cardioversion and Pacing	CPT: 92953, 92960 ICD-9-CM: 996, 9961, 9962, 9969
Coronary Angiography	CPT: 93452, 93453, 93454, 93455, 93458, 93459, 93460, 93461, 93462, 93508, 93510, 93511, 93514, 93524, 93526, 93527, 93528, 93529 ICD-9-CM: 3722, 3723, 8850, 8852, 8853, 8853, 8854, 8855, 8856, 8857, 8859
Coronary Artery Bypass Graft	CPT: 33510, 33511, 33512, 33513, 33514, 33516, 33517, 33518, 33519, 33521, 33522, 33523, 33533, 33534, 33535, 33536, 33572, S2205, S2206, S2207, S2208, S2209 ICD-9-CM: 3610, 3611, 3612, 3613, 3614, 3615, 3616, 3617, 3619, 362, 363, 3631, 3632, 3639
Coronary Intervention – Percutaneous Transluminal Coronary Angioplasty	CPT: 92920, 92921, 92924, 92925, 92928, 92929, 92933, 92934, 92973, 92980, 92981, 92982, 92984, 92995, 92996, G0290, G0291 ICD-9-CM: 0066, 1755, 3601, 3602, 3605, 3606, 3607, 3609
ECHO	CPT: 93303, 93304, 93306, 93307, 93308, 93312, 93313, 93314, 93315, 93316, 93317, 93318, C8921, C8922, C8923, C8924, C8925, C8926, C8927 C8929 ICD-9-CM: 8872
ECHO Stress Test	CPT: 93350, 93351, C8928, C8930
Non-Imaging Stress Test	CPT: 93015, 93016, 93017, 93018 ICD-9-CM: 8941, 8942, 8943

Nuclear Stress Test	CPT: 78451, 78452, 78454, 78472, 78473, 78481, 78483, 78491, 78492 ICD-9-CM: 8944
EKG (Electrocardiogram)	CPT: 93000, 93005, 93010, 93012, 93014, 93040, 93041, 93042 ICD-9-CM: 8951, 8952, 8957
ICD/Pacemaker Maintenance (Evaluation)	CPT: 93279, 93280, 93281, 93282, 93283, 93284, 93286, 93287, 93288, 93289, 93290, 93293, 93294, 93295, 93296, 93297, 93724, 93731, 93732, 93733, 93734, 93735, 93741, 93742, 93743, 93744, 93745 ICD-9-CM: 894, 8945, 8946, 8947, 8948, 8949
ICD/Pacemaker (Insertion/Replacement/Revision)	CPT: 33214, 33215, 33218, 33220, 33222, 33223, 33225, 33226, 33233, 33234, 33235, 33241, 33244 ICD-9-CM: 0050, 0051, 0052, 0053, 0054, 0056, 0057, 1751, 1752, 377, 3770, 3771, 3772, 3773, 3774, 3775, 3776, 3777, 3779, 378, 3780, 3781, 3782, 3783, 3785, 3786, 3787, 3789, 3794, 3795, 3796, 3797, 3798
Right Heart Catheterization/Swan	CPT: 36013, 93451, 93456, 93457, 93501, 93503, 93561, 93562 ICD-9-CM: 3721, 8852, 8963, 8964, 8967, 8968
Thrombolysis, Medical (CPT)	CPT: 92977

Phase 2. Creating Person-Level Variables for Each Procedure Within Each Data Source. For each of the 15 CV procedure variables examined in this report, we created person-level count and indicator variables for the VHA and Non-VA (Fee) Medical Care outpatient files and person-level indicator variables for the VHA and Non-VA (Fee) Medical Care inpatient files. Creating the person-level variables required a series of steps. We followed a similar process as described in the algorithm for risk factors and conditions, creating a person-level file from intermediary datasets unique by person and procedure code.

Modifying the raw record-level VHA and Non-VA (Fee) Medical Care outpatient files involved reshaping the raw datasets three times (elongation, removal of duplicates, and person-level file creation) with intermediary variables to help carry-over information.

Note: Unlike the risk factor and condition variable creation process described in the previous sections, creating the person-level procedure variables did not require limiting records to face-to-face encounters because many of the cardiovascular procedures are performed without the presence of a clinician.

Step 1. To address the fact that a VHA outpatient utilization file could contain multiple procedures, CPT1-CPT20, in a single record, we reshaped the dataset such that there was only one procedure variable (CPT) instead of multiple ones. The elongation of the dataset resulted in a separate record for every non-missing procedure value.

Note: WHEI's processed Non-VA (Fee) Medical Care outpatient files contain only one procedure field, CPT1. For an explanation of the data cleaning steps, please see the Technical Appendix of Sourcebook: Volume 3.[7]

Step 2. We next removed duplicate records where information by person and procedure code was equivalent.

Step 3. Based on our operationalization of the CV procedure groups, we created an intermediary variable (long record level variable) for each procedure group that indicated if the record contained a procedure code that was mapped to a cardiovascular procedure. To create the person-level procedure count variables, we summed these intermediary indicator variables by person. If the sum of diagnoses in a procedure group across all records was one or more, we gave the person-level procedure indicator variable a value of 1 (1=yes; 0=no).

Step 4. Creating the person-level variables for the VHA/Non-VA (Fee) Medical Care inpatient files involved a similar process of modifying the raw datasets as described for the outpatient files, except that we searched CPT/HCPCS and ICD-9-CM codes. We created only person-level indicator variables for the inpatient files to identify if there was at least one instance of procedure appearing in the VHA inpatient (yes/no) or Non-VA (Fee) Medical Care inpatient (yes/no) settings.

Phase 3. Creating Person-Level Variables for Each Procedure Across Data Sources. The final person-level variable for each procedure presented throughout this report was created by searching within each of the four person-level, file-specific databases for any indication of presence of the procedure.

For this report, a patient is considered to have received a particular procedure if he/she had at least one instance of an ICD-9-CM code or CPT/HCPCS code mapped to the procedure in the VHA/Non-VA (Fee) Medical Care outpatient or inpatient file in FY14.

Algorithm for Aggregate Procedure Variables

The Women Veterans Cardiovascular Health Workgroup also grouped procedure variables into aggregate procedures based on a common procedural characteristic. Aggregate variables include any stress test procedures, any catheterization procedures, and any cardiovascular procedures.

[7] Frayne SM, Phibbs CS, Saechao F, Maisel NC, Friedman SA, Finlay A, Berg E, Balasubramanian V, Dally SK, Ananth L, Romodan Y, Lee J, Iqbal S, Hayes PM, Zephyrin L, Whitehead A, Torgal A, Katon JG, Haskell S. Sourcebook: Women Veterans in the Veterans Health Administration. Volume 3. Sociodemographics, Utilization, Costs of Care, and Health Profile. Women's Health Evaluation Initiative, Women's Health Services, Veterans Health Administration, Department of Veterans Affairs, Washington DC. February 2014. Available at: http://www.womenshealth.va.gov/WOMENSHEALTH/docs/Sourcebook_Vol_3_FINAL.pdf

AGGREGATE VARIABLES	PROCEDURE VARIABLES
Any Stress Test	ECHO Stress Test, Nuclear Stress Test, Non-Imaging Stress Test
Any Catheterization	Coronary Angiography, Coronary Intervention-PTCA
Any Cardiovascular Procedure	Electrophysiology Mapping and Ablation, Ambulatory EKG Monitoring, Cardioversion and Pacing, Coronary Angiography, CABG, Coronary Intervention-PTCA, Echocardiogram, ECHO Stress Test, Non Imaging Stress Test, Nuclear Stress Test, EKG, ICD/Pacemaker Maintenance, ICD/Pacemaker (Insertion/Replacement/Revision), Right Heart Catheterization/Swan, Thrombolysis

Using the final person-level database described above, we created a person-level indicator variable (yes/no) for each aggregate procedure indicating whether the patient had at least one procedure that was mapped to the aggregate procedure group.

Algorithm for VISN-Level Frequencies

This report also described frequencies of cardiovascular risk factors, conditions, and procedures at the Veterans Integrated Service Network (VISN) level. Because the station location variables available in the VHA and Non-VA (Fee) Medical Care files are different, we processed each of the files separately.

Step 1. The VHA outpatient and inpatient source files contain the VISN variable, which identifies the Veterans Integrated Service Network where the patient received care.

Using the VHA outpatient (SE) file, we created an intermediary dataset containing all unique records by SCRSSN and VISN. We then merged this dataset with the person-level VHA outpatient cardiovascular risk factor dataset to create a new person-level outpatient risk factor dataset by VISN.

Using the VHA inpatient (PTF) files, we created an intermediary dataset containing all unique records by SCRSSN and VISN. We then merged this dataset with the person-level VHA inpatient cardiovascular risk factor dataset to create a new person-level inpatient risk factor dataset by VISN.

Step 2. Because the Non-VA (Fee) Medical Care files do not contain the VISN variable, we first created a STA6A-VISN crosswalk file. The STA6A-VISN crosswalk file was obtained from the VHA Site Tracking (VAST)[8] System of site classifications for FY14.

Using the Non-VA (Fee) Medical Care outpatient file, we created an intermediary dataset containing all unique records by SCRSSN and STA6A. We then merged this dataset with the person-level Non-VA (Fee) Medical Care outpatient cardiovascular risk factor dataset to create a new person-level outpatient risk factor dataset by STA6A. Next, we linked this dataset with the STA6A-VISN crosswalk file to generate a final person-level outpatient risk factor dataset by VISN.

[8] Veterans Health Administration. VHA Site Classifications and Definitions (VHA Handbook 1600.02). Washington, DC; US Department of Veterans Affairs; 2013.

Using the Non-VA (Fee) Medical Care inpatient and inpatient ancillary files, we created an intermediary dataset containing all unique records by SCRSSN and STA6A. We then merged this dataset with the person-level Non-VA (Fee) Medical Care inpatient cardiovascular risk factor dataset to create a new person-level inpatient risk factor dataset by STA6A. Next, we linked this dataset with the STA6A-VISN crosswalk file to generate a final person-level outpatient risk factor dataset by VISN.

Step 3. We merged the four person-level, file-specific datasets created in Steps 1 and 2 above, matching on scrambled SSN and retaining the VISN values by person. Note that with this process, patients who received VA care in more than one VISN will appear as having a count of a risk factor in one VISN and will have a count of the same risk factor in another VISN.

The VISN-level frequencies of cardiovascular conditions and procedures followed a similar process as described above.