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State of Cardiovascular Health in Women Veterans

Volume 1: VA Outpatient Diagnoses and Procedures in Fiscal Year (FY) 2010

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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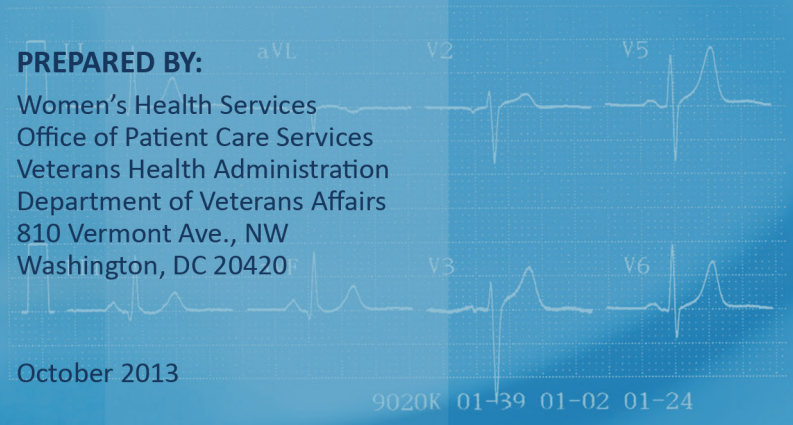

U.S. Department of Veterans Affairs

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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
Alison M. Whitehead, MPH
Melinda B. Davis, MD
Claire Duvernoy, MD
Basmah Safdar, MD
Chileshe Nkonde-Price, MD
Samina Iqbal, MD
Vidhya Balasubramanian, MS
Susan M. Frayne, MD, MPH
Sarah A. Friedman, MSPH
Patricia M. Hayes, PhD
Sally G. Haskell, MD

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List of Acronyms

ADUSH	Assistant Deputy Under Secretary for Health
AHA	American Heart Association
CPT	Current Procedural Terminology
CV	Cardiovascular
CVD	Cardiovascular Disease
ECHO	Echocardiogram
EKG	Electrocardiogram
FY	Fiscal Year (October 1 to September 30)
ICD	Implantable Cardioverter-Defibrillator
ICD-9	International Classification of Diseases, Ninth Revision
LDL-C	Low-Density-Lipoprotein Cholesterol
MI	Myocardial Infarction
MV	Men Veterans
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
VBA	Veterans Benefits Administration
VHA	Veterans Health Administration
VISN	Veterans Integrated Service Network
WHC	Women's Health Clinic
WHEI	Women's Health Evaluation Initiative
WHS	Women's Health Services
WV	Women Veterans

Executive Summary

The face of the Department of Veterans Affairs (VA) is changing. Women now make up 15 percent of active duty military. Further, they are separating from service and using the VA in record numbers. While the number of living male Veterans is declining, the number of women Veterans is rising and the number of women Veterans using the Veterans Health Administration (VHA) for their medical care has doubled in the past decade. In addition to the growth in number of women Veterans, the age distribution has changed. The largest cohort of women Veterans is now made up of those aged 45-64, and these women will require cardiovascular (CV) care as they continue to age. In addition, the new influx of younger women Veterans necessitates a focus on prevention, including prevention of cardiovascular disease (CVD) risk factors and conditions.

A mission of VA is to provide equitable, high quality care for women Veterans, thereby becoming a U.S. leader in health care for women. In the private civilian sector, gender disparities between men and women in CV risk factor management and in CV care and outcomes have been documented.[1] Based on this, Women's Health Services (WHS) identified the need to assess CV care for women Veterans, forming a Cardiovascular Health in Women Veterans Workgroup in 2011.

This report is the initial result of the work done by WHS and the Cardiovascular Health in Women Veterans Workgroup, in collaboration with Women's Health Evaluation Initiative (WHEI), VA Palo Alto. The first in a planned series of reports, this volume evaluates CV risk factors, conditions and procedures occurring in VHA outpatient care in women and men Veterans in 2010. This report builds on Sourcebook Vol. 1 developed collaboratively by WHS and WHEI. [2] [3]

All data in this report come from centralized, national VHA administrative databases of enrollment and outpatient care. The report describes women and men Veterans receiving VHA outpatient care in Fiscal Year 2010 (FY10) related to specific CVD risk factors, conditions, procedures and clinic utilization. It also presents a comparison of the frequency of CV risk factors in women Veterans in FY00 and in FY10.

This report has several limitations: (1) Data are from 2010, and may not reflect current practices or procedures in the VA healthcare system. (2) Data represents only Veterans who chose to use VHA outpatient care, rather than all Veterans. (3) Some risk factors, conditions or procedures may be under-counted for Veterans receiving CV-related care outside VHA. (4) This report does not examine non-Veteran women who use VHA services. (5) Utilization data include outpatient VHA care, but do not include inpatient VHA care and do not include care provided by VHA through Non-VA Care (Fee) or contracts. (6) Under-counting 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. (7) Data are cross-sectional; any associations discussed here do not assure causality.

1 Daly C, Clemens F, Lopez Sendon JL, et al. Gender differences in the management and clinical outcome of stable angina. Circulation. 2006. 113:490-498.

2 Frayne SM, Phibbs CS, Friedman SA, Berg E, Ananth L, Iqbal S, Hayes PM, Herrera L. Sourcebook: Women Veterans in the Veterans Health Administration. Volume 1. Sociodemographic Characteristics and Use of VHA Care. Women's Health Evaluation Initiative, Women Veterans Health Strategic Health Care Group, Veterans Health Administration, Department of Veterans Affairs, Washington DC. December 2010.

3 Where relevant, some text from Sourcebook Vol. 1 is included in this report.

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 differences are statistically significant. Furthermore, any statements about gender differences need to be interpreted in the context that there could be gender differentials in rates of use of non-VA care, and thus in amount of un-captured care.

Key Findings

Rapid Growth of VHA Women Veterans Population. The number of women Veterans using VHA services has increased significantly in the past decade, doubling between FY00 to FY10, from 159,548 to 316,865. The rate of growth has been faster in women Veterans than in men Veterans.

Shifting Age Distribution in VHA Women Veterans. In FY00, the age distribution of women Veterans had two main peaks: the tallest peak had a maximum at age 44, and the second peak had a maximum at age 76. By FY10, the peaks shifted, showing both a growth and an aging of the population. The peak that had been tallest in FY00 was even taller in FY10 and had its maximum at age 47. The second peak in FY10 had its maximum at age 87, up from age 76 in FY00.

High Frequency of Cardiovascular Risk Factors in Women and Men Veterans. In FY10, the frequency of diagnosis of CV risk factors was high in both men and women Veterans. The frequencies were lower in women than men in all age groups, although the difference narrowed with age. This may represent lower prevalence versus lower recognition or screening in women.

Despite the lower frequency of CVD in women, it is striking that approximately 80% of women Veterans 65+ had a diagnosis of a major CV risk factor, including:

- More than 50% of women 65+ had a diagnosis of dyslipidemia, 25% had a diagnosis of diabetes, and 65% a diagnosis of hypertension.
- Depression and Posttraumatic Stress Disorder (PTSD), although not considered traditional risk factors, are associated with higher CV risk.[4] [5] Women Veterans had a higher frequency of depression across all age groups than men, especially in the 18-44 and 45-64 age groups, where approximately 30% had a diagnosis of depression.
- Although PTSD is seen more frequently in men, it affects around 15% of women in the 18-44 and 45-64 age groups.

Cardiovascular Conditions. Overall, slightly more women than men had a CV condition in the 18-44 age group, but fewer women than men had a CV condition in the 45-64 and 65+ age groups. The higher frequency of CV conditions in younger women may have been driven by the inclusion of chest pain/angina in the aggregate CV condition variable.

Higher Frequency of Chest Pain, Palpitations and Valvular Disease in Women Veterans. In all age groups women had higher rates of chest pain/angina, palpitations and valvular disease, but lower rates of coronary artery disease, atrial fibrillation/ atrial flutter, tachycardia, conduction disorders and heart failure.

4 Edmondson D, Cohen BE. Posttraumatic stress disorder and cardiovascular disease. Prog Cardiovasc Dis. 2013. 55(6):548-56.
5 Elderon L, Whooley MA. Depression and cardiovascular disease. Prog Cardiovasc Dis. 2013 May-Jun;55(6):511-23.

Changes Over Time: Women in FY00 vs. FY10. Rates of diabetes, hypertension and dyslipidemia increased from FY00 to FY10. It is unclear if this represents a true increase in disease prevalence or an increased focus throughout the VA on screening and risk factor management.

The frequency of diagnosis of depression and PTSD also increased from FY00 to FY10. Similarly, this may represent a true increase in disease prevalence, or an increased focused throughout VA on mental health screening.

Gender Differences in Cardiovascular Procedure Frequency. The proportion of women receiving any CV procedure was slightly lower for those in the 18-44 and 45-64 age groups and nearly equal in the 65+ age group as compared to men of the same age. Looking only at electrocardiograms (EKGs), women in the 18-44 and 45-64 age groups were less likely than men to receive EKGs and the frequency in the 65+ year old group was the same for women and men.

Procedures Received by Diagnosis. This section 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.

Among patients with chest pain/angina, a lower proportion of women than men received at least one EKG.

Overall, a lower proportion of women received a stress test procedure than men. We do not report cardiac catheterization in this report because it commonly occurs in the inpatient setting and would be undercounted in outpatient data alone.

Among patients with heart failure or atrial fibrillation/atrial flutter, a higher proportion of women than men received at least one echocardiogram or EKG.

Clinic Utilization. Among Veterans with CV risk factors, a higher proportion of women than men had at least one Emergency Department visit. Proportions of Primary Care visits were similar among women and men.

Similarly, among women with CVD conditions, a higher proportion of women than men had at least one visit to an Emergency Department or Cardiology Clinic. Primary Care visits were similar among women and men.

Key Implications for Policy and Practice

The number of women Veterans using VHA services has nearly doubled in the past decade. If the growth continues at this pace, and especially if market penetration increases among the large group of women Veterans who currently do not use VHA, increasing demands on VHA CV care delivery systems for women are anticipated.

The number of young women in VHA has grown rapidly in recent years. The influx of younger Veterans necessitates a focus on prevention of CVD risk factors and conditions in addition to treatment.

The tallest peak in the age distribution of women Veteran patients was at age 47 in FY10. Twenty years from now, this large group of women will be nearing their seventies. These women will require more intensive health care services as they age, including CV care. VHA must meet the needs of the 45-64

and 65+ age groups of the 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.

The high percentage of both women and men Veterans with CVD risk factors highlights the need for strong programs for the prevention and treatment of CV factors.

The high rates of depression in women Veterans across all ages highlights the need for gender-focused mental health treatment and further study of the impact of mental health conditions on CV risk, especially in women Veterans.

The higher proportions of women Veterans with chest pain/angina, palpitations and valvular disease as compared to men in the same age groups highlights the need for focused research on chest pain/angina in women, both raising awareness of CVD in women Veterans and understanding etiologies and treatment for non-cardiac chest pain among younger women.

The proportion of women Veteran VHA outpatients who received a diagnosis of a CV risk factor increased between FY00 and FY10. It is unclear whether this represents a true increase in disease prevalence or an increased focus throughout VA on screening and risk factor management.

Among those women with chest pain/angina, there was a lower proportion of EKG or stress test procedures compared to men with chest pain/angina across all ages. This may represent a higher proportion of women with non-cardiac chest pain/angina than men, or lower awareness of CVD risk for women Veterans. We are not able to determine whether the procedures measured were directly correlated with the chest pain/angina diagnoses and cannot determine timeliness of treatment.

Among patients with a diagnosis of CV risk factors or conditions, a higher proportion of women than men had Emergency Department visits; however a similar proportion of women and men had Primary Care visits. This highlights the need for Emergency Department services for women Veterans by providers trained in women's CV health, as well as a focus on comprehensive Primary Care with extended hours and improved accessibility for women Veterans of all ages, in all areas.

Introduction

Background

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

In 2008, the VA Under Secretary for Health (USH) convened a task force to evaluate the care provided to women Veterans. The task force noted that Primary Care was often fragmented over multiple sites of care, and there were differences in quality outcomes for women compared to 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 health care system, and educated over 1500 providers in basic and advanced women's health through Mini-Residency Programs.

These changes have transformed Primary Care for women Veterans so that women now have access to trained and proficient designated women's comprehensive Primary Care providers at 99 percent of VA health care systems. From 2008-2011, VA also saw a significant improvement in gender disparities for many clinical prevention measures and now outperforms most private and public sector health care organizations in these quality measures for both men and women.

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 CVD which is the leading cause of death among women in major developed countries and many developing countries.[6] Nationally, (in the civilian sector) gender differences have been identified in CVD symptoms, physiology, quality of care and outcomes.[7] [8] However, little is known 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 a Cardiovascular Health in Women Veterans Workgroup made up of researchers and subject matter experts to further evaluate issues related to women Veterans CV health. To facilitate dissemination of major findings to a broader audience, key sociodemographic and VHA outpatient health care data related to CVD disease risk factors, conditions, procedures and clinic utilization have been organized in this first phase of a series of reports related to CV health in women Veterans. The purpose of this first phase report is a preliminary assessment of diagnoses and outpatient procedures that were received by VA outpatients in FY10.

6 Mosca, L., et al., Effectiveness-Based Guidelines for the Prevention of Cardiovascular Disease in Women - 2011 update. A Guideline from the American Heart Association. Circulation, 2011. 123(11): 1243-62.

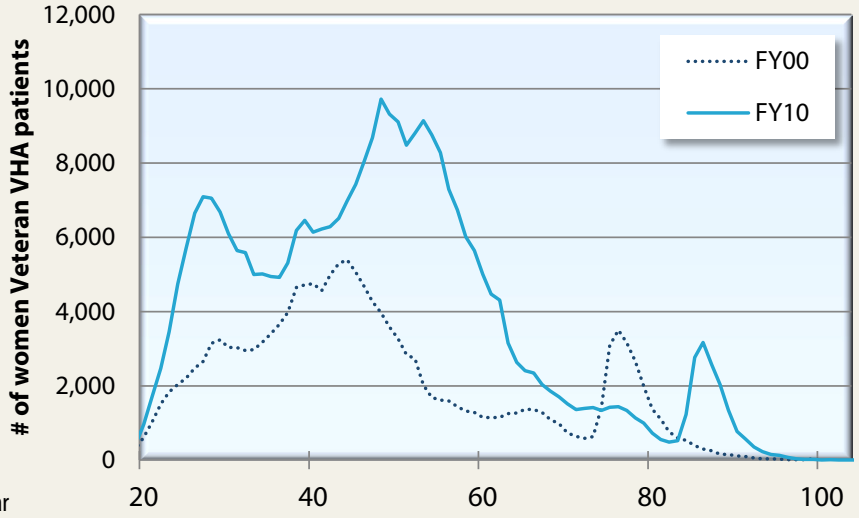
7 Daly C, Clemens F, Lopez Sendon JL, et al. Gender differences in the management and clinical outcome of stable angina. Circulation. 2006. 113:490-498.

8 Hippisley-Cox J, Pringle M, Crown N, Meal A, Wynn A. Sex inequalities in ischemic heart disease in general practice: cross sectional survey. British Medical Journal. 2001. 322:832.

Growing Population of Women Veterans Using VHA

The number of women Veterans using VHA services has increased significantly, almost doubling between FY00 to FY10, from 159,548 to 316,865—a nearly 100 percent increase. This is in contrast to the number of men Veterans which has grown more slowly, from 3,225,712 to 5,036,990—a 56 percent increase. Figure 1 shows the number of women at each age in FY00 (dotted line), and again in FY10 (bold line). In FY00, the distribution had two main peaks: the tallest peak had a maximum at age 44, and the second peak had a maximum at age 76. By FY10, the peaks had shifted, showing both a growth and an aging of the population. The peak that had been tallest in FY00 was even taller and had its maximum at age 47. The second peak had its maximum at age 87. This distribution is important to note in order to anticipate and address the growing needs of 45-64 and 65+ age groups of women Veterans.

Figure 1. Age distribution Among Women Veteran VHA patients, FY00-FY10



Key: FY—Fiscal Year

Notes: Findings portray women Veteran patients, not the entire Veteran population. See Technical Appendix.

Cohort: Women Veteran patients with non-missing ages 18–110 years (inclusive) in FY00 and FY10. Women in FY00: N=159,548; FY10: N=316,865

Source: WHEI Master Database

Notes to Interpretation: Twenty years from now, this large group of women will be nearing their seventies. These women will require more intensive health care services as they age, including CV 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. Additionally, with the influx of younger women Veterans into VA, prevention and treatment of risk factors for CVD, such as diabetes, hypertension, dyslipidemia, obesity, and tobacco use must be addressed.

Cardiovascular Disease in Women

The growth and aging of the women Veteran population highlights 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 female

lives than cancer, chronic respiratory diseases, Alzheimer's disease and accidents combined.[9] In 2007, 421,918 women died of CVD in the U.S., or about 1 death per minute.[10] Contrary to popular belief, more women die of CVD than men.[11]

Although public health campaigns have drawn attention to the underappreciated burden of CVD among women, disparities in knowledge and treatment persist. In the civilian population, women are less likely to receive evidence-based CV therapies than men[12] and may be diagnosed later than men, due in part to the more vague nature of CVD symptoms in women.[13] Women have higher mortality following myocardial infarction,[14] as well as a higher incidence of subsequent heart failure. [15]

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 out of every three U.S. women are now overweight or obese.[16] Women with diabetes may be less likely to achieve glycosylated hemoglobin control than men.[17] 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,[18] numerous studies have shown that women are less likely than men to be screened[19 20] and to achieve treatment goals.[21 22 23] Similar disparities are found in commercial and Medicare managed care plans,[24] as well as within the VA health care system.[25]

9 Mosca L. Benjamin EJ. Berra K et al. Effectiveness based guidelines for the prevention of cardiovascular disease in women—2011 update: a guideline from the American Heart Association. Circulation. 2011. 123 (11);1243-62.

10 Ibid.

11 Mozaffarian D, Roger VL, et al. Heart disease and stroke statistics—2013 update: a report from the American Heart Association. Circulation.2013: published online before print December 12, 2012.

12 Daly C, Clemens F, Lopez Sendon JL, et al. Gender differences in the management and clinical outcome of stable angina. Circulation. 2006. 113:490-498.

13 McSweeney J.C., Cody M., O'Sullivan P., Elberson K., Moser D.K., Garvin B.J.; Women's early warning symptoms of acute myocardial infarction, Circulation. 2003. 108: 2619-2623.

14 Milcent C, Dormont B, Durand-Zaleski I, Steg PG.Gender differences in hospital mortality and use of percutaneous coronary intervention in acute myocardial infarction. Circulation. 2007. 115: 833-839.

15 Hellerman JP, Jacobsen SJ, Gersh BJ, Rodeheffer RJ, Reeder GS, Roger VL. Heart failure after myocardial infarction: a review. Am J Med. 2002. 113(4): 324-30.

16 Roger VA, Go AS, Lloyd-Jones DM, Adams RJ, Berry JD, Brown RM, Carenethon MR, et al: On behalf of the American Heart Association Statistics Committee and Stroke Statistics Subcommittee. Heart disease and stroke statistics—2011 update: a report from the American Heart Association Circulation 2011:123e18-e209.

17 Larkin ME, Backlund JY, Clearly P. Bayless M, Schaefer B, CanadyJ, Nathan DM. Disparity in management of diabetes and coronary disease risk factors by sex in the DCCT/EDIC. Diabetic Medicine. 2010.27;4;451-458.

18 Mosca L. Benjamin EJ. Berra K et al. Effectiveness based guidelines for the prevention of cardiovascular disease in women—2011 update: a guideline from the American Heart Association. Circulation. 2011. 123 (11);1243-62.

19 Hippisley-Cox J, Pringle M, Crown N, Meal A, Wynn A. Sex inequalities in ischemic heart disease in general practice: cross sectional survey. British Medical Journal. 2001; 322:832.

20 Sloan KI, sales AE, Willems JP, Every NR, Martin GV, Sun H. Frequency of serum low-density lipoprotein cholesterol management and frequency of results ≤ 100 mg/dl among patient who had coronary events (Northwest VA Network Study) American Journal of Cardiology. 2001. 88; 1143-1146.

21 Massing MW, Foley KA, Carter-Edwards L. Sueta CA, Alexander CM, Simpson RJ. Disparities in lipid management for African Americans and Caucasians with coronary artery disease: A national cross-sectional study. BMC Cardiovascular Disorder;14:15.

22 Mosca L, Merz Nb, Blumentahl RS. Cziraky JM, Fabunmi RP, Sarawate C. Opportunity for intervention to achieve American Heart Association guidelines for optimal lipid levels in high-risk women in a managed care setting. Circulation. 2005; 111;488-93.

23 Persell SD, Maviglia SM, Bates DW, ayanian JZ. Ambulatory hypercholestesrolemia management in patients with atheroschlerosis. Gender and race differences in processes and outcomes. Journal of General Internal Medicine. 2005;20:123-130.

24 Chou AF, Scholle SH, Weisman CS, Bierman AS, Correa-de-Araujo R, Mosca L. Gender Disparities in the quality of cardiovascular disease care in private managed care plans. Women's Health Issues. 2007;17:120-130.

25 VHA Office of Analytics and Business Intelligence, Performance Management FY 2011 Gender Report. http://vaww.oqp.med.va.gov/programs/pm/pmGenderReporting.aspx ; accessed January 16, 2011.

VA Cardiology Services

For both men and women, the VA has made it a priority to ensure that Veterans receive high-quality CV care. The recently conducted 2011 Survey of Cardiovascular Specialty Care Services assessed the availability of various CV services at Veterans Integrated Service Networks (VISNs) across the country, with the goal of providing outstanding access to high quality CV care for all Veterans. The survey addressed the availability of on-site cardiologists, diagnostic/non-invasive CV procedures, invasive cardiology procedures and electrophysiology services.[26]

The survey indicated that 90 percent of VA sites had some level of on-site cardiologist services available, but the full extent and level of complexity of services was highly variable. Among VA facilities, 51 percent had catheterization laboratories, 47 percent had the ability to implant arrhythmia devices and/or perform electrophysiology procedures, 48 percent had a dedicated clinic for patients with heart failure, and 24 percent had a dedicated chest pain or observation unit. Cardiac rehabilitation was only available at 26 percent of VA facilities.

With this background knowledge of what services were available across the country as of 2011, this document will help identify the spectrum of CVD and utilization of CV services among women Veteran outpatients receiving care in the VA in FY10.

Methods

Overview. This report presents the number and age of women and men Veterans who received CV care in VHA as outpatients in FY 2010, specifically focusing on CVD risk factors, conditions, procedures and clinic utilization. Data for this report were derived from centralized VHA administrative files (the Assistant Deputy Under Secretary for Health [ADUSH] Monthly Enrollment File and the Outpatient Encounter [SE] File, described in further detail in the Technical Appendix). We also evaluated changes in the frequency of CV risk factors in women from FY00 to FY10.

Characteristics Examined. This report examines a number of specific types of outpatient conditions and procedures as well as several types of clinics related to CVD. The specific conditions included:

- **Risk Factors:** "Any Major CV Risk Factor" is an aggregate variable that includes diabetes, hypertension, dyslipidemia, family history and smoking (family history and smoking are only in the aggregate variable as they are most likely underreported when identified by ICD-9 codes alone). Individual risk factor variables include diabetes, hypertension, dyslipidemia, depression and PTSD (depression and PTSD are only evaluated individually and not in the aggregate variable as they were not considered major or traditional risk factors for this report).
- **Conditions:** "Any CV Condition" is an aggregate variable that includes chest pain/angina, coronary artery disease, palpitations, atrial fibrillation/atrial flutter, tachycardia/arrhythmia-other, conduction disorders, heart failure, valvular disease, cerebrovascular disease and peripheral vascular disease.
- **Procedures:** "Any CVD Related Procedures" is an aggregate variable that includes EKG, Echocardiogram, Echocardiogram Stress Test, Nuclear Stress Test, Non-Imaging Stress Test, Diagnostic and Therapeutic Procedures.

26 2011 Survey of Cardiovascular Specialty Care Services in VHA. Healthcare Analysis and Information Group, VHA Office of Strategic Planning and Analysis.

- **Clinic Types:** Emergency Department, Cardiology Clinic, Anticoagulation Clinic, Cardiac Surgery Clinic, and Primary Care Clinic.[27] (See Technical Appendix for details of the algorithms used to create these variables).

Analyses. The data in this report are mostly descriptive. We compared the frequency of CV diagnoses and procedures received by men and women Veterans using VHA services in FY 2010. 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. The exception is that, in some cases, logistic regression was used to determine age-adjusted odds ratios and 95 percent confidence intervals 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 Veteran outpatients, FY10
  - By age group
  - Age adjusted odds ratios (women vs. men)
- Diagnoses of CV risk factors in women Veteran outpatients, FY00 and FY10
  - By age group
- Diagnoses of CVD conditions in women and men Veteran outpatients, FY10
  - By age group
  - Age adjusted odds ratios (women vs. men)
- Diagnoses of CVD conditions in women Veteran outpatients, FY00 and FY10
  - By age group

The analyses in the procedures section are organized as follows:

- Frequency of CV procedures received by women and men Veteran outpatients, FY10
  - By age group
- Frequency of CV procedures received by women and men Veteran outpatients who also had at least one instance of a CV condition, FY10
  - By age group

The analyses in the clinic type section are organized as follows:

- Utilization by clinic type, FY10

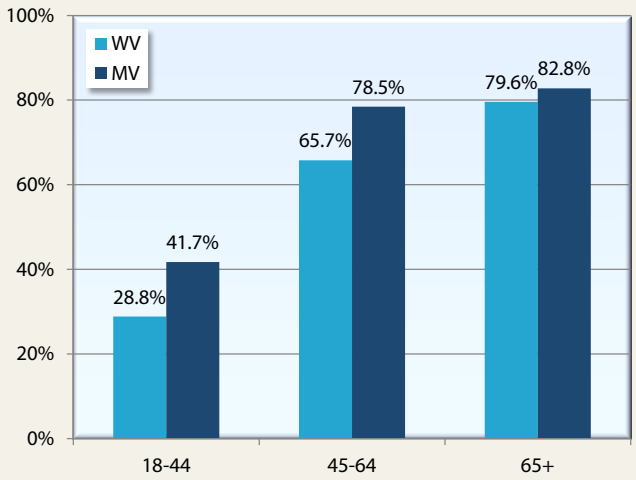
27 WHEI Definition, HBPC Nursing RN or LPN, Mental Health Primary Care Team – IND.

Results

Cardiovascular Risk Factors

Prevalence of Any Major Cardiovascular Risk Factor. In FY10 both women and men Veteran outpatients had high frequencies of any major CV risk factor across all age groups, with the highest rates seen in the 65+ age group (Figure 2). This included having one or more instances of receiving a diagnosis of dyslipidemia, diabetes, hypertension, tobacco use or family history of CVD disease/stroke.[28] Though lower frequencies were seen in women than men, the rates in women were still of concern for all age groups: 18-44 (28.8%), 45-64 (65.7%) and 65+ (79.6%), especially given the growing numbers of women Veterans and the large peak in the 45-64 group that will soon move into the 65+ group.

Figure 2. Proportion of Veteran VHA outpatients with at least one instance of major cardiovascular risk factor, FY10



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

Notes: Any major CV risk factor includes dyslipidemia, diabetes non-pregnancy related, hypertension non-pregnancy related, tobacco use, family history of CVD/stroke. See Technical Appendix for a full list of variables and ICD-9 codes.

Cohort: Women and men Veteran VHA outpatients. Women in FY10: 18-44 (N=131,968); 45-64 (N=139,030); 65+ (N=40,129). Men in FY10: 18-44 (N=617,551); 45-64 (N=2,106,636); 65+ (N=2,209,972)

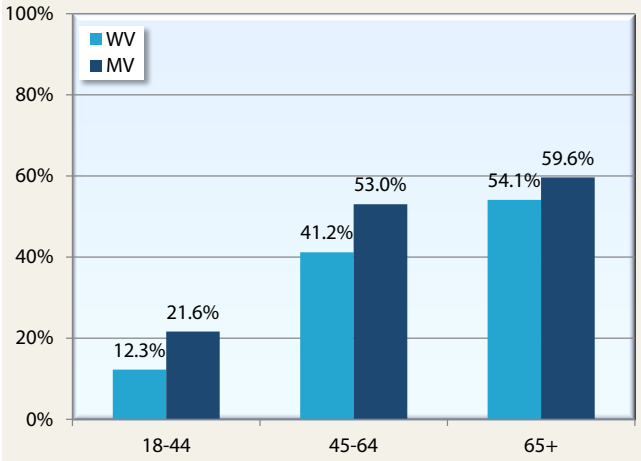
Source: WHEI Master Database

Notes to Interpretation: Findings portray high proportions of major CV risk factors in all age groups. Rates increased with age with the highest rates in the 65+ age group. Although lower rates were seen in women Veterans compared to men Veterans, the difference between women and men narrowed with increasing age.

Traditional Risk Factors. Compared to men of the same age, women had fewer diagnoses of the traditional CV risk factors dyslipidemia (Figure 3), diabetes (Figure 4) and hypertension (Figure 5) across all age groups in FY10. The highest rates for both men and women were seen in the older age groups, 45-64 and 65+, for each risk factor. Although women had lower rates of these risk factors, the increasing rates with age highlight the need for effective preventive strategies for women Veterans.

28 Depression and PTSD were not included in the "major CV risk factor" variable; however they are included as individual variables.

Figure 3. Proportion of Veteran VHA outpatients with at least one instance of dyslipidemia, FY10



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

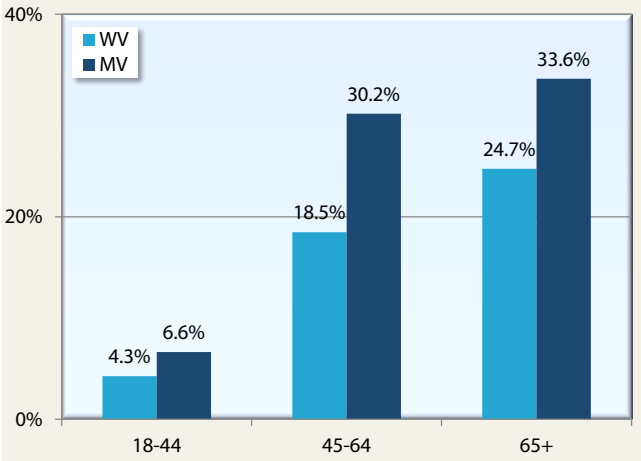
Notes: Presence of dyslipidemia was determined by having at least one instance of an ICD-9 code. See Technical Appendix for details on variable development and a full list of ICD-9 codes used.

Cohort: Women and men Veteran VHA outpatients. Women in FY10: 18-44 (N=131,968); 45-64 (N=139,030); 65+ (N=40,129). Men in FY10: 18-44 (N=617,551); 45-64 (N=2,106,636); 65+ (N=2,209,972)

Source: WHEI Master Database

Notes to Interpretation: Findings portray increasing rates of dyslipidemia with age with highest rates in age 65+. Although lower prevalence was seen in women Veterans compared to men Veterans, the difference between women and similarly aged men narrowed with increasing age.

Figure 4. Proportion of Veteran VHA outpatients with at least one instance of diabetes, FY10



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

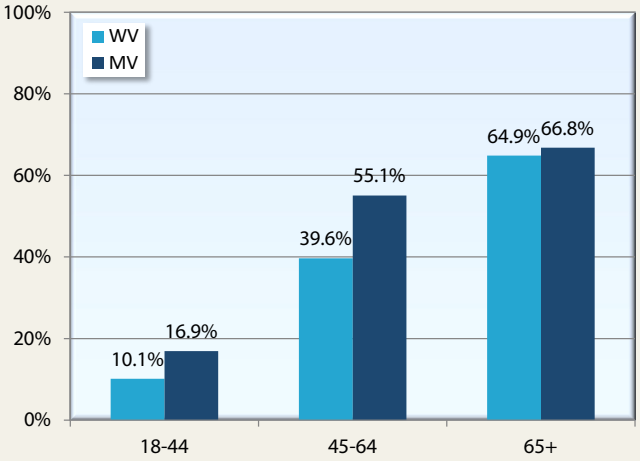
Notes: Due to small percentages, the vertical axis scale was changed from 100% to 40%. Presence of diabetes was determined by having at least one instance of an ICD-9 code. See Technical Appendix for details on variable development and a full list of ICD-9 codes used.

Cohort: Women and men Veteran VHA outpatients. Women in FY10: 18-44 (N=131,968); 45-64 (N=139,030); 65+ (N=40,129). Men in FY10: 18-44 (N=617,551); 45-64 (N=2,106,636); 65+ (N=2,209,972)

Source: WHEI Master Database

Notes to Interpretation: Findings portray a consistent pattern of increasing proportions of diabetes with age. Across all age groups, lower proportions were seen in women Veterans as compared to men Veterans.

Figure 5. Proportion of Veteran VHA outpatients with least one instance of hypertension, FY10



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 Technical Appendix for details on variable development and a full list of ICD-9 codes used.

Cohort: Women and men Veteran VHA outpatients. Women in FY10: 18-44 (N=131,968); 45-64 (N=139,030); 65+ (N=40,129). Men in FY10: 18-44 (N=617,551); 45-64 (N=2,106,636); 65+ (N=2,209,972)

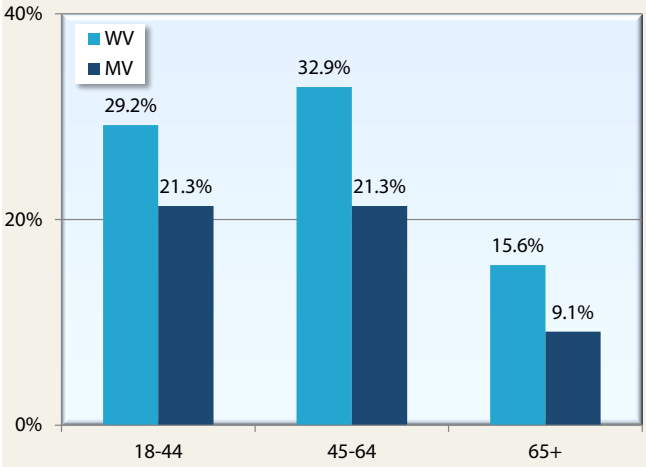
Source: WHEI Master Database

Notes to Interpretation: Findings portray increasing proportions of hypertension with age with the highest rates in age 65+. Although a lower proportion of women Veterans had at least one instance of hypertension as compared to men Veterans, the difference between women and men narrowed with increasing age. Overall, the rates of hypertension were the highest of all the CV risk factors.[29]

29 For the purpose of this report, we did not include obesity as a risk factor variable, as we did not have an accurate means to determine obesity. There are ICD-9 codes for both obesity and various levels of BMI, and it is thought that obesity may be underreported in VA. Further analysis using additional data sources may be needed.

Depression and PTSD. Depression and PTSD are non-traditional risk factors for CVD.[30] [31] Women had higher rates of depression diagnosis in FY10 than men across all age groups. The highest rates were seen in women in the 18-44 age group (29.2%) and in the 45-64 group (32.9%) (Figure 6). The high rates of depression in women Veterans highlight the need for VA to study the impact of mental illness on CVD risk and to ensure provision of services focused on treatment and prevention of CVD in women Veterans with mental health conditions. Men had higher rates of PTSD than women across all age groups, but particularly in the younger cohort (15.7% women and 19.4% men) (Figure 7).

Figure 6. Proportion of Veteran VHA outpatients with at least one instance of depression, FY10



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

Notes: Due to small percentages, the vertical axis scale was changed from 100% to 40%. Presence of depression was determined by having at least one instance of an ICD-9 code. See Technical Appendix for details on variable development and a full list of ICD-9 codes used.

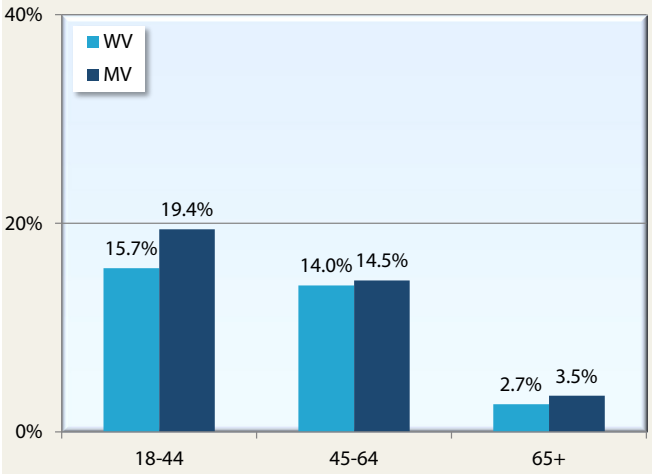
Cohort: Women and men Veteran VHA outpatients. Women in FY10: 18-44 (N=131,968); 45-64 (N=139,030); 65+ (N=40,129). Men in FY10: 18-44 (N=617,551); 45-64 (N=2,106,636); 65+ (N=2,209,972)

Source: WHEI Master Database

Notes to Interpretation: Findings portray a higher proportion of depression in women Veterans compared to men Veterans across all age groups. Rates were the highest in the 18-44 and 45-64 age groups, with a significant decline in the 65+ age group. Overall patterns were in contrast to the rates seen for traditional CV risk factors.

30 Edmondson D, Cohen BE. Posttraumatic stress disorder and cardiovascular disease. Prog Cardiovasc Dis. 2013. 55(6):548-56.
31 Elderon L, Whooley MA. Depression and cardiovascular disease. Prog Cardiovasc Dis. 2013 May-Jun;55(6):511-23.

Figure 7. Proportion of Veteran VHA outpatients with at least one instance of PTSD, FY10



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

Notes: Due to small percentages, the vertical axis scale was changed from 100% to 40%. Presence of PTSD was determined by having at least one instance of an ICD-9 code. See Technical Appendix for details on variable development and a full list of ICD-9 codes used.

Cohort: Women and men Veteran VHA outpatients. Women in FY10: 18-44 (N=131,968); 45-64 (N=139,030); 65+ (N=40,129). Men in FY10: 18-44 (N=617,551); 45-64 (N=2,106,636); 65+ (N=2,209,972)

Source: WHEI Master Database

Notes to Interpretation: Findings portray higher proportions of PTSD in the 18-44 and 45-64 age groups compared to the 64+ age group for both women Veterans and male Veterans. Proportions were lower in women Veterans compared to men Veterans across all age groups. The age distribution was similar to the pattern seen in depression, but in contrast to the traditional risk factors for CVD.

Risk Factors in Women Compared to Men, FY10. Because age may vary even within age groups (women Veterans within age groups may be younger), age-adjusted odds ratios were used to give a more accurate comparison between the cohorts of women and men Veterans. Compared to men VA outpatients in FY10, women were less likely to be diagnosed with most CV risk factors (Table 1). This could be due to either higher prevalence of CV risk factors among male Veterans or lower screening or reporting of CV risk factors among women Veterans. However women were more likely to be diagnosed with depression than men across all age groups, and more likely in the 45-64 age group to be diagnosed with PTSD than men of the same age.

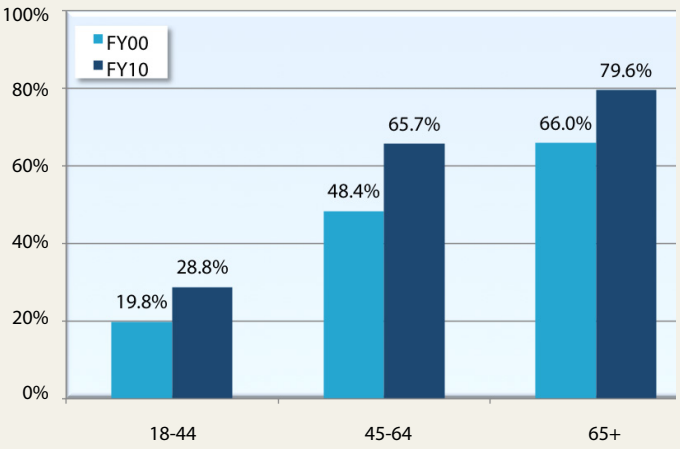
Table 1. Age adjusted odd ratios (and 95% CI) for cardiovascular risk factors in women vs. men, FY10

	Total Women	18-44	45-64	65+
Any Major Cardiovascular Risk Factor	0.59 (0.59-0.59)	0.57 (0.56-0.58)	0.68 (0.67-0.69)	0.84 (0.82-0.86)
Dyslipidemia	0.61 (0.60-0.61)	0.52 (0.51-0.53)	0.79 (0.78-0.80)	0.83 (0.81-0.85)
Diabetes	0.53 (0.53-0.54)	0.67 (0.65-0.69)	0.68 (0.67-0.69)	0.67 (0.65-0.69)
Hypertension	0.62 (0.61-0.62)	0.57 (0.56-0.58)	0.70 (0.69-0.71)	0.92 (0.90-0.94)
Depression	1.57 (1.56-1.58)	1.53 (1.51-1.55)	1.70 (1.68-1.72)	1.92 (1.86-1.97)
PTSD	0.81 (0.80-0.82)	0.76 (0.75-0.77)	1.26 (1.24-1.28)	0.80 (0.75-0.85)

Risk Factors - FY00 vs. FY10 Women Veteran Outpatients

Changes in Frequency of Women with Cardiovascular Risk Factors Over Time, FY00 vs. FY10.
Women Veterans carried a high burden of one or more CV risk factors and this proportion steadily increased over the past decade across all age groups. This may indicate both improved screening and recognition of these risk factors among Veterans or an increased prevalence of disease. The highest rates for all risk factors studied were seen in the 45-64 and 65+ age groups (Figure 8).

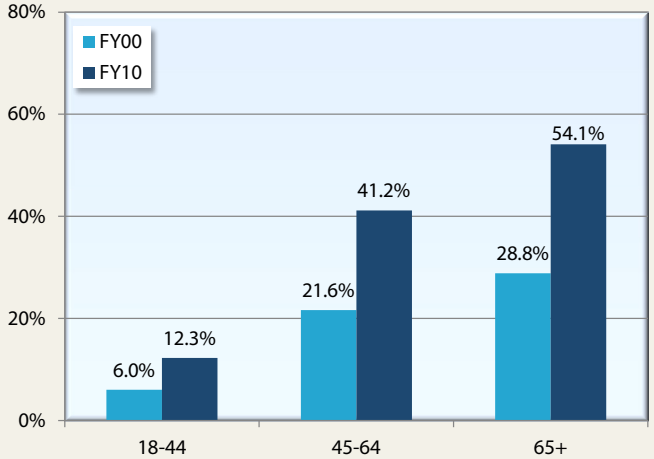
Figure 8. Proportion of women Veteran VHA outpatients with any major cardiovascular risk factor, FY00 and FY10



Key: VHA – Veterans Health Administration; WV- Women Veterans; FY – Fiscal Year
Notes: Presence of any major CV risk factor was determined by having at least one instance of an ICD-9 code. See Technical Appendix for details on variable development and a full list of ICD-9 codes used.
Cohort: Women Veteran VHA outpatients. Women FY00: 18-44 (N=79,051); 45-64 (N= 45,956); 65+ (N=29,165).
Women FY10: 18-44 (N=131,968); 45-64 (N=139,030); 65+ (N=40,129)
Source: WHEI Master Database

Notes to Interpretation: The proportion of women Veterans with at least one instance of a traditional risk factor was higher for each age group in FY10 than in FY00. This includes diagnoses of dyslipidemia (Figure 9), diabetes (Figure 10), and hypertension (Figure 11). The highest proportions were seen in the 44-64 and 65+ age groups.

Figure 9. Proportion of women Veteran VHA outpatients with at least one instance of dyslipidemia, FY00 and FY10

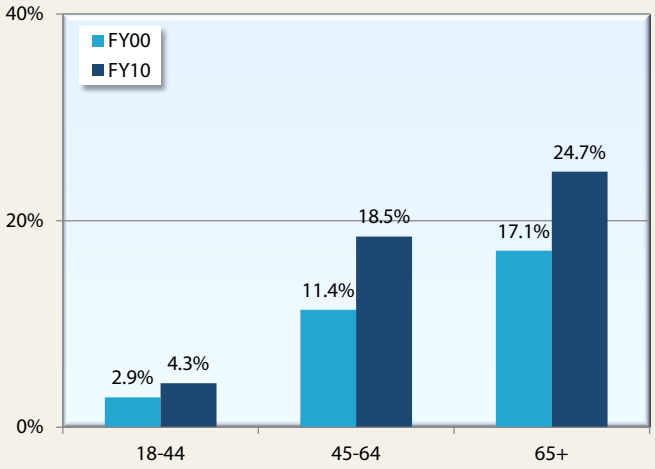


Key: VHA – Veterans Health Administration; WV- Women Veterans; FY – Fiscal Year
Notes: Presence of dyslipidemia was determined by having at least one instance of an ICD-9 code. See Technical Appendix for details on variable development and a full list of ICD-9 codes used.
Cohort: Women Veteran VHA outpatients. Women FY00: 18-44 (N=79,051); 45-64 (N= 45,956); 65+ (N=29,165)
Women FY10: 18-44 (N=131,968); 45-64 (N=139,030); 65+ (N=40,129)
Source: WHEI Master Database

Notes to Interpretation: Findings portray that a larger proportion of women Veterans FY10 had at least one instance of dyslipidemia compared to women Veterans in FY00. The difference within each

age group between FY10 and FY00 increased with increasing age. The largest difference was seen in the 65+ age group.

Figure 10. Proportion of women Veteran VHA outpatients with at least one instance of diabetes, FY00 and FY10



Key: VHA – Veterans Health Administration; WV- Women Veterans; FY – Fiscal Year

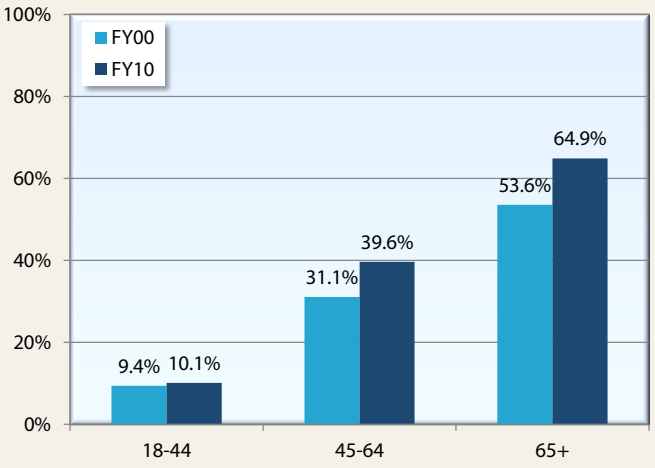
Notes: Due to small percentages, the vertical axis scale was changed from 100% to 40%. Presence of diabetes was determined by having at least one instance of an ICD-9 code. See Technical Appendix for details on variable development and a full list of ICD-9 codes used.

Cohort: Women Veteran VHA outpatients. Women FY00: 18-44 (N=79,051); 45-64 (N= 45,956); 65+ (N=29,165). Women FY10: 18-44 (N=131,968); 45-64 (N=139,030); 65+ (N=40,129)

Source: WHEI Master Database

Notes to Interpretation: Findings portray that women Veterans in FY10 had higher proportions of receiving a diagnosis of diabetes compared to women Veterans in FY00. Overall the proportions of women Veterans with diabetes were lower than all other traditional risk factors for CVD.

Figure 11. Proportion of women Veteran VHA outpatients with at least one instance of hypertension, FY00 and FY10



Key: VHA – Veterans Health Administration; WV- Women Veterans; FY – Fiscal Year

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

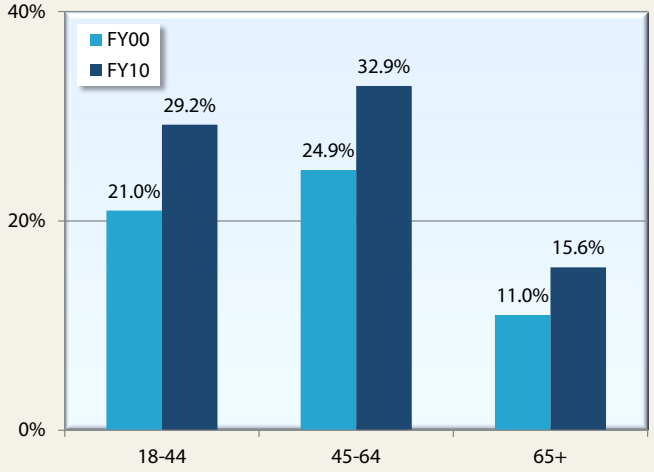
Cohort: Women Veteran VHA outpatients. Women FY00: 18-44 (N=79,051); 45-64 (N= 45,956); 65+ (N=29,165). Women FY10: 18-44 (N=131,968); 45-64 (N=139,030); 65+ (N=40,129)

Source: WHEI Master Database

Notes to Interpretation: Findings portray that a higher proportion of women Veterans in FY10 had a diagnosis of hypertension compared to women Veterans in FY00.

Looking for changes over time, Figures 12 and 13 show higher recognition of both depression and PTSD in FY10 across all age groups as compared to FY00. This may reflect greater awareness for the disorders and implementation of screening processes in the VA system.

Figure 12. Proportion of women Veteran VHA outpatients with at least one instance of depression, FY00 and FY10



Key: VHA – Veterans Health Administration; WV- Women Veterans; FY – Fiscal Year

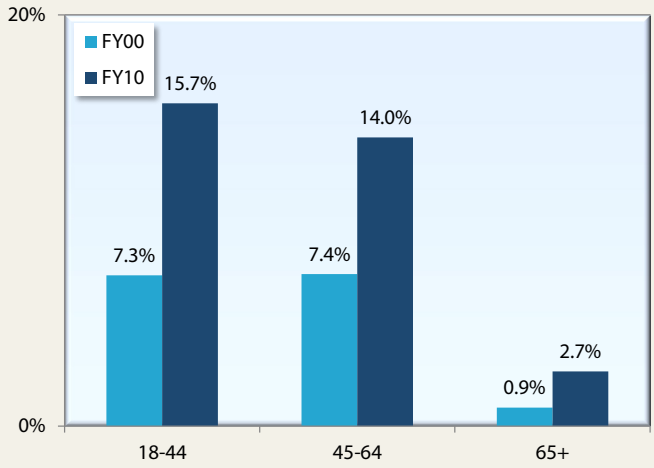
Notes: Due to small percentages, the vertical axis scale was changed from 100% to 40%. Presence of depression was determined by having at least one instance of an ICD-9 code. See Technical Appendix for details on variable development and a full list of ICD-9 codes used.

Cohort: Women Veteran VHA outpatients. Women FY00: 18-44 (N=79,051); 45-64 (N= 45,956); 65+ (N=29,165). Women FY10: 18-44 (N=131,968); 45-64 (N=139,030); 65+ (N=40,129)

Source: WHEI Master Database

Notes to Interpretation: Findings portray that larger proportions of women in the 18-44 and 45-64 age groups had diagnosis of depression compared to the 65+ age group. Across all age groups, a larger proportion of women Veterans in FY10 had a diagnosis of at least one instance of depression compared to women Veterans in FY00.

Figure 13. Proportion of women Veteran VHA outpatients with at least one instance of PTSD, FY00 and FY10



Key: VHA – Veterans Health Administration; WV- Women Veterans; FY – Fiscal Year

Notes: Due to small percentages, the vertical axis scale was changed from 100% to 20%. Presence of PTSD was determined by having at least one instance of an ICD-9 code. See Technical Appendix for details on variable development and a full list of ICD-9 codes used.

Cohort: Women Veteran VHA outpatients. Women FY00: 18-44 (N=79,051); 45-64 (N= 45,956); 65+ (N=29,165). Women FY10: 18-44 (N=131,968); 45-64 (N=139,030); 65+ (N=40,129)

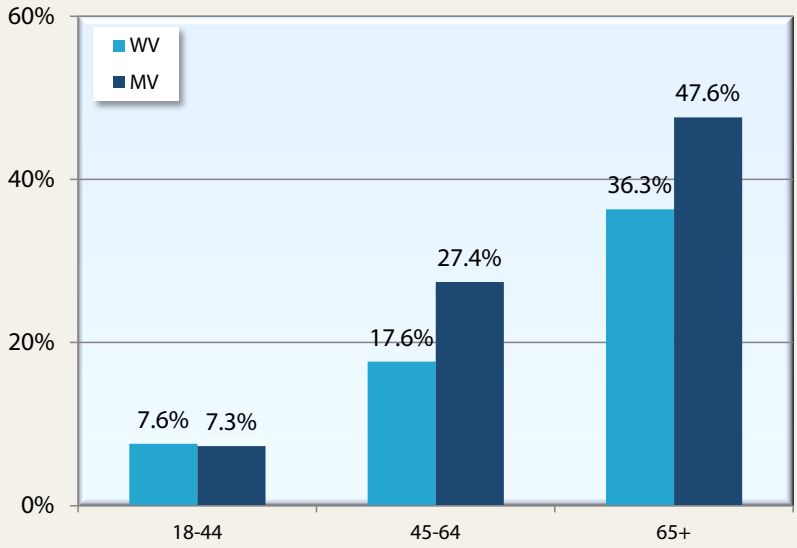
Source: WHEI Master Database

Notes to Interpretation: Findings portray that a higher proportion of women in the 18-44 and 45-64 age groups had a diagnosis of PTSD compared to the 65+ age group. Across all age groups, a greater proportion of women Veterans in FY10 had a diagnosis of at least one instance of PTSD compared to women Veterans in FY00.

Cardiovascular Conditions

Prevalence of Any Cardiovascular Condition, FY10. Fewer women than men Veterans in FY10 had a documented CV condition for the 45-64 (17.6% vs. 27.4%) and 65+ (36.3% vs. 47.6%) age groups. A slightly larger proportion of women in the 18-44 age group had any CV condition than men of the same age group (7.6% vs. 7.3%) (Figure 14). This may have been driven by slightly higher rates of chest pain/angina in women in the 18-44 age group (Figure 14).

Figure 14. Proportion of Veteran VHA outpatients with at least one instance of any cardiovascular condition, FY10



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

Notes: Due to small percentages, the vertical axis scale was changed from 100% to 60%. Any CV condition includes Chest Pain / Angina, Palpitations, Acute Myocardial Infarction (MI), MI Sequelae, Coronary Artery Disease Non-MI, Heart Failure, Tachycardia/Arrhythmia-Other, Atrial Fibrillation/Atrial Flutter, Valvular Disease, Pericarditis, Endocarditis, Myocarditis, Other Carditis, Cardiac Tamponade, Conduction (fine), Acute Stroke, Late Effects of Stroke, Other Cerebrovascular Disease, TIA, Peripheral Vascular Non-Aortic Abdominal Aneurysm Disease, Peripheral Vascular Aortic Abdominal Aneurysm, Cardiac Arrest. Presence of any CV condition was determined by having at least one instance of an ICD9-code. See Technical Appendix for details on variable development and a full list of ICD-9 codes used.

Cohort: Women and men Veteran VHA outpatients. Women in FY10: 18-44 (N=131,968); 45-64 (N=139,030); 65+ (N=40,129). Men in FY10: 18-44 (N=617,551); 45-64 (N=2,106,636); 65+ (N=2,209,972)

Source: WHEI Master Database

Notes to Interpretation: Findings portray increased proportions of CV conditions with increased age, with the highest proportion among those in the 65+ age group. Women Veterans in the 45-64 age group and 65+ age group were less likely than men Veterans to have one or more CV condition. This is in contrast to the 18-44 age group where rates were slightly higher in women Veterans.

Women had higher rates than men in all age groups for chest pain/angina, palpitations and valvular disease and lower rates of coronary artery disease, atrial fibrillation/atrial flutter, tachycardia/arrhythmia-other, conduction disorders and heart failure. For the purposes of this report, specific CV condition data is only shown for the 45-64 (Figure 15) and 65+ age groups (Figure 16).

Figure 15. Proportion of Veteran VHA outpatients aged 45-64 with at least one instance of cardiovascular conditions, FY10 (left)

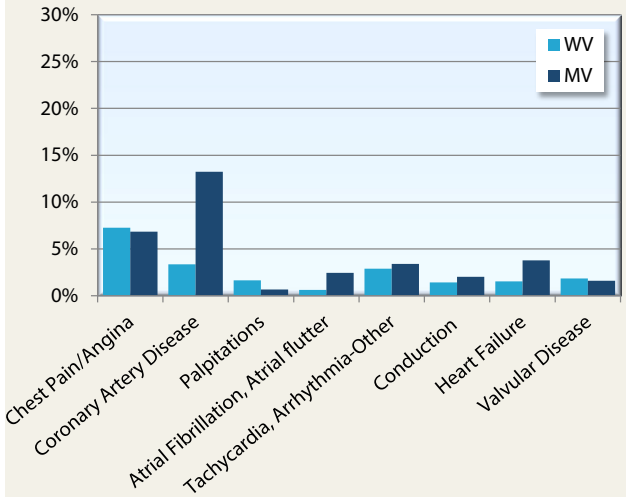
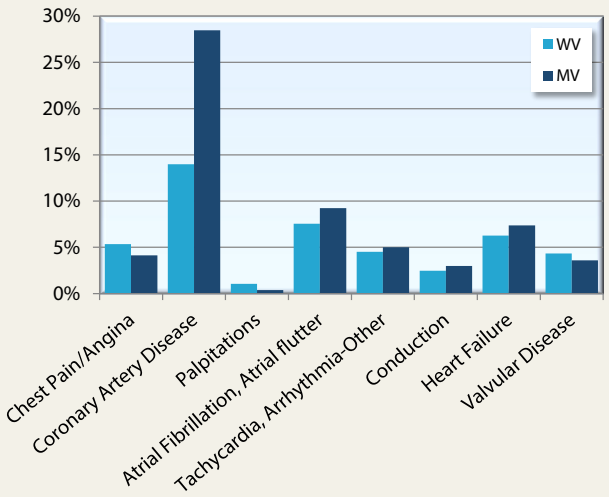


Figure 16. Proportion of Veteran VHA outpatients aged 65+ with at least one instance of cardiovascular conditions, FY10 (right)



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 Technical Appendix for details on variable development and a full list of ICD-9 codes used.

Cohort: Women and men Veteran VHA outpatients aged 45-64 and 65+ in FY10. Women 45-64 (N=139,030); 65+ (N=40,129). Men 45-64 (N=2,106,636); 65+ (N=2,209,972)

Source: WHEI Master Database

Notes to Interpretation: Findings portray increased rates of all conditions with increased age. The most common condition in the 45-64 age group of women Veterans was chest pain/angina. The most common condition in 65+ women Veterans was coronary artery disease. This contrasts with men Veterans in whom coronary artery disease was the most common condition in both age groups.

In the age analysis, women were found to be more likely diagnosed with chest pain/angina, palpitations, and valvular diseases across all age groups, and for tachycardia/arrhythmia in the 18-44 age group (Table 2). They were, however, less likely to be diagnosed with coronary artery disease, heart failure, atrial fibrillation/atrial flutter and conduction disorders than men of the same age.

Table 2. Age adjusted odd ratios for cardiovascular conditions in women vs. men, FY10

	Total Women	18-44	45-64	65+
Any Cardiovascular Disease Condition (Aggregate Variable)	**0.69** (0.68-0.70)	**1.07** (1.05-1.10)	**0.75** (0.74-0.76)	**0.60** (0.59-0.61)
Chest Pain / Angina	**1.00** (0.99-1.02)	**1.06** (1.03-1.10)	**1.08** (1.05-1.10)	**1.35** (1.30-1.42)
Palpitations	**2.25** (2.17-2.33)	**2.02** (1.91-2.14)	**2.53** (2.41-2.65)	**2.90** (2.63-3.21)
Coronary Artery Disease	**0.30** (0.29-0.30)	**0.40** (0.36-0.44)	**0.34** (0.33-0.35)	**0.39** (0.38-0.40)
Heart Failure	**0.56** (0.54-0.58)	**0.58** (0.52-0.65)	**0.52** (0.50-0.55)	**0.79** (0.76-0.83)
Atrial Fibrilation / Atrial Flutter	**0.51** (0.50-0.53)	**0.32** (0.26-0.39)	**0.38** (0.35-0.41)	**0.74** (0.71-0.76)
Tachycardia/ Arrhythmia, Other	**0.95** (0.93-0.98)	**1.20** (1.15-1.26)	**1.01** (0.98-1.04)	**0.87** (0.83-0.91)
Valvular Disease	**1.32** (1.28-1.36)	**2.03** (1.89-2.18)	**1.51** (1.45-1.58)	**1.15** (1.10-1.21)
Conduction Disorders	**0.77** (0.74-0.79)	**0.83** (0.77-0.90)	**0.85** (0.81-0.89)	**0.80** (0.75-0.85)

Cerebrovascular Disease and Peripheral Vascular Disease. The rates for both women and men outpatients in the 45-64 and 65+ age groups were low for cerebrovascular and peripheral vascular diseases; however they were slightly lower in women than men for both groups (Figures 17, 18). This may represent actual low prevalence of disease, or low recording of diagnoses for these conditions. In the 18-44 age group (data not shown) women Veterans had the same rate of cerebrovascular disease as men (0.48%) and slightly lower rate of peripheral vascular disease (0.16% vs. 0.20%).

Figure 17. Proportion of Veteran VHA outpatients aged 45-64 with at least one instance of cerebrovascular or peripheral vascular disease, FY10 (left)

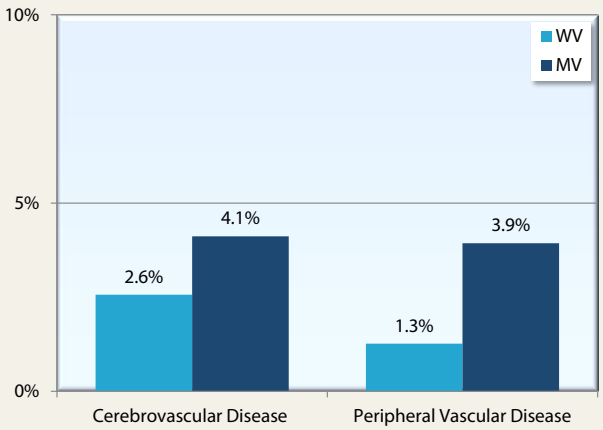
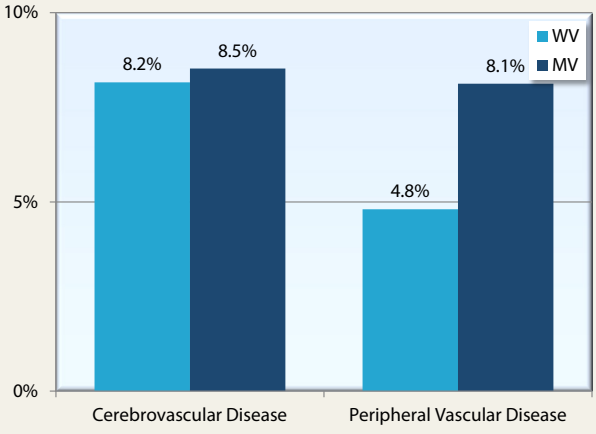


Figure 18. Proportion of Veteran VHA outpatients aged 65+ with at least one instance of cerebrovascular or peripheral vascular disease, FY10 (right)



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 10%. Presence of cerebrovascular disease and peripheral vascular disease were determined by having at least one instance of an ICD-9 code. See Technical Appendix for details on variable development and a full list of ICD-9 codes used.

Cohort: Women and men Veteran VHA outpatients aged 45-64 and 65+ in FY10. Women 45-64 (N=139,030); 65+ (N=40,129). Men 45-64 (N=2,106,636); 65+ (N=2,209,972)

Source: WHEI Master Database

Notes to Interpretation: Findings portray rates of cerebrovascular and peripheral vascular disease were low for both men and women outpatients in the 45-64 and 65+ age groups compared to rates of coronary artery disease, arrhythmias and heart failure. The frequency increased with increasing age. Women Veterans had slightly lower rates compared to men Veterans for both age groups.

Women were less likely to be diagnosed with cerebrovascular disease than men in the 45-64 and 65+ age groups. Women were less likely to be diagnosed with peripheral vascular disease than men across all age groups (Table 3).

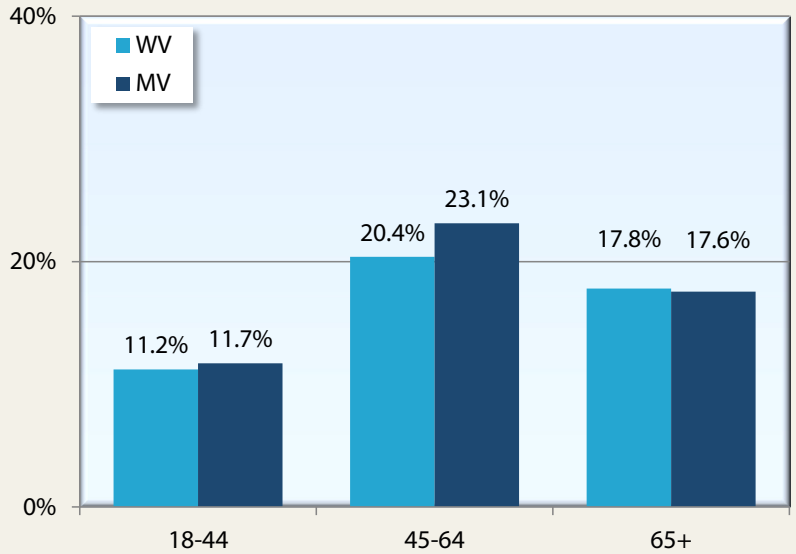
Table 3. Age adjusted odds ratios for cerebrovascular and peripheral vascular disease in women vs. men, FY10

	Total Women	18-44	45-64	65+
Cerebrovascular Disease	**0.75** (0.73-0.76)	**1.05** (0.96-1.14)	**0.84** (0.81-0.87)	**0.92** (0.80-0.95)
Peripheral Vascular Disease	**0.40** (0.39-0.41)	**0.85** (0.74-0.99)	**0.47** (0.45-0.49)	**0.57** (0.54-0.59)

Outpatient Cardiovascular-Related Procedures

The frequency of women receiving "any outpatient CV procedure" in FY10 was lower than that of men across the younger age groups: 18-44 (11.2% vs. 11.7%), 45-64 (20.4% vs. 23.1%) and nearly equal to that of men in the oldest age group 65+ (17.8% vs. 17.6%) (Figure 19). Of note, the 65+ age group for both men and women had a lower frequency of any CV procedure than the 45-64 age group. This may reflect a growing reliance on Medicare services in older Veterans versus the increased potential for diagnostic procedures to be received in the inpatient VHA setting in older Veterans and thus not counted in the dataset.

Figure 19. Proportion of Veteran VHA outpatients with at least one instance of any cardiovascular procedure, FY10



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

Notes: Due to small percentages, the vertical axis scale was changed from 100% to 40%. "Any cardiovascular procedures" includes: EKG, Echocardiogram (ECHO), ECHO Stress Test, Nuclear Stress Test, Non-Imaging Stress Test, Catheterization, Ambulatory ECG Monitoring, ICD/ Pacemaker Maintenance, Catheterization with Intervention-Stent/Angioplasty, Thrombolysis -Medical, Cardioversion and Pacing, Ablation Procedures. Presence of any cardiovascular procedure was determined by having at least one instance of a Current Procedural Terminology (CPT) code. See Technical Appendix for details on variable development and a full list of CPT codes used.

Outpatient catheterization with interventions that occurred in the outpatient setting are included in this any CV procedure aggregate group, These procedures may also occur in the inpatient setting, though inpatient data was not included in this preliminary report.

Cohort: Women and men Veteran VHA outpatients. Women in FY10: 18-44 (N=131,968); 45-64 (N=139,030); 65+ (N=40,129). Men in FY10: 18-44 (N=617,551); 45-64 (N=2,106,636); 65+ (N=2,209,972)

Source: WHEI Master Database

Notes to Interpretation: Findings portray higher rates of outpatient CV procedures in the 45-64 and 65+ age groups compared to the 18-44 age group. The highest rates were seen in the 45-64 age group. Women Veterans had slightly lower rates of procedures in the 18-44 age group and similar rates of CV procedures compared to men Veterans in the 65+ age group.

Thrombolysis, ablation and catheterization procedures were included in the aggregate variable "any CV procedure" but as they are more likely to be performed in the inpatient setting, may be under-reported in this outpatient dataset. We therefore kept these procedures in the aggregate variable, "any CV procedure," but do not assess them individually in this report. Note that all procedures discussed in this report are outpatient procedures performed in VHA.

Diagnostic and Therapeutic Procedures. Diagnostic and therapeutic procedures are performed for different indications (diagnostic procedures to diagnose a condition and therapeutic procedures for treatment). Because gender differences have been shown to exist in civilian (non-VA) populations in screening, diagnosis and treatment, we considered it important to divide procedures into Diagnostic and Therapeutic categories. Outpatient catheterization and catheterization with interventions that occurred in the outpatient setting are included in the aggregate Diagnostic and Therapeutic procedures. These procedures may also occur in the inpatient setting, though inpatient data was not included in this preliminary report.

"Diagnostic Procedures" variable includes: EKG, ECHO, Echocardiogram Stress Test, Nuclear Stress Test, Non-Imaging Stress Test, Catheterization (without intervention), Ambulatory EKG Monitoring, and Implantable Cardioverter-Defibrillator (ICD)/Pacemaker Maintenance.

"Therapeutic Procedures" variable includes: Catheterization with Intervention-Stent, Angioplasty, Thrombolysis -Medical, Cardioversion and Pacing, Ablation Procedures.

Diagnostic Procedures by Gender and Age, FY10. The proportion of women and men with diagnostic procedures was similar across all age groups (Table 4), although a slightly lower proportion of younger women received diagnostic procedures.

Table 4. Proportion of diagnostic procedures among Veteran VHA outpatients by gender and age, FY10

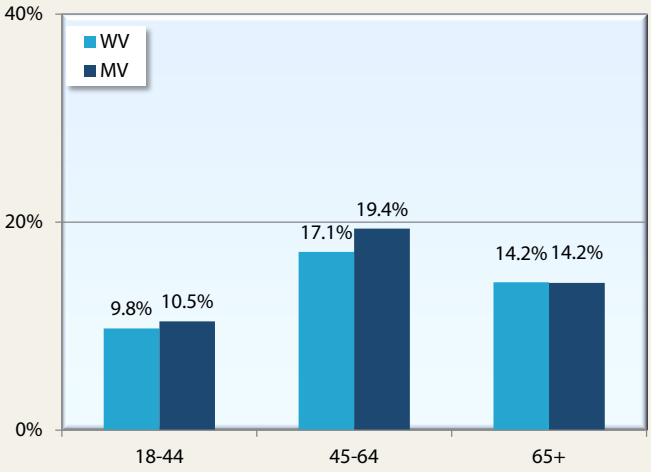
Diagnostic Procedures	Women	Men
18-44	11.22%	11.71%
45-64	20.40%	23.13%
65+	17.81%	17.55%

Women: 18-44 (N=131,968); 45-64 (N=139,030); 65+ (N=40,129)
Men: 18-44 (N=617,551); 45-64 (N=2,106,636); 65+ (N=2,209,972)

Therapeutic Procedures. The rates of therapeutic procedures were low in the outpatient setting so they were not included in this analysis.

Prevalence of EKG or Echocardiogram Procedures, FY10. EKGs were performed in a slightly lower proportion of women than men in the 18-44 and 45-64 age groups; however, the proportions were nearly equal to men in the 65+ age group (Figure 20). It is interesting to note that a higher proportion of women Veteran VHA outpatients had at least one instance of chest pain/angina or palpitations across all age groups during this same time period. Further analysis is needed to determine if appropriate testing for chest pain/angina is being administered.

Figure 20. Proportion of Veteran VHA outpatients with at least one instance of EKG procedures, FY10



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

Notes: Due to small percentages, the vertical axis scale was changed from 100% to 40%. Presence of EKG procedures was determined by having at least one instance of a CPT code. See Technical Appendix for details on variable development and a full list of CPT codes used.

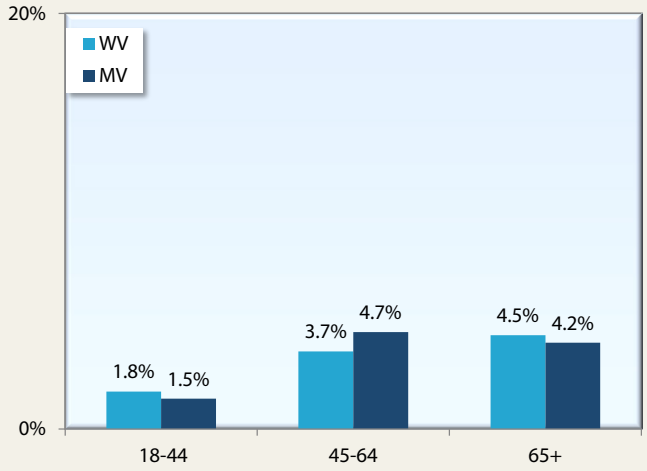
Cohort: Women and men Veteran VHA outpatients. Women in FY10: 18-44 (N=131,968); 45-64 (N=139,030); 65+ (N=40,129). Men in FY10: 18-44 (N=617,551); 45-64 (N=2,106,636); 65+ (N=2,209,972)

Source: WHEI Master Database

Notes to Interpretation: Findings portray higher rates of outpatient EKG in the 45-64 and 65+ age groups as compared to the 18-44 age group for both men and women. The highest rates were seen in the 45-64 age group. Across all age groups, women Veterans had similar (slightly lower) rates of EKG compared to men Veterans.

Echocardiogram: The proportion of women and men with outpatient ECHO procedures were low across all age groups in FY10 (Figure 21). Of note, the proportion of women with outpatient ECHOs was higher than the proportion of men in the 18-44 and 65+ age groups. Although heart failure was less common in women than men, valvular disease was more common in women than men across all age groups. Additional analysis is needed to determine whether or not women are receiving appropriate diagnostic evaluation.

Figure 21. Proportion of Veteran VHA outpatients with at least one instance of echocardiogram procedures, FY10



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

Notes: Due to small percentages, the vertical axis scale was changed from 100% to 20%. Presence of ECHO procedures was determined by having at least one instance of a CPT code. See Technical Appendix for details on variable development and a full list of CPT codes used.

Cohort: Women and men Veteran VHA outpatients. Women in FY10: 18-44 (N=131,968); 45-64 (N=139,030); 65+ (N=40,129). Men in FY10: 18-44 (N=617,551); 45-64 (N=2,106,636); 65+ (N=2,209,972)

Source: WHEI Master Database

Notes to Interpretation: Findings portray relatively low rates of outpatient ECHOs across all age groups. There were higher rates of outpatient ECHOs in the 45-64 and 65+ age groups compared to the 18-44 age group. Women Veterans had very similar but slightly higher rates of echocardiograms in the 18-44 and 65+ age groups compared with men.

Proportions of Stress Test Modalities out of All Stress Tests Conducted for Women and Men Outpatients, FY10. For both men and women, nuclear stress tests were the most common stress test modality used in the outpatient setting. Non-imaging stress tests were the second most common modality, followed by ECHO stress tests (Figures 24, 25, 26). Women had a slightly larger proportion than men of ECHO stress tests (Figures 22, 23). ECHO stress tests may be particularly appropriate for women patients, especially those of childbearing age because they offer similar sensitivity and specificity as a nuclear imaging test, but without the radiation risk.

Figure 22. Proportion of stress test type out of all stress tests conducted in women Veteran VHA outpatients

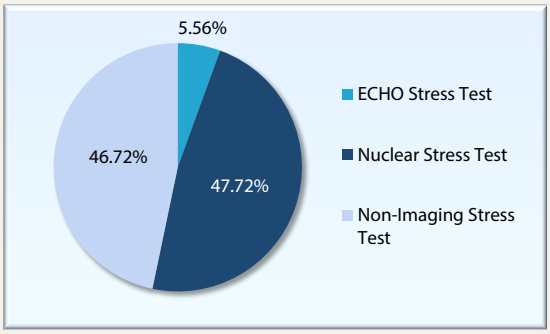
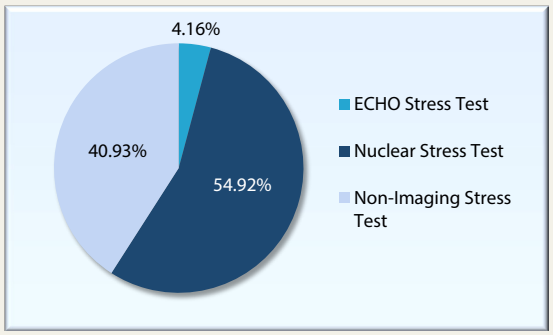


Figure 23. Proportion of stress test type out of all stress tests conducted in men Veteran VHA outpatients



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

Notes: Presence of stress tests was determined by having at least one instance of a CPT code. See Technical Appendix for details on variable development and a full list of CPT codes used.

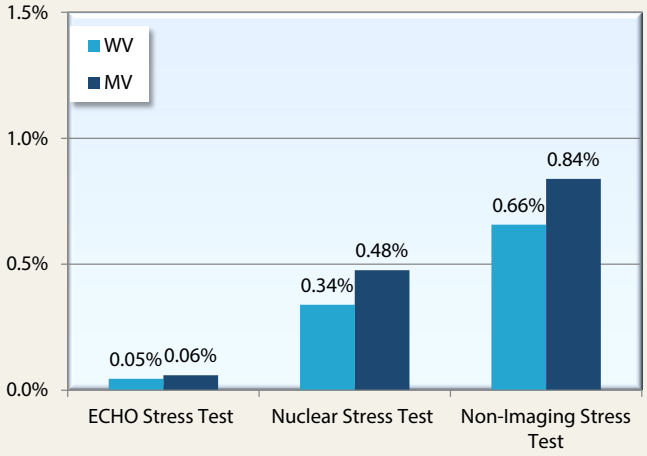
Cohort: Women and men Veteran VHA outpatients with at least one instance of a stress test in FY10. Women (N=7,198), Men (N=157,140)

Source: WHEI Master Database

Notes to Interpretation: Findings portray that the types of stress tests conducted were the same for both women Veterans and men Veterans. The most common type of stress test in both groups was nuclear stress test followed by non-imaging stress test. ECHO stress test represented only a minority of stress tests in both female and male Veterans.

Comparison of Stress Test Procedures for Women vs. Men Veterans.

Figure 24. Proportion of Veteran VHA outpatients aged 18-44 with at least one instance of stress test procedures, FY10



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

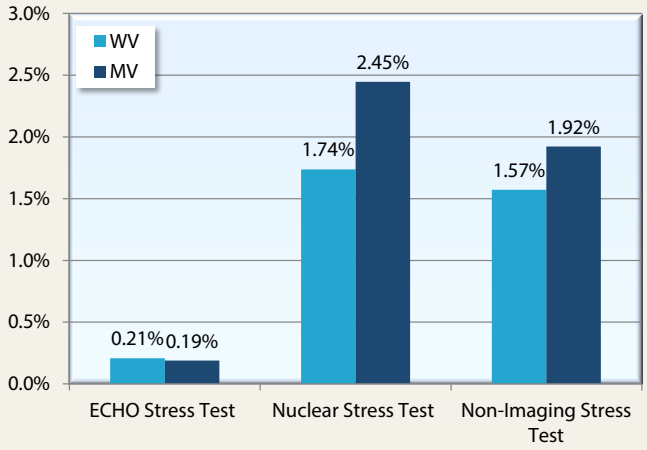
Notes: Due to small percentages, the vertical axis scale was changed from 100% to 1.5%. Presence of stress tests was determined by having at least one instance of a CPT code. See Technical Appendix for details on variable development and a full list of CPT codes used.

Cohort: Women and men Veteran VHA outpatients aged 18-44 in FY10. Women (N=131,968), Men (N=617,551)

Source: WHEI Master Database.

Notes to Interpretation: Findings portray that, overall, there were relatively few stress tests conducted in 18-44 age group Veterans (Figure 24). The most common type of stress test ordered in this age group was non-imaging stress test followed by nuclear stress test. ECHO stress tests represented a significant minority of stress tests conducted in this age group. Women aged 18-44 were less likely than men to receive all types of stress tests.

Figure 25. Proportion of Veteran VHA outpatients aged 45-64 with at least one instance of stress test procedures, FY10



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

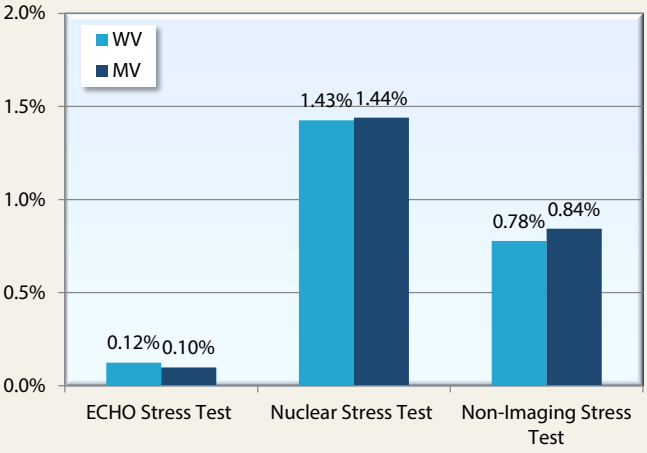
Notes: Due to small percentages, the vertical axis scale was changed from 100% to 3%. Presence of stress tests was determined by having at least one instance of a CPT code. See Technical Appendix for details on variable development and a full list of CPT codes used.

Cohort: Women and men Veteran VHA outpatients aged 45-64 in FY10. Women (N=139,030), Men (N=2,106,636)

Source: WHEI Master Database

Notes to Interpretation: Findings portray that the most common type of outpatient stress test conducted in the 45-64 age cohort of Veterans was nuclear stress test followed by non-imaging stress test (Figure 25). ECHO stress tests remained a significant minority of stress tests ordered in this group. Nuclear stress tests and non-imaging stress tests were conducted less often in women Veterans compared to men Veterans. This was in contrast to ECHO stress tests where proportions were similar.

Figure 26. Proportion of Veteran VHA outpatients aged 65+ with at least one instance of stress test procedure, FY10



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

Notes: Due to small percentages, the vertical axis scale was changed from 100% to 2%. Presence of stress tests was determined by having at least one instance of a CPT code. See Technical Appendix for details on variable development and a full list of CPT codes used.

Cohort: Women and men Veteran VHA outpatients aged 65+ in FY10. Women (N=40,129). Men (N=2,209,972)

Source: WHEI Master Database

Notes to Interpretation: Findings portray that the most common type of outpatient stress test conducted in 65+ Veterans was nuclear stress test followed by non-imaging stress tests (Figure 26). ECHO stress tests remained a significant minority. The proportions of all types of stress test were similar in women Veterans and men Veterans.

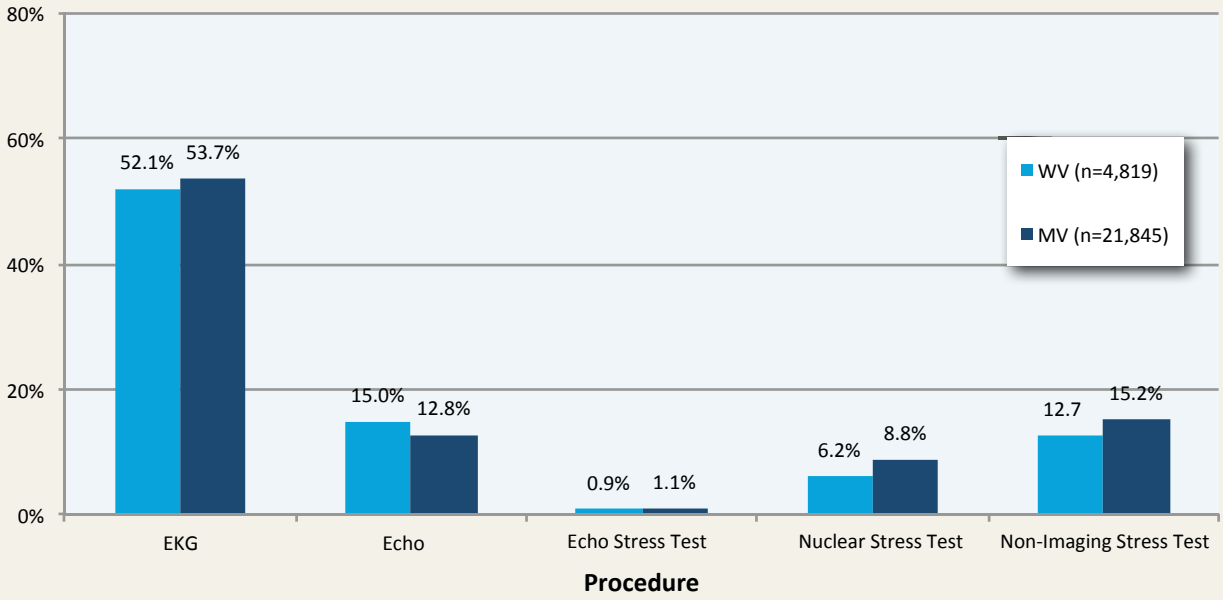
Procedures Received by VA Outpatients with a Cardiovascular Disease Diagnosis in FY10

In this section, we evaluated procedures received by patients with specific CV diagnoses. We were not able to ascertain whether these were new diagnoses or 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 to men, which may affect rates at which certain procedures were performed.

Cardiovascular Procedures Received by Outpatients with Chest pain/Angina, FY10. Across all age groups, the most common CV procedures in outpatients with chest pain/angina in FY10 were for EKG, ECHO, nuclear stress test and non-imaging (exercise) stress test for both men and women (Figures 27, 28, 29).

Of note, although the rates of procedures were similar for men and women across all age groups, women were less likely to receive EKGs or stress tests in all age groups.

Figure 27. Proportion of cardiovascular procedures among Veteran VHA outpatients aged 18-44 with chest pain, FY10



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

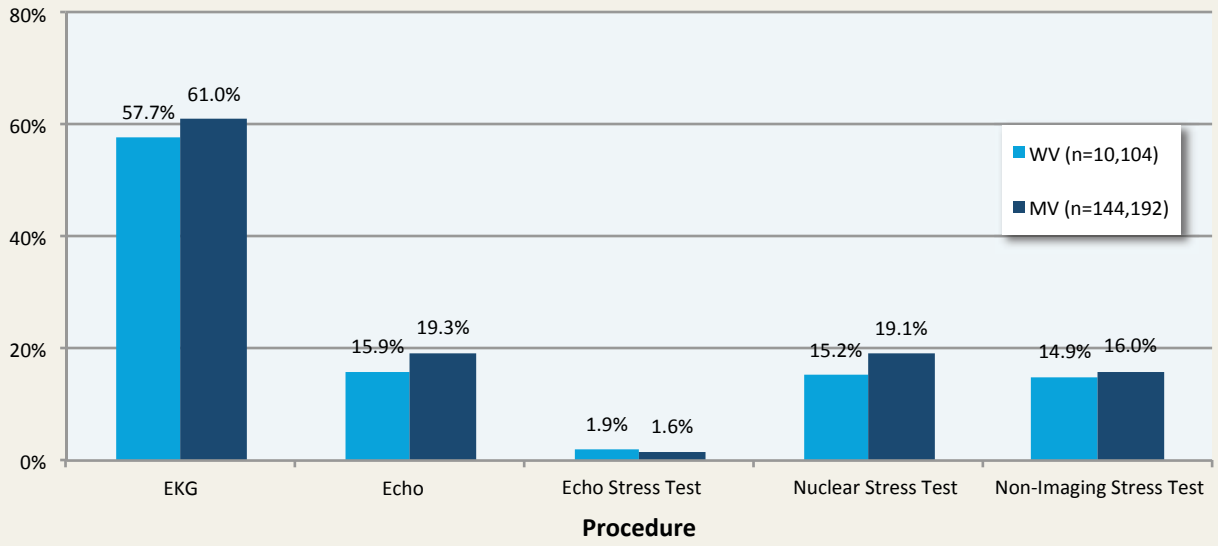
Notes: Due to small percentages, the vertical axis scale was changed from 100% to 80%. We are not able to ascertain whether these are new diagnoses or determine time to treatment. Presence of CVD diagnosis was determined by having at least one instance of a related ICD-9 code. Presence of a CV-related procedure was determined by presence of at least one CPT code. See Technical Appendix for details on variable development and a full list of ICD-9 and CPT codes used.

Cohort: Women and men Veteran VHA outpatients aged 18-44 with at least one instance of chest pain/angina in FY10. Women (N=4,819), Men (N=21,845).

Source: WHEI Master Database.

Notes to Interpretation: Findings portray that in the 18-44 age group, Veterans with a diagnosis of chest pain/angina, the most common CVD procedure was EKG followed by ECHO, non-imaging stress test and then nuclear stress test, respectively. ECHO stress tests are rarely performed in this age group. Women in this age group with chest pain/angina received slightly fewer EKGs, more ECHOs, but less stress tests of all types.

Figure 28. Proportion of cardiovascular procedures among Veteran VHA outpatients aged 45-64 with at least one instance of chest pain/angina, FY10



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

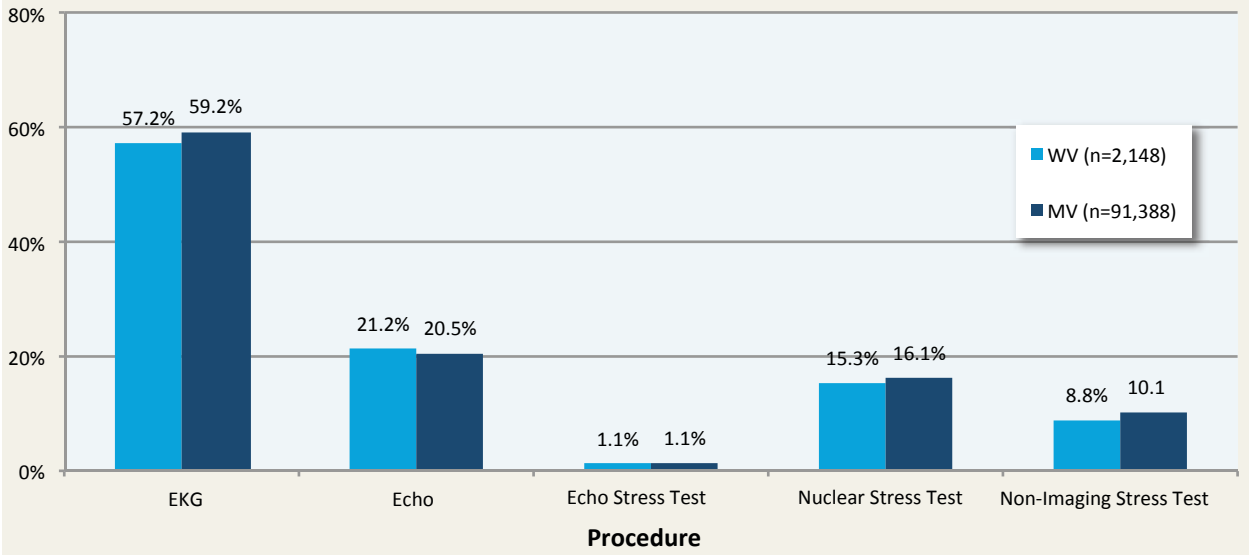
Notes: We are not able to ascertain whether these are new diagnoses or determine time to treatment. Presence of CVD diagnosis was determined by having at least one instance of a related ICD-9 code. Presence of a CV-related procedure was determined by presence of at least one CPT code. See Technical Appendix for details on variable development and a full list of ICD-9 and CPT codes used.

Cohort: Women and men Veteran outpatients aged 45-64 with at least one instance of chest pain/angina in FY10. Women (N=10,104), Men (N=144,192).

Source: WHEI Master Database.

Notes to Interpretation: Findings portray that in Veterans aged 45-64 with a diagnosis of chest pain/angina, the most common CVD procedure was EKG followed by ECHO, nuclear stress test and then non-imaging stress test. In this age group, women with chest pain/angina received fewer EKGs, ECHOs, and stress tests.

Figure 29. Proportion of cardiovascular procedures among Veteran VHA outpatients aged 65+ with at least one instance of chest pain/angina, FY10



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

Notes: We are not able to ascertain whether these are new diagnoses or determine time to treatment. Presence of CVD diagnosis was determined by having at least one instance of a related ICD-9 code. Presence of a CV-related procedure was determined by presence of at least one CPT code. See Technical Appendix for details on variable development and a full list of ICD-9 and CPT codes used.

Cohort: Women and men Veteran VHA outpatients aged 65+ with at least one instance of chest pain/angina in FY10. Women (N=2,148), Men (N=91,388).

Source: WHEI Master Database.

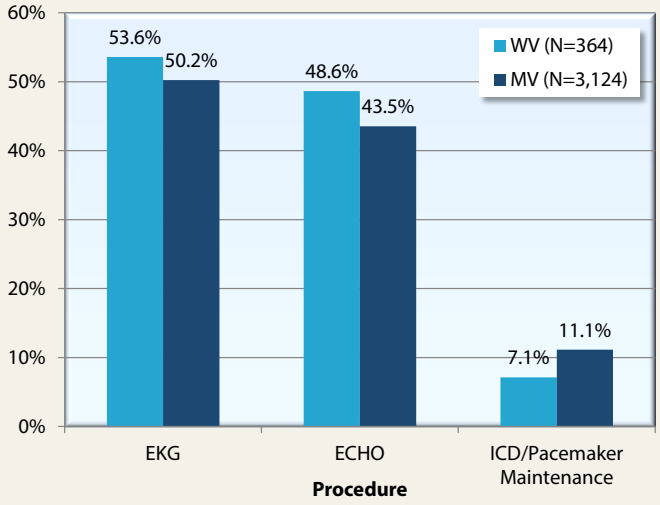
Notes to Interpretation: Findings portray that in Veterans in the 65+ age group with a diagnosis of chest pain/angina, the most common CVD procedure was EKG followed by ECHO, nuclear stress test and then non-imaging stress test. In this age group, women with chest pain/angina were slightly less likely than men to receive EKGs, slightly more likely to receive ECHOs, and less likely to receive stress tests.

Cardiovascular Procedures Received by Outpatients with Heart Failure, FY10.

Across all age groups, the most common CV procedures in outpatients with heart failure in FY10 were for EKG, followed by ECHO and then ICD/Pacemaker maintenance, for both men and women (Figures 30, 31, 32).

Of note, although the rates of procedures were similar for men and women across all age groups, women were more likely to receive EKGs or ECHOs, but less likely to receive ICD/Pacemaker Maintenance procedures in all age groups.

Figure 30. Proportion of cardiovascular procedures among Veteran VHA outpatients aged 18-44 with at least one instance of heart failure, FY10



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

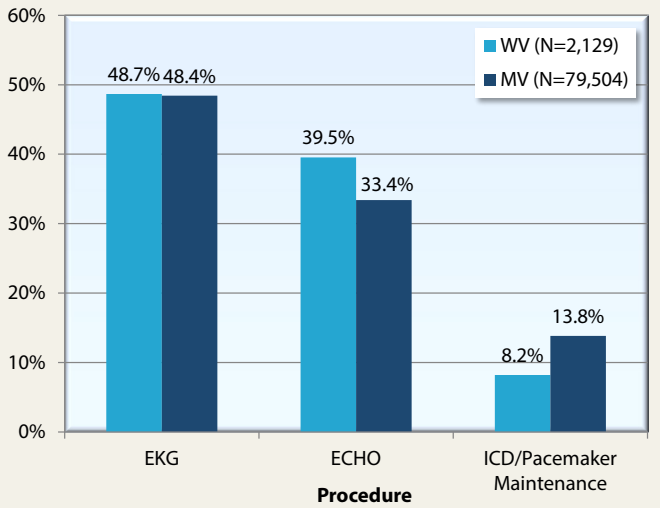
Notes: Due to small percentages, the vertical axis scale was changed from 100% to 60%. We are not able to ascertain whether these are new diagnoses or determine time between diagnoses and procedure. Presence of CVD diagnosis was determined by having at least one instance of a related ICD-9 code. Presence of a CV-related procedure was determined by presence of at least one CPT code. See Technical Appendix for details on variable development and a full list of ICD-9 and CPT codes used.

Cohort: Women and men Veteran VHA outpatients aged 18-44 with at least one instance of heart failure in FY10. Women (N=364), Men (N=3,124).

Source: WHEI Master Database.

Notes to Interpretation: Findings portray that in the 18-44 age group of Veterans with at least once instance of heart failure, the most common procedures conducted were EKG and ECHO. The rates were slightly higher in women Veterans compared to men Veterans. Women Veterans underwent less ICD/Pacemaker maintenance compared men Veterans in this age group.

Figure 31. Proportion of cardiovascular procedures among Veteran VHA outpatients aged 45-64 with at least one instance of heart failure, FY10



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

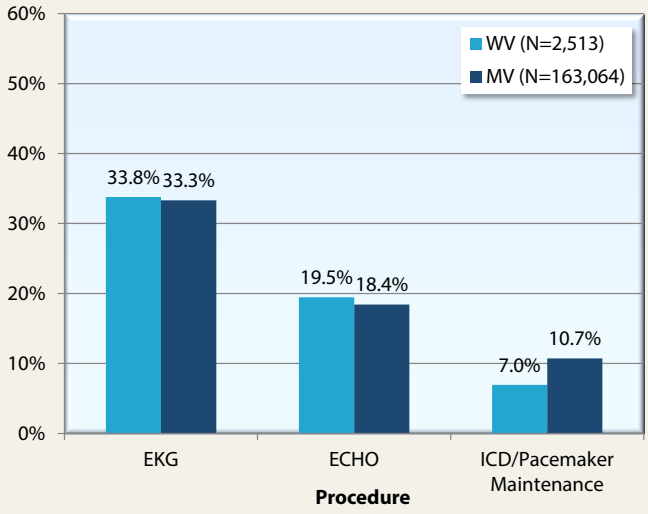
Notes: Due to small percentages, the vertical axis scale was changed from 100% to 60%. We are not able to ascertain whether these are new diagnoses or determine time between diagnoses and procedure. Presence of CVD diagnosis was determined by having at least one instance of a related ICD-9 code. Presence of a CV-related procedure was determined by presence of at least one CPT code. See Technical Appendix for details on variable development and a full list of ICD-9 and CPT codes used.

Cohort: Women and men Veteran VHA outpatients aged 45-64 with at least one instance of heart failure in FY10. Women (N=2,129), Men (N=79,504).

Source: WHEI Master Database.

Notes to Interpretation: Findings portray that in the 45-64 age group of Veterans with at least one instance of heart failure, the most common procedure conducted was EKG followed by ECHO. The proportion of EKGs was similar in women Veterans and men Veterans. Women Veterans had a slightly higher rate of ECHOs and a lower rate of ICD/Pacemaker maintenance.

Figure 32. Proportion of cardiovascular procedures among Veteran VHA outpatients aged 65+ with at least one instance of heart failure, FY10



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

Notes: Due to small percentages, the vertical axis scale was changed from 100% to 60%. We are not able to ascertain whether these are new diagnoses or determine time between diagnoses and procedure. Presence of CVD diagnosis was determined by having at least one instance of a related ICD-9 code. Presence of a CV-related procedure was determined by presence of at least one CPT code. See Technical Appendix for details on variable development and a full list of ICD-9 and CPT codes used.

Cohort: Women and men Veteran VHA outpatients aged 65+ with at least one instance of heart failure in FY10. Women (N=2,513), Men (163,064).

Source: WHEI Master Database.

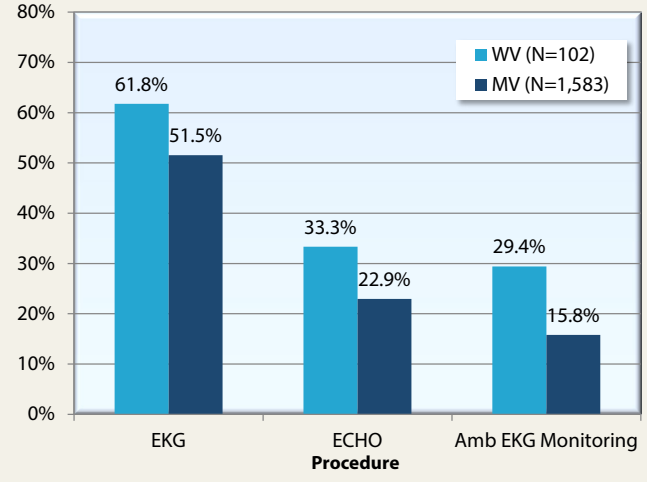
Notes to Interpretation: Findings portray that in the 65+ age group of Veterans with at least one instance of heart failure, the most common procedure conducted was EKG followed by ECHO. The proportion of EKGs was similar in women Veterans and men Veterans. Women Veterans had slightly higher rates of ECHOs and lower rates of ICD/Pacemaker maintenance.

Cardiovascular Procedures Received by VHA Outpatients with Atrial Fibrillation/ Atrial Flutter, FY10 .

Across all age groups, the most common CV procedures in outpatients with atrial fibrillation/atrial flutter in FY10 were for EKG, followed by ECHO and then ambulatory EKG monitoring, for both men and women (Figures 33, 34, 35).

Of note, although the rates of procedures were similar for men and women across all age groups, women were more likely to receive EKGs, ECHOs or Ambulatory EKG Monitoring procedures in all age groups.

Figure 33. Proportion of cardiovascular procedures among Veteran VHA outpatients aged 18-44 with at least one instance of atrial fibrillation/atrial flutter, FY10



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

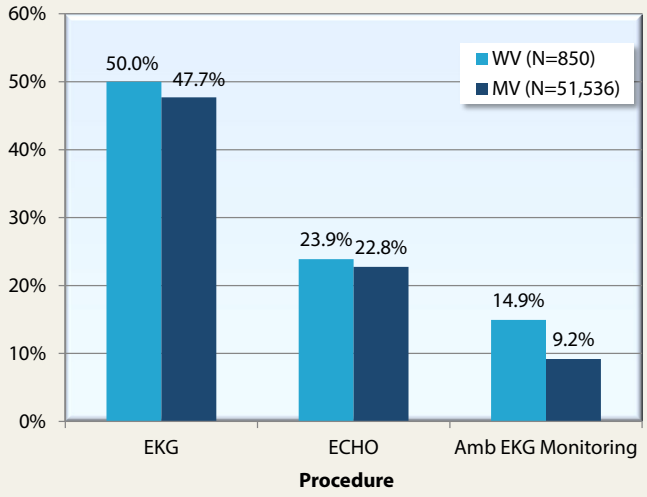
Notes: We are not able to ascertain whether these are new diagnoses or determine time between diagnoses and procedure. Presence of CVD diagnosis was determined by having at least one instance of a related ICD-9 code. Presence of a CV-related procedure was determined by presence of at least one CPT code. See Technical Appendix for details on variable development and a full list of ICD-9 and CPT codes used.

Cohort: Women and men Veteran VHA outpatients aged 18-44 with at least one instance of atrial fibrillation/atrial flutter in FY10. Women (N=102), Men (N=1,583)

Source: WHEI Master Database.

Notes to Interpretation: Findings portray that in the 18-44 age group of Veterans with at least one instance of atrial fibrillation/atrial flutter, the most common procedure conducted was EKG. ECHO and Ambulatory EKG monitoring were less commonly conducted in both women Veterans and male Veterans. Among patients with the diagnosis of atrial fibrillation/atrial flutter, women received more EKGs, ECHOs, and Ambulatory EKG monitoring as compared to men.

Figure 34. Proportion of cardiovascular procedures among Veteran VHA outpatients aged 45-64 with at least one instance of atrial fibrillation/atrial flutter, FY10



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

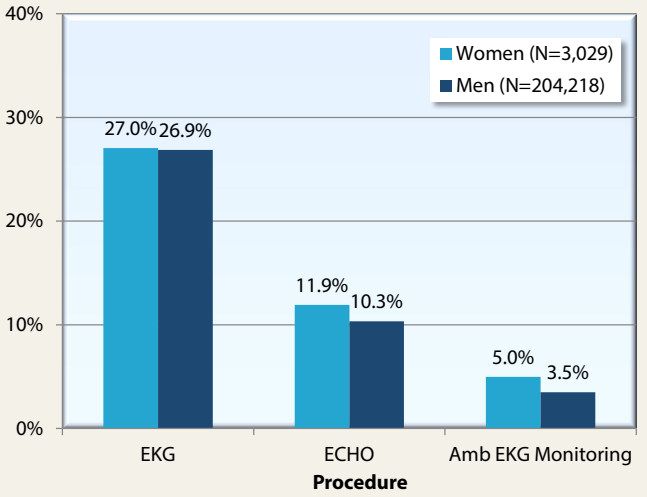
Notes: Due to small percentages, the vertical axis scale was changed from 100% to 60%. We are not able to ascertain whether these are new diagnoses or determine time between diagnoses and procedure. Presence of CVD diagnosis was determined by having at least one instance of a related ICD-9 code. Presence of a CV-related procedure was determined by presence of at least one CPT code. See Technical Appendix for details on variable development and a full list of ICD-9 and CPT codes used.

Cohort: Women and men Veteran VHA outpatients aged 45-64 with at least one instance of atrial fibrillation/atrial flutter in FY10. Women (N=850), Men (N=51,536)

Source: WHEI Master Database.

Notes to Interpretation: Findings portray that in the 45-64 age group of Veterans with at least one instance of atrial fibrillation/atrial flutter, the most common procedure conducted was EKG. ECHOs and Ambulatory EKG monitoring were less commonly conducted in both women Veterans and men Veterans. The frequency of EKG and ECHO were similar in women Veterans and men Veterans in this age group, in contrast to Ambulatory EKG monitoring, which was more common in women Veterans compared to men Veterans in this age group.

Figure 35. Proportion of cardiovascular procedures among Veteran VHA outpatients aged 65+ with at least one instance of atrial fibrillation/atrial flutter, FY10



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

Notes: Due to small percentages, the vertical axis scale was changed from 100% to 40%. We are not able to ascertain whether these are new diagnoses or determine time to treatment. Presence of CVD diagnosis was determined by having at least one instance of a related ICD-9 code. Presence of a CV-related procedure was determined by presence of at least one CPT code. See Technical Appendix for details on variable development and a full list of ICD-9 and CPT codes used.

Cohort: Women and men Veteran VHA outpatients aged 65+ with at least one instance of atrial fibrillation/atrial flutter in FY10. Women (N=40,129), Men (N=2,209,972)

Source: WHEI Master Database.

Notes to Interpretation: Findings portray that among the 65+ age group of Veterans with at least one instance of atrial fibrillation/atrial flutter, the most common procedure conducted was EKG. ECHOs

and Ambulatory EKG monitoring were less commonly conducted in both women Veterans and men Veterans. The proportions of EKG were similar in women Veterans and men Veterans in this age group, in contrast to ECHOs and Ambulatory EKG monitoring which were both more common in women Veterans compared to men Veterans in this age group.

Clinic Visit Types, FY10 Veteran Outpatients

In FY10, in Veterans with at least one of the five major CV risk factors, 26 percent of women Veteran outpatients and 18 percent of men Veteran outpatients visited the Emergency Department at least once (Table 5). In contrast, a smaller proportion of women than men had visits to Cardiology Clinics (7.3% vs. 9.0%) or Anticoagulation Clinics (0.9% vs. 1.9%), but a similar proportion made visits to Primary Care Clinics.[32] Women and men with risk factors had similar attendance in Cardiac Surgery Clinics (0.1% for both groups). In Veterans with CV conditions (as opposed to risk factors), 38 percent of women and 22 percent of men veterans visited the Emergency Department at least once in the same year (Table 6). More women than men (24.9% vs. 19.5%) visited Cardiology Clinics, while the proportion using the Primary Care Clinic was comparable. Out of outpatients who had chest pain/angina in FY10, 55.8 percent of women (n=17,071) and 50.9 percent of men (n=257,426) also had at least one instance of an Emergency Department visit in FY10 [data not shown].

Table 5. Clinic visit types for Veteran outpatients with any of 5 major cardiovascular disease risk factors, FY10

CLINIC TYPE	Women Veterans with CVD Risk Factor (N=161,390)	Men Veterans with CVD Risk Factor (N=3,740,378)
Emergency Department	25.9%	17.8%
Cardiology Clinic	7.3%	9.0%
Anticoagulation Clinic	0.9%	1.9%
Cardiac Surgery Clinic	0.1%	0.1%
Primary Care Clinic	98.5%	98.4%

Table 6. Clinic visit types for Veteran outpatients with any cardiovascular disease condition, FY10

CLINIC TYPE	Women Veterans with CVD Condition (N=49,111)	Men Veterans with CVD Condition (N=1,674,332)
Emergency Department	37.9%	22.4%
Cardiology Clinic	24.9%	19.5%
Anticoagulation Clinic	2.6%	4.0%
Cardiac Surgery Clinic	0.2%	0.3%
Primary Care Clinics	97.7%	98.1%

Note: Based on 1+ Instance of a CV-related ICD9 code and 1+ instance of CV-related clinic stop code in FY10 VA Outpatient data
Source of data: WHEI Master Database.

32 Based on the Women's Health Evaluation Initiative (WHEI) Definition of Primary Care which includes: HBPC Physician, HBPC Nursing (RN or LPN), HBPC Physician Extender (NP, CNS, PA), Spinal Cord Injury, General Internal Medicine, Geriatric Clinic, Geriatric Evaluation and Management (GEM) Clinic, Primary Care Medicine, Primary Care Group, Geriatric Primary Care, Mental Health Primary Care Team –Group, Mental Health Primary Care Team – Individual, Pap Smear Clinic.

Technical Appendix

Data Sources

Data for this report came from centralized VHA administrative data files from FY00 and FY10. The two source files used are:

ADUSH: [33] Monthly VHA Enrollment data files maintained by the office of the ADUSH, containing records of sociodemographic characteristics and other person-level variables (sex, Veteran status, VHA user status, date of birth, etc.).

SE/SF: VHA outpatient encounter files (SAS Medical Dataset from VHA's National Patient Care Database). The SE file contains a record for every encounter the patient makes to 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)

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, used VHA for outpatient care at least once in the year being examined (FY00 and FY10).

Algorithm for Cardiovascular Variables

Algorithm for Cardiovascular Risk Factors and Conditions. The Women Veterans Cardiovascular Health Workgroup identified the following 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.[34]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).

For each of 30 CV risk factor and condition categories examined in this report, we created a variable, counting how often each patient received corresponding ICD-9-CM diagnoses codes in the FY10 Medical SAS outpatient Event dataset (SE). The counts include diagnoses in the same risk factor or condition category made during different clinic visits. For example, a patient whose only CV diagnoses in FY10 were two coronary artery disease diagnoses made in the same Cardiology Clinic visit would receive a count of one.

33 Assistant Deputy Under Secretary for Health.

34 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.

Outpatient Risk Factor Variable ICD-9-CM Codes. The specific ICD-9-CM codes from the SE file used to create variables for each type of risk factor we examined are listed here. Note that some of the variables listed are only included in the aggregate diagnosis definitions (see aggregate variable definitions below).

RISK FACTOR VARIABLE	ICD-9-CM DIAGNOSIS CODES
Diabetes	25000, 25001, 7902, 79021, 79022, 79029, 25002, 25003, 25010, 25011, 25012, 25013, 25040, 25041, 25042, 25043, 25050, 25051, 25052, 25053, 2506, 25060, 25061, 25062, 25063, 2507, 25070, 25071, 25072, 25073, 25090, 25091, 25020, 25021, 25022, 25023, 2503, 25030, 25031, 25032, 25033, 2508, 25080, 25081, 25082, 25083, 25092, 25093, 3572, 36641, 36201, 36202, 36203, 36204, 36205, 36206, 36207
Hypertension	36211, 401, 4011, 4019, 4010, 40200, 40201, 4021, 40210, 40211, 4029, 40290, 40291, 4030, 40300, 40301, 4031, 40310, 40311, 4039, 40390, 40391, 4040, 40400, 40401, 40402, 40403, 4041, 40410, 40411, 40412, 40413, 4049, 40490, 40491, 40492, 40493, 405, 4050, 40501, 40509, 4051, 40511, 40519, 4059, 40591, 40599, 4372, 4020, 402, 403, 404
Dyslipidemia	272, 2720, 2721, 2722, 2723, 2724, 2727, 2728, 2729
Depressive Disorders	29620, 29621, 29624, 29625, 29626, 29630, 29631, 29632, 29633, 29634, 29635, 29636, 3004, 311
PTSD	30981
Tobacco Use	3051, 30510, 30511, 30512
Family History of CVD Disease, Stroke	V173, V174, V1741, V1749, V171

Outpatient Condition Variable ICD-9-CM Codes. The specific ICD-9-CM codes from the SE file 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 aggregate variable definitions below).

CONDITION VARIABLE	ICD-9-CM DIAGNOSIS CODES
Chest pain/angina	78650, 78651, 78659, 413, 4130, 4131, 4139
Palpitations	7851
Atrial fibrillation/Atrial flutter	42731, 42732
Tachycardia/Arrhythmia-Other	4270, 4271, 4272, 7850, 42760, 42761, 42769, 42781, 42789, 4279
Conduction Disorders	4260, 42610, 42611, 42612, 42613, 4262, 4263, 4264, 42650, 42651, 42652, 42653, 42654, 4266, 4267, 42681, 42689, 4269, 79431, 42682
Acute Stroke	43301, 43311, 43321, 43331, 43381, 43391, 4340, 43400, 43401, 4341, 43410, 43411, 4349, 43490, 43491, 436, 4330, 43300, 4331, 43310, 4332, 43320, 4333, 43330, 4338, 43380, 4339, 43390
Heart Failure	39891, 4280, 4281, 4282, 42820, 42821, 42822, 42823, 4283, 42830, 42831, 42832, 42833, 4284, 42840, 42841, 42842, 42843, 4289, 4291, 4293, V432, 42983, 4250, 4251, 4254, 4257, 4258, 4259
Valvular Disease	7852, 7853, 4295, 4296, 42981, 3940, 3941, 3942, 3949, 3950, 3951, 3952, 3959, 3960, 3961, 3962, 3963, 3968, 3969, 3970, 3971, 3979, 4240, 4241, 4242, 4243

CONDITION VARIABLE	ICD-9-CM DIAGNOSIS CODES
Acute 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, 41403, 41406, 4142, 4148, 4149, V4581, V4582, 41412, 4292, 41402, 41404, 41405, 41407, 41410, 41411, 41419
Cardiac Arrest	42741, 42742, 4275, V1253
Pericarditis	3910, 393, 4200, 42090, 42091, 42099, 4231, 4232, 4238, 4239, 03641, 07421, 11503, 11513, 11593
Endocarditis	3911, 4210, 4211, 4219, 03642, 07422, 11281, 11504, 11514, 11594, 42490, 42491, 42499
Myocarditis	3912, 3980, 4220, 42290, 42291, 42292, 42293, 42299, 4290, 03282, 03643, 07423, 1303
Other Carditis	3918, 3919, 3920, 39890, 39899, 03640, 07420
Cardiac Tamponade	4233
Late Effects of Stroke	438, 4380, 43810, 43811, 43812, 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
TIA	435, 4350, 4351, 4352, 4353, 4358, 4359
Peripheral Vascular Disease (Non-Aortic Abdominal Aneurysm)	4400, 4401, 4402, 44020, 44021, 44022, 44023, 44029, 4404, 4408, 4409, 443, 4431, 4438, 44381, 44389, 4439, 4471, 5570, 5571, 5579, 4403, 44030, 44031, 44032, V434
Peripheral Vascular Disease (Aortic Abdominal Aneurysm)	441, 4411, 4412, 4413, 4414, 4415, 4416, 4417,4419

In developing the risk factors and conditions person-level dataset, we reshaped our raw dataset three times (long record level, day-stop code record level, and person level) with intermediary variables to help carry-over information. We only saved the final person level dataset and its variables.

From the SE from FY10, we read in variables SCRSSN, VIZDAY, STA5A, CL, DXLSF, DXF2, DXF3, DXF4, DXF5, DXF6, DXF7, DXF8, DXF9, DXF10 and sorted the dataset in the same order. Of note, the sequence of these variables is important in the processing of the data. Due to the multiple diagnosis variables (DXLSF, DXF2-DXF10), we reshaped the dataset such that there was only one diagnosis variable instead of ten. The elongation of the dataset resulted in a separate record for every non-missing diagnosis value. The elongated dataset records are unique by SCRSSN VIZDAY STA5A CL and DX.

We next removed duplicate records where information on all fields (i.e., same SCRSSN, VIZDAY, STA5A, CL, and the newly formed variable DX) was equivalent.

Based on our operationalization of the CV diagnosis 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 also contained in the group's definition. These intermediary indicator variables were then summed among records with the same values of SCRSSN VIZDAY STA5A and CL and saved under summed long record level variables. The dataset records were

then unique by SCRSSN VIZDAY STA5A CL. We only required indicating a diagnosis group once per SCRSSN VIZDAY STA5A and CL. If the sum of diagnoses in a diagnosis group was one or more, we gave the day-stop code record level diagnosis indicator variable a value of 1.

Aggregate Risk Factor Variables
Any of 5 Major Risk Factors: Dyslipidemia, Diabetes non-pregnancy related, Hypertension non-pregnancy related, Tobacco Use, Family History of CVD/stroke

Aggregate Condition Variables
Cerebrovascular Disease: Acute Stroke, Late Effects of Stroke, Other Cerebrovascular Disease, TIA
Peripheral Vascular Disease: Peripheral Vascular Disease (Non-Aortic Abdominal Aneurysm) and Peripheral Vascular Disease (Aortic Abdominal Aneurysm)
Conronary Artery Disease: Acute Myocardial Infarction, Myocardial Infarction Sequelae, Coronary Artery Disease (Non-Myocardial Infarction)
Any CV Condition: Chest Pain / Angina, Palpitations, Acute MI, MI Sequelae, Coronary Artery Disease Non-MI, Heart Failure, Tachycardia/Arrhythmia-other, Atrial Fibrillation/Atrial Flutter, Valvular Disease, Pericarditis, Endocarditis, Myocarditis, Other Carditis, Cardiac Tamponade, Conduction (fine), Acute Stroke, Late Effects of Stroke, Other Cerebrovascular Disease, TIA, Peripheral Vascular Disease (Non-Aortic Abdominal Aneurysm), Peripheral Vascular Disease (Aortic Abdominal Aneurysm), Cardiac Arrest

Aggregate diagnosis and risk factor variables grouped multiple variables based on a common diagnosis characteristic. Aggregate variables included: Any of 5 Major Risk Factors, Pregnancy related Hypertension and Diabetes, Obesity Broad, Coronary Artery Disease Broad, Carditis Broad, Cerebrovascular Disease Broad, Peripheral Vascular Disease Broad, Any CVD Condition.

Based on this second shaping of the data, we amassed information by person. We summed diagnosis group variables by unique SCRSSN and saved it in a final person level count variable. Subsequent variable creation based on the count variables dichotomized counts into 0, or 1 or more for every person.

The final diagnosis dataset consisted of unique individual's SCRSSN and final diagnosis group variable of 0/1+ categories.

Algorithm for Cardiovascular Procedures. We follow a similar algorithm for the development of procedural variables, replacing diagnostic fields for procedural ones. The workgroup operationalized CV procedures using Healthcare Common Procedure Coding System Level I (also known as Current Procedural Terminology or CPT codes) and Level II codes. From the SE dataset, we read in variables SCRSSN, VIZDAY, STA5A, CL, CPT1, CPT2, CPT3, CPT4, CPT5, CPT6, CPT7, CPT8, CPT9, CPT10, CPT11, CPT12, CPT13, CPT14, CPT15, CPT16, CPT17, CPT18, CPT19, CPT20, and sort the dataset in the same order. We continue with the same process as described in the algorithm for risk factors and conditions, creating a person-level file from intermediary dataset unique by SCRSSN VIZDAY STA5A CL and CPT.

PROCEDURE VARIABLE	CPT/HCPCS CODES
ECHO	93303, 93304, 93306, 9330, 93308, C8921, C8922, C8923, C8924, C8929, 93312, 93313, 93314, 93315, 93316, 93317, 93318
ECHO Stress Test	93350, 93351, C8928, C8930
Nuclear Stress Test	78451, 78452, 78454, 78472, 78473, 78481, 78483, 78491, 78492

PROCEDURE VARIABLE	CPT/HCPCS CODES
Non-Imaging Stress Test	See note below
Catheterization	93451, 93456, 93457, 93561, 93562, 93503, 93501, 93452, 93458, 93459, 93462, 93510, 93511, 93514, 93524, 93453, 93460, 93461, 93526, 93527, 93528, 93529, 93454, 93455, 93508, 36013, 93463, 93464
Catheterization with Intervention-Stent Angioplasty	92973, 92980, 92981, 92982, 92984, 92995, 92996, G0290, G0291
Ambulatory EKG monitoring	93224, 93225, 93226, 93227, 93228, 93229, 93230, 93231, 93232, 93233, 93235, 93236, 93237, 93268, 93270, 93271, 93272, 93278
Implantable Cardioverter-Defibrillator (ICD)/Pacemaker Maintenance	93279, 93280, 93281, 93286, 93293, 93294, 93288, 93731, 93732, 93733, 93734, 93735, 93741, 93742, 93743, 93744, 93724, 93282, 93283, 93284, 93287, 93289, 93290, 93295, 93296, 93297, 93745, 33214, 33215, 33218, 33220, 33222, 33223, 33225, 33226, 33233, 33234, 33235, 33241, 33244
EKG	93000, 93005, 93012, 93040, 93041
Cardioversion and Pacing	92953, 92960

Aggregate procedure variables group multiple procedure variables based on a common procedural characteristic. Aggregate variables include diagnostic procedures, therapeutic procedures, stress test procedures, and any CV-related procedure.

Aggregate Procedure Variables

Any Stress Test: Echocardiogram Stress Test, Nuclear Stress Test, Non-Imaging Stress Test

Any Catheterization: Catheterization, Catheterization with Intervention-Stent Angioplasty

Diagnostic Procedures: EKG, ECHO, ECHO Stress Test, Nuclear Stress Test, Non-Imaging Stress Test, Catheterization, Ambulatory EKG Monitoring, ICD/Pacemaker Maintenance

Therapeutic Procedures: Catheterization with Intervention-Stent Angioplasty, Thrombolysis-Medical, Cardioversion and Pacing, Ablation Procedures

Any CV Procedure: EKG, ECHO, ECHO Stress Test, Nuclear Stress Test, Non-Imaging Stress Test, Catheterization, Ambulatory EKG Monitoring, ICD/Pacemaker Maintenance, Catheterization with Intervention-Stent Angioplasty, Thrombolysis-Medical, Cardioversion and Pacing, Ablation Procedures

The final procedure dataset consists of unique individual's SCRSSN, aggregate procedure variables, and final 0/1+ dichotomized procedure variable.

A Note on Non-Imaging Stress Test

After discussing the output on stress test variables, there was interest in reporting an EKG stress test in the absence of a nuclear or echocardiogram stress test. Our experts' rationale was that an EKG stress test is almost always performed with a nuclear or an echocardiogram stress test. One hypothesis is that if an EKG stress test occurs alone that this may indicate a TRUE exercise stress test.

According to our experts, a non-imaging stress test occurring on the same day (regardless of station or clinic stop) as a nuclear or echocardiogram stress test would be considered "double" counting. Therefore we create the non-imaging stress test variable if only an EKG stress test was present by person and visit day.

The request to create an EKG stress test variable in the absence of an echocardiogram or nuclear stress test, referred to as the non-imaging stress test variable, diverges slightly from how the other procedure variables were created.

In a separate program, we develop the non-imaging stress test variable by removing duplicates by SCRSSN, VIZDAY, and CPT. The duplicate algorithm only affects the non-imaging stress test variable. The non-imaging stress test variable is dependent on the absence of imaging stress tests on the same record and not solely on the EKG stress test related CPT codes. If an EKG stress test was performed and no other stress tests were performed on that same day, then the non-imaging stress test variable was indicated with a 1. We sum the non-imaging stress test variable by unique SCRSSN and save it in a final person level count variable. Subsequent variable creation dichotomizes the counts into 0, or, 1 or more for every person.

Algorithm for Clinic Visits. To measure visits to a type of clinic, we examined clinic stops (variable name CL) and calculated the counts of records for every person who went to the Emergency Department, Cardiology, Anticoagulation, Cardiac Surgery or Primary Care related clinics. Clinic "stop codes" (codes indicating clinic type) identify the clinical setting in which the patient received care.[35]

From the SE FY10 dataset, we read in the variables SCRSSN, VIZDAY, STA5A, and CL and sorted the dataset in the same order. Of note, the order of which these variables are sequenced is important in the processing of the data. We next removed duplicate records where information on all fields is the same (i.e. same SCRSSN, VIZDAY, STA5A, and CL).

We then created separate variables for each clinic stop of interest.

Decision Support System (DSS) – Clinic Stop Definitions

CLINIC TYPE	DSS Stop Codes
Emergency Department	130
Cardiology Clinic	303
Anticoagulation Clinic	317
Cardiac Surgery Clinic	402
Primary Care Clinic (WHEI Definition)*	171, 210, 301, 318, 319, 322, 323, 348, 350, 531, 562, 704

*WHEI Definition[36]

To create the final person-level count variable for type of clinic visited, we amassed clinic stop information by person and we summed clinic stop variables by unique SCRSSN. Subsequent variable creation based on the count variables categorized 0, 1, or 2 or more counts of a procedure group variable and 0 or 1 or more counts for every person.

The final clinic stop dataset consists of unique individual's SCRSSN and the three types of final variables for each clinic stop: count, 0/1/2+ categories, and 0/1+ categories.

35 "Stop codes" are clinic type codes, which are used to identify outpatient care in VHA. Each type of clinic has a unique three-digit code. The codes are entered into the local VHA VISTA system for each patient encounter (e.g. a clinic visit, a radiology procedure, a clinical telephone encounter). The data gathered through VISTA are aggregated into SE files in the national SA Medical Datasets.

36 Based on the Women's Health Evaluation Initiative (WHEI) Definition of Primary Care which includes: HBPC Physician, HBPC Nursing (RN or LPN), HBPC Physician Extender (NP, CNS, PA), Spinal Cord Injury, General Internal Medicine, Geriatric Clinic, Geriatric Evaluation and Management (GEM) Clinic, Primary Care Medicine, Primary Care Group, Geriatric Primary Care, Mental Health Primary Care Team –Group, Mental Health Primary Care Team – Individual, Pap Smear Clinic.