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Associations Between Provider Designation and Female-specific Cancer Screening in Women Veterans

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Abstract

Background—In 2010, the Department of Veterans Affairs Healthcare System (VA) implemented policy to provide Comprehensive Primary Care (for acute, chronic, and female-specific care) from designated Women's Health providers (DWHPs) at all VA sites. However, since that time no comparisons of quality measures have been available to assess the level of care for women Veterans assigned to these providers.

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Objectives—To evaluate the associations between cervical and breast cancer screening rates among age-appropriate women Veterans and designation of primary-care provider (DWHP vs. non-DWHP).

Research Design—Cross-sectional analyses using the fiscal year 2012 data on VA women's health providers, administrative files, and patient-specific quality measures.

Subjects—The sample included 37,128 women Veterans aged 21 through 69 years.

Measures—Variables included patient demographic and clinical factors (ie, age, race, ethnicity, mental health diagnoses, obesity, and site), and provider factors (ie, DWHP status, sex, and panel size). Screening measures were defined by age-appropriate subgroups using VA national guidelines.

Results—Female-specific cancer screening rates were higher among patients assigned to DWHPs (cervical cytology 94.4% vs. 91.9%, $P < 0.0001$; mammography 86.3% vs. 83.3%, $P < 0.0001$). In multivariable models with adjustment for patient and provider characteristics, patients assigned to DWHPs had higher odds of cervical cancer screening (odds ratio, 1.26; 95% confidence interval, 1.07–1.47; $P < 0.0001$) and breast cancer screening (odds ratio, 1.24; 95% CI, 1.10–1.39; $P < 0.0001$).

Conclusions—As the proportion of women Veterans increases, assignment to DWHPs may raise rate of female-specific cancer screening within VA. Separate evaluation of sex neutral measures is needed to determine whether other measures accrue benefits for patients with DWHPs.

Keywords

cancer screening; prevention; women; veterans; primary-care providers

In 2008, the Department of Veterans Affairs (VA) Under Secretary for Health, the highest ranking position for the Veterans Health Administration, convened a task force to evaluate the provision of primary care to women Veterans. The task force found that care for women Veterans was often fragmented and that quality of care for men exceeded that for women in many measures. On the basis of this report, VA implemented policy in 2010 to provide Comprehensive Primary Care (including acute, chronic disease and female-specific care) from Designated Women's Health providers (DWHPs) at all VA sites.[1] Each DWHP is a "primary care provider who is interested and proficient in women's health" and is "preferentially assigned women Veterans."[1] This study examines the level of female-specific cancer screening in women assigned to a DWHP versus a non-DWHP after the implementation of Comprehensive Primary Care policy.

Since 1950, cervical cancer mortality rates have decreased consistently with prevention and early detection by screening with mortality rates subsequently stabilizing from 2005 to 2009,[2] and breast cancer mortality rates have decreased since 1989 through earlier detection, improved treatment, and potentially decreased hormone therapy use.[2] Thus, cervical cancer screening with cervical cytology testing (ie, the Papanicolaou/Pap test) and breast cancer screening with mammography remain the gold standard for female-specific cancer screening in normal-risk individuals. However, some women remain less likely to be screened for

female-specific cancers. In particular, those without a high school education, without health insurance, recent immigrants to the United States, and those classified as poor and near-poor by socioeconomic status have lower female-specific cancer screening rates.[2] Moreover, rates still vary widely across states, metropolitan areas, and counties based on factors such as insurance and usual source of care.[3,4] Women Veterans using VA care will differ from these former groups, as they have an established usual source of care regardless of education, income, or insurance status. Separate from these access factors, patient clinical characteristics such as obesity and mental health diagnosis may impact cancer screening in women Veterans. The literature on obesity is mixed showing obese body mass classifications as having a negative effect on receipt of cervical and breast cancer screening in non-Veterans[5] and conversely associated with increased screening or no difference in Veteran women.[6–8] Separately, mental health diagnoses generally show an effect of lower rates of cervical and breast screening overall,[9,10] but there is a small amount of literature indicating that some patients with mental illness have no difference in screening once they are at a site of usual care.[9] More striking is that there may be a more complex experience for mental health Veteran patients studied by Weitlauf and colleagues[11] whereby those who are low users of primary care often obtain screening, and conversely those who are high users often do not. Although these issues all remain potential factors influencing screening, we do not know whether provider type (separate from physician specialty) exerts an effect on cervical and breast cancer screening. For VA, this question remains important because the VA has traditionally served a male population. Thus, many primary-care providers have not had to offer or coordinate these female-specific cancer screening services while providing comprehensive primary care. Currently, women Veterans are one of the most rapidly growing subpopulations of VA users. Relative to older women using VA, female Veterans returning from active duty and exiting the military who enter VA are comprised of a higher proportion of persons with military-related disabilities and higher proportion of racial and ethnic minorities.[12] Once female Veterans enter the VA, they qualify for all preventive care and female-specific cancer screening as mandated by the Veterans Health Care Act of 1992 (Public Law 102-585), allowing them to have a usual source of care regardless of insurance status and to be assigned a primary-care provider (who may or may not be a DWHP).

This study examines VA data nationally using an outpatient sample linked to health care providers to determine whether screening may differ for women who are assigned to a provider with a women's health focus. Our hypothesis is the following: women Veterans assigned to DWHPs will have higher levels of cervical and breast cancer screening than those assigned to non-DWHPs. This work addresses a gap in the general literature by defining the prevalence rates for female-specific cancer screening among women Veterans assigned to specific types of primary-care providers.

For cervical cancer screening criteria, national guidelines were updated in late 2012 by the American Society for Colposcopy and Cervical Pathology, and American Congress of Obstetricians and Gynecologists.[13] Each supported the conservative 3-year interval for cervical cytology evaluation for normal-risk young women (age, 21–30 y) without human papilloma virus (HPV) cotesting and the same 3-year interval for older women (age, 30–65 y) if HPV cotesting is not available. In this latter case, 5-year cervical cytology could also have been performed with accompanying HPV testing and been guideline appropriate, but

the conservative 3-year interval was supported by VA national guidelines during that same period.[14] For breast cancer screening criteria, VA guidelines followed the USPTF recommendations supporting routine screening at age 50 and repeated at 2-year intervals.[15] In 2012, these guidelines differed from other national organizations (American Cancer Society, National Cancer Institute, and American College of Obstetrics and Gynecology) who recommended yearly screening from age 40 onward.[13]

METHODS

Data Sources and Sample

For the patient sample, we used one national retrospective cohort of female Veterans in the VA health care system from the VHA Office of Informatics and Analytics *External Peer Review Program (EPRP)* during the fiscal year 2012 (FY12) comprised of general outpatient clinic users. As part of the VA quality performance process, EPRP selects monthly random samples of Veterans only from each VA medical center and uses third party chart review to document whether each Veteran has received appropriate and timely preventive and chronic disease care using quality indicators supported by national and/or VA-specific guidelines. All patients selected for review fit criteria for use of a recent VA clinic setting and also have at least 1 previous outpatient visit within the past 24 months.[14] Chart review abstractors use explicit criteria for assessing quality, completing evaluations, and generating valid estimates at VA regional and facility levels.[14,16]

Unique women Veteran patients from the EPRP FY12 dataset were then linked to assigned providers in Primary Care Management Module (PCMM) application that contains facility-specific data, patient panel information, and provider data for tracking VA workload. The patient cohort was linked to the database by using patient scrambled social security numbers, a code for the specific VA facility, and a time interval within the fiscal year to define the patient's relationship with a provider. Once the unique patients were linked to both a provider and a VA facility, the dataset was augmented with pertinent patient demographic and clinical characteristics previously associated with lower cervical and breast cancer screening rates.[15] Patients with incomplete data were not included. No imputation occurred.

For the provider sample, we used the Fiscal Year 2012 Designated Women's Health Provider: Assessment of Workforce Capacity survey conducted by the VHA Women's Health Services. For this survey, key informants at each VA Health Care System had to identify the DWHPs at all of the sites in their facility from a list of primary-care providers generated from the VA PCMM and add any provider names of DWHPs missing from this list. This mandatory survey was completed by 100% of the 140 VA Health Care Systems identified (for a total of 148 VA Medical Centers and 743 community-based outpatient clinics nationwide that provided primary care).

Patient demographic and clinical data on race, ethnicity, body mass index (BMI), and mental health diagnoses were included for this patient sample. Race and ethnicity data were merged with the analytic sample from the VA Corporate Data Warehouse, which has information from all electronic health data systems at each VA site. BMI was calculated from EPRP data using the following equation: weight (kg)/[height (m)]^2 with standard categories for

underweight, normal, overweight, and obese persons as defined by the Centers for Disease Control and Prevention.[17] A mental health variable was used to identify patients who had a diagnosis code during the previous 12 months starting with the month in which the patient was sampled for EPRP review. VA created this mental health diagnosis indicator for evaluating special clinic populations for quality of care measures nationally. The code includes mental health diagnoses covering categories of acute stress reactions and adjustment reactions, mood disorders, neurotic disorders, paranoid or psychotic states, personality disorders, substance use categories, and other diagnoses (conduct disorders, hyperkinetic states, eating disorders, etc.).

Outcome Measures

Our patient outcome variables included: (1) receipt of cervical cancer screening within a 3-year interval (ie, cervical cytology test) and (2) receipt of breast cancer screening in a 2-year interval (ie, mammogram). Our independent demographic and clinical patient variables included age, race (white vs. nonwhite), Hispanic ethnicity (yes, no), BMI, and mental health diagnosis (yes, no) as described above.

The primary variable being tested was provider type (DWHP vs. non-DWHP). Other provider variables included were the following: provider sex (female/male), provider class (physician: PH, nurse practitioner: NP, or physician's assistant: PA), proportion of providers who had a full-time position, total patient panel size, and whether the provider was exclusively scheduled for time in women's clinics (yes/no), provider exclusively scheduled for time in nonwomen's clinic settings (yes/no), or whether they were scheduled in both.

This study reports data for women Veterans aged 21 through 69 years. This approach complies with the recommended cervical and breast cancer screening and complies with Pap smear every 3 years screening starting at age 21 years and ending at 65 years for average-risk women in the United States as long as routine screening has occurred for the patient[18–21] and with combined mammography screening recommendations for the general population (40–69 y) based on combined recommendations from VA and US Preventive Services Task Force guidelines.[22–24]

Statistical Analyses

We initially compared patient characteristics by assignment to DWHPs versus non-DWHPs, and then subsequently compared provider characteristics by designation as DWHPs. In both sets of comparisons we used the 2-sided *t* test for continuous variables, the Wilcoxon Rank-Sum test for non-normal continuous measures (ie, percent female in provider panel), and the χ^2 statistic for categorical variables. We then calculated the screening rates for cervical and breast cancer among the overall sample and within the 2 provider designation types, adjusted only for survey measures (sample weighting, region, station, and clustering within primary provider).

To model the occurrence of each cancer screening measure, we used multiple logistic regression with adjustment for the forementioned survey measures. Models included additional adjustment for the following patient characteristics: age, race, ethnicity, BMI, and an indicator for any of several mental health diagnoses. The models also adjusted for the

following provider characteristics: sex, class (physician, nurse practitioner, or physician assistant), provider designation (DWHP vs. non-DWHP), and total number of patients in the provider's panel, ie, those patients assigned to a specific VA primary-care provider in PCMM.[25] We also tested 2 clinically relevant interactions involving DWHP status, specifically with provider sex and provider class within each multivariable model. Because neither interaction was significant, they were not included in the final multivariable models. All analyses were complete case and used procedures SURVEYFREQ, SURVEYMEANS, or SURVEYLOGISTIC in SAS v9.2 (SAS Institute Inc., Cary, NC), with a type I error of ≤5% (2-sided) defining statistical significance.

RESULTS

Table 1 demonstrates that within our analytic sample, 60.8% of women Veteran patients were assigned to a DWHP. Compared with those who were assigned to a non-DWHP, women Veterans with DWHPs were slightly younger (47.4 vs. 48.6 y, $P < 0.0001$), more likely to be white (69.8% vs. 66.7%, $P < 0.0001$), had nearly equivalent BMIs (30.4 vs. 30.7, $P = 0.003$) and Hispanic ethnicity and similar high prevalence of mental health diagnoses.

Table 2 shows that relative to non-DWHP, DWHPs were slightly younger (mean age, 50.8 vs. 52.9 y, $P < 0.0001$), more often female (78.4% vs. 46.5%, $P < 0.0001$), more often nurse practitioners (29.6% vs. 15.2%, $P < 0.0001$), and had more female patients in their panels (mean, 177 vs. 63, $P < 0.0001$). Again relative to non-DWHPs, more DWHPs were scheduled exclusively in women's clinics (47.8% vs. 4.8%, $P < 0.0001$) or both women's clinics and nonwomen's clinics (23.4% vs. 2.1%, $P < 0.001$) and fewer DWHPs were scheduled in only non-women's clinics (eg, general primary care or general medicine) (28.9% vs. 93.1%, $P < 0.0001$). These findings were similar to data reported in a prior comparison of satisfaction measures between DWHPs and non-DWHPs.[26] The overall cervical cancer screening rates in patients aged 21–64 years was higher among those assigned to DWHPs (94.4% vs. 91.9%, $P < 0.0001$) and the overall breast cancer screening rates using mammography in patients 40–69 years was also higher among those assigned to DWHPs (86.3% vs. 83.3%, $P < 0.0001$), as denoted in Table 3. When restricted to VA guidelines of women 50–69 years, the overall breast cancer screening in each older decade was significantly higher among women assigned a DWHP (50–59 y, 88.5% vs. 85.1%; and 60–69 y, 89.7% vs. 85.5%, $P < 0.0001$ for each).

Table 4 presents results from multiple logistic regression of cervical cancer screening. Factors associated with higher screening rates included assignment to a DWHP [odds ratio (OR), 1.26; 95% confidence interval (CI), 1.07–1.47] and female provider (OR, 1.43; 95% CI, 1.21–1.69). Factors significantly associated with lower cervical cancer screening included presence of mental health diagnosis (OR, 0.79; 95% CI, 0.68–0.91), and older age, that is, 50–59 years (OR, 0.60; 95% CI, 0.46–0.78) and 60–64 years (OR, 0.42; 95% CI, 0.31–0.56) compared with 21–29 years.

Continuing in Table 5, factors significantly associated in a multivariable regression model with higher breast cancer screening included assignment to DWHP (OR, 1.24; 95% CI, 1.10–1.39), female provider (OR, 1.21; 95% CI, 1.07–1.36), older ages including 50–59

years (OR, 1.59; 95% CI, 1.44–1.76) and 60–69 years (OR, 1.78; 95% CI, 1.56–2.03) compared with 40–49 years, overweight BMI (OR, 1.21; 95% CI, 1.07–1.37), obese BMI (OR, 1.34; 95% CI, 1.19–1.50), and nonwhite race (OR, 1.23; 95% CI, 1.11–1.36). The one patient factor significantly associated with lower levels of breast cancer screening was presence of a mental health diagnosis (OR, 0.80; 95% CI, 0.72–0.88).

DISCUSSION

Three main findings of clinical and policy significance arise in this study. First, women Veterans assigned to DWHPs in VA show significantly higher rates of cervical and breast cancer screening, although the clinical magnitude of this difference is not large. Second, women in VA experience high rates of overall cervical and breast cancer screening nationally indicating general success at screening most women for 2 common female-specific cancers. Third, women with mental health diagnoses show lower levels of both cervical and breast cancer screenings indicating a need to understand what factors promote or impair cancer screening in this Veteran subgroup.

We found that differences in both cervical and breast cancer screening rates between patients of DWHPs and non-DWHPs were not eliminated after adjusting for patient demographic and clinical characteristics or known provider characteristics. From a policy perspective certain environments may benefit from the availability of DWHP providers, particularly health care settings with little clinical experience with women or experiencing rapid, new growth in women Veteran numbers. Thus, increasing the availability of DWHPs for women Veterans in key settings may facilitate consistency or improve the rate of cervical and breast cancer screening locally.

Over the past 2 decades, VA experienced rapid transformations in health care delivery resulting in benchmarking status for multiple quality of care measures and emergence as a leader in health care delivery.[27–30] In addition, VA stands out as an early adopter of women's clinics for primary-care delivery[5,8,31] for one of the fastest growing segments of VA users—women Veterans.[32,33] Previous work on quality measures in VA has focused on the comparison of general screening measures between male and female Veterans in outpatient care such as immunizations, blood pressure, and diabetes screening, etc.[34,35] but has not directly targeted female-specific measures in women. Although a few published studies examined influences on cervical or breast cancer screening rates among VA patients by organizational factors, disability status, or overweight/obese (BMI) classification,[10,11,36] these did not examine VA provider type and its association with receipt of cervical and breast cancer screening among women Veterans.

In this national sample of women Veterans using VA, overall cervical cancer screening rates for women aged 21–64 years were very high (94.4% for DWHP and 91.9% for non-DWHP patients) with no change in the multivariate result for obesity status, race, or ethnicity. For these Veteran women, high cervical screening rates indicate that VA use can provide potential access to care regardless of insurance status, serve as a usual source of care, and offer equity in care despite potential lower economic status; all factors that are associated with lower cancer screening rates in our nation.[37] Our finding of decreased receipt of

screening among women with mental health diagnoses is comparable with other data also show mixed results for cervical screening rates with race/ethnicity, mental health status, disability, or obesity status.[38,39] In sum, our study used the conservative 3-year interval for cervical cancer screening evaluation that applies to young women (age, 21–30 y) and also to older women (age, 30–65 y) if HPV cotesting is not available. This 3-year interval showed consistent levels of cervical screening received regardless of provider type.

Separately, overall breast cancer screening rates for women aged 40–69 years in VA were very high (85.1%) and even higher when restricted to VA guidelines for women aged 50–59 or 60–69 years (87.1% and 88.0%, respectively). In the general population, mammography screening rates increased over the last 3 decades from 29% in 1987 to 70% in 2000[2] and up to 72.4% in 2010 overall using National Health Interview Survey Data[40] but never equaling or surpassing VA rates of patients assigned to DWHPs or non-DWHPs.

In our study, a diagnosis of a mental health condition was associated with lower rates of cancer screening for women Veterans. Prior studies have also found mixed results in the rates of cervical or breast cancer screening among women Veterans and in civilian women with mental illness.[9] Although Weitlauf et al[11] found that cervical cancer screening did not differ among women in VA with diagnoses of either post-traumatic stress disorder, depression, or no mental health diagnosis, the overall cervical screening rates were lower during the time period sampled (2003–2007). However, Yee et al[10] found that women with a mental health diagnosis had lower rates of breast cancer screening compared with women without a diagnosis. It remains unclear what the specific factors are that influence reproductive cancer screening in women with mental health disorders.[10] The civilian literature also shows mixed results of comparable or lower levels of cervical and breast cancer screening among women.[9] Some studies show that women with mental health diagnoses have similar cancer screening rates to women without these diagnoses, and other studies show lower screening rates without clear explanations of the factors contributing to the outcome results.[9] These results point to a need to explore how women use the VA outpatient system and whether patient adherence, provider specialty, utilization patterns, or organizational setting may contribute to differences or variations that show Veterans with mental health diagnoses appear more vulnerable due to lower screening.

In addition to the DWHP status, we found that NPs, compared with PHs, were less likely to have patients who complete breast cancer screening but no differences in cervical cancer screening. Few prior studies examine differences in cancer screening by provider type (NP, PA, and PH), however, 2 studies report increased cervical, breast, and colorectal screening with the use of mid-level provider combined with primary-care physicians or midlevels in comparison with physicians, and another reports potential benefits of including midlevels in cancer screening programs.[41–43] This finding may be important for VA—to address the potential scarcity of primary-care providers in the future, the VA may need to hire more NPs. The finding of lower breast cancer screening by NPs may represent a more complex process of clinical setting, location, and mammography availability and warrants further investigation. The rest of the literature is more specific to the type of physician and rates of cancer screening.[43–45]

Prior research on women indicates that variation in quality of care may be related to provider sex and use of women's health clinics.[5] Even after adjustment for DWHP and provider class we found that female providers had higher rates of both cervical and breast cancer screening. Because of the high correlations between DWHP and employment in a women's health clinic and percent of female patients in the provider's clinic, we were unable to test the independent associations of these 2 factors in our analyses.

Relative to normal and underweight women Veterans, our study found that overweight BMI status was associated with higher likelihood of receipt of both screening measures, and obese BMI status was associated with higher likelihood of breast cancer screening. Prior studies showed mixed results when examining cancer screening measures by BMI. For non-Veteran cohorts, higher BMI was associated with lower rates of cervical and breast cancer screening[36,46]; however, for Veteran cohorts, higher BMI was associated with higher screening rates for general and female-specific quality measures when compared with their normal weight counterparts.[10]

Compared with men, women in the active duty military represent higher proportions of racial and ethnic minorities, and our finding that nonwhite race was associated with better breast cancer screening rates is important in this Veteran subgroup who are younger and more often nonwhite than male Veterans. This finding should promote further inquiry as it adds to the literature on factors associated with the presence or absence of racial/ethnic disparities.[47,48]

Several limitations remain. Our findings are limited to EPRP data and may not be generalizable outside the VA. Our sample had a high prevalence of mental health issues, which may not be true in other primary-care settings. In our analyses, we incorporated a mental health variable that combines several diagnoses and was created previously for assessing VA quality measures. We do not know if the individual mental health indicators are consistently associated with lower female-specific cancer screening in women Veterans. However, it is impressive to note that the overall cervical and breast cancer screening remained high across the analytic sample even with a high prevalence of mental health diagnoses.

In our study, nearly 61% of women Veterans received care from a DWHP. According to results from the FY12 DWHP survey, only 40% of DWHPs had at least 10% women patients in their primary-care panel, so other factors (eg, women's health training, completing the Mini-Residency in Women's Health, prior clinical experience, precepting with an experienced women's health clinician) may have contributed to determining which providers were considered DWHPs. Future studies may be able to examine the importance of these individual components of training and experience on the patients' overall experience with outpatient care. The reasons for higher levels of screening rates among patients linked to DWHPs could include greater emphasis on sex-specific and general prevention by those providers, ownership of performing the screening and/or consistent documentation of the breast and cervical cancer screening, patients choosing to see their specific providers more often, or organizational factors in the clinical setting. In summary, women in VA have high prevalence rates for receipt of both cervical and breast cancer screening, and women patients

assigned to a DWHP have slight yet significantly improved levels of care for both of these measures. Ongoing work to evaluate the presence of DWHPs in various VA medical centers or community-based clinics may be warranted to understand processes for improving quality. Moreover, while female-specific cancer screening rates are high among women in VA, we did not evaluate how non–female-specific quality of care measures compare between these 2 types of providers. Evaluating sex neutral measures (preventive and chronic disease measures) will be the next step for understanding whether other benefits occur for patients seen by DWHPs.

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References

1. Veterans Health Administration. Department of Veterans AffairsedVHA Handbook 1330.01: Health Care Services for Women Veterans. 2010. Comprehensive Primary Care for Women Veterans, pages 10-11; p. 1-28.2010; Washington, DC
2. American Cancer Society. Breast Cancer Facts & Figures 2013–2014. Atlanta, GA: American Cancer Society Inc; 2013.
3. Pace LE, He Y, Keating NL. Trends in mammography screening rates after publication of the 2009 US Preventive Services Task Force recommendations. Cancer. 2013; 119:2518–2523. [PubMed: 23605683]
4. Xu F, Town M, Balluz LS, et al. Surveillance for certain health behaviors among states and selected local areas—United States, 2010. MMWR CDC Surveill Summ. 2013; 62:1–247.
5. Littman AJ, Koepsell TD, Forsberg CW, et al. Preventive care in relation to obesity: an analysis of a large, national survey. Am J Prev Med. 2011; 41:465–472. [PubMed: 22011416]
6. Yancy WS, McDuffie JR, Stechuchak KM, et al. Obesity and receipt of clinical preventive services in veterans. Obesity. 2010; 18:1827–1835. [PubMed: 20203629]
7. Chang VW, Asch DA, Werner RM. Quality of care among obese patients. JAMA. 2010; 303:1274–1281. [PubMed: 20371786]
8. Littman AJKT, Forsberg CW, Haselkorn JK, et al. Preventive services in veterans related to disability. J Rehabil Res Dev. 2012; 49:339–350. [PubMed: 22773194]
9. Aggarwal A, Pandurangi A, Smith W. Disparities in breast and cervical cancer screening in women with mental illness: a systematic literature review. Am J Prev Med. 2013; 44:392–398. [PubMed: 23498106]
10. Yee EF, White R, Lee S-J, et al. Mental illness: is there an association with cancer screening among women veterans? Women's Health Issues. 2011; 21:S195–S202. [PubMed: 21724141]
11. Weitlauf JC, Jones S, Xu X, et al. Receipt of Cervical Cancer Screening in Female Veterans: Impact of Posttraumatic Stress Disorder and Depression. Women's Health Issues. 2013; 23:e153–e159. [PubMed: 23660429]
12. Frayne, SM., Phibbs, CS., Friedman, SA., et al. Sourcebook: Women Veterans in the Veterans Health Administration Volume 2 Sociodemographics and Use of VHA and Non-VA Care (Fee). Washington DC: Women's Health Evaluation Initiative, Women's Health Services, Veterans Health Administration, Department of Veterans Affairs; 2012.

13. WebMD. When to get a screening mammogram. Reviewed September 19 2011. http://www.webmd.com/breast-cancer/features/starting-mammography-screening?page=4. Accessed Jan 22, 2014
14. US Department of Veterans Affairs. EPRP Technical Manual Fiscal Year 2012, Quarter 4, July 15, 2012. Office of Analytics and Business Intelligence, Veterans Health Administration; http://vaww.car.rtp.med.va.gov/programs/pm/pmPolicyTechManual.aspx. Accessed November 1, 2013
15. Centers for Disease Control and Prevention. Breast Cancer Screening Rates. 2012. http://www.cdc.gov/cancer/breast/statistics/screening.htm. Accessed January 22, 2014
16. US Department of Veterans Affairs. External Peer Review Program (EPRP), VHA Directive 2008-032. Veterans Health Administration; Jun 23. 2008 Expires June 30, 2013
17. Centers for Disease Control and Prevention. Healthy Weight—it's not a diet, it's a lifestyle!. 2011. Available at: http://www.cdc.gov/healthy-weight/assessing/bmi/adult_bmi/index.html?s_cid=tw_ob064. Accessed February 2, 2014
18. Centers for Disease Control and Prevention. Cervical Cancer Screening Guidelines for Average-Risk Women. 2012. Available at: http://www.cdc.gov/cancer/cervical/pdf/guidelines.pdf. Accessed January 22, 2014
19. Saslow D, Solomon D, Lawson H, et al. American Cancer Society, American Society for Colposcopy and Cervical Pathology, and American Society for Clinical Pathology screening guidelines for the prevention and early detection of cervical cancer. Cancer J Clin. 2012; 62:147–172.
20. Moyer V. Screening for Cervical Cancer: US Preventive Services Task Force Recommendation Statement. Ann Intern Med. 2012; 156:880–891. [PubMed: 22711081]
21. Smith R, Manassaram-Baptiste D, Brooks D, et al. Cancer screening in the United States, 2014: a review of current American Cancer Society guidelines and current issues in cancer screening. Cancer J Clin. 2014; 64:30–51.
22. U.S. Preventive Services Task Force (USPSTF). Screening for Breast Cancer: US Preventive Services Task Force Recommendation Statement. Ann Intern Med. 2009; 151:716–726. [PubMed: 19920272]
23. US Preventive Services Task Force (USPSTF). Screening for breast cancer: US Preventive Services Task Force recommendation statement, December 2009 addendum. Ann Intern Med. 2009; 151:716–726. [PubMed: 19920272]
24. American College of Obstetricians and Gynecologists (ACOG). Breast cancer screening. 2011. American College of Obstetricians and Gynecologists (ACOG), ACOG practice bulletin, no. 122
25. Fihn, S. Direct Communication. Office of Analytics and Business Intelligence; 2014.
26. Bastian L, Trentalange M, Murphy TE, et al. Association between women Veterans' experiences with VA outpatient health care and designation as a women's health provider in primary care clinics. Womens Health Issues. 2014; 24:605–612. [PubMed: 25442706]
27. Jha AK, Perlin JB, Kizer KW, et al. Effect of the transformation of the Veterans Affairs Health Care System on the quality of care. N Engl J Med. 2003; 348:2218–2227. [PubMed: 12773650]
28. Ross JS, Keyhani S, Keenan PS, et al. Use of recommended ambulatory care services: is the Veterans Affairs quality gap narrowing? Arch Intern Med. 2008; 168:950–958. [PubMed: 18474759]
29. Bean-Mayberry BA, Chang CC, McNeil MA, et al. Ensuring high-quality primary care for women: predictors of success. Womens Health Issues. 2006; 16:22–29. [PubMed: 16487921]
30. Bean-Mayberry B, Yano EM, Bayliss N, et al. Federally funded comprehensive women's health centers: leading innovation in women's healthcare delivery. J Womens Health. 2007; 16:1281–1290.
31. Yano EM, Goldzweig C, Canelo I, et al. Diffusion of innovation in women's health care delivery: the Department of Veterans Affairs' adoption of women's health clinics. Womens Health Issues. 2006; 16:226–235. [PubMed: 17055375]
32. Friedman SA, Phibbs CS, Schmitt SK, et al. New women veterans in the VHA: a longitudinal profile. Womens Health Issues. 2011; 21:S103–S111. [PubMed: 21724129]
33. US Department of Veterans Affairs. Women Veterans Health Care. 2014. Available at: http://www.womenshealth.va.gov/. Accessed December 3, 2013

34. Bean-Mayberry, B., Huang, C., Batuman, F., et al. Systematic Review of Women Veterans' Health Research: 2004–2008. Los Angeles, CA: VA Evidence Synthesis Program; 2010. VA HSR&D Evidence Synthesis Report
35. Jha AK, Perlin JB, Steinman MA, et al. Quality of ambulatory care for women and men in the Veterans Affairs Health Care System. J Gen Intern Med. 2005; 20:762–765. [PubMed: 16050889]
36. Goldzweig CL, Balekian TM, rolon C, et al. The state of women veterans' health research. Results of a systematic literature review. J Gen Intern Med. 2006; 21(suppl 3):S82–S92. [PubMed: 16637952]
37. Brown ML, Klabunde CN, Cronin KA, et al. Challenges in meeting healthy people 2020 objectives for cancer-related preventive services, National Health Interview Survey, 2008 and 2010. Prev Chronic Dis. 2014; 11:E29. (1–11). [PubMed: 24576396]
38. Horner-Johnson W, Dobbertin K, Andresen EM, et al. Breast and cervical cancer screening disparities associated with disability severity. Womens Health Issues. 2014; 24:e147–e153. [PubMed: 24439941]
39. Andresen EM, Peterson-Besse JJ, Krahn GL, et al. Pap, mammography, and clinical breast examination screening among women with disabilities: a systematic review. Womens Health Issues. 2013; 23:e205–e214. [PubMed: 23816150]
40. Centers for Disease Control and Prevention. Cancer Screening – United States 2010. Morb Mortal Wkly Rep. 2012; 61:41–45.
41. Reed CA, Selleck CS. The role of midlevel providers in cancer screening. Med Clin North Am. 1996; 80:135–144. [PubMed: 8569292]
42. Kepka D, Smith A, Zeruto C, et al. Is provider type associated with cancer screening and prevention: advanced practice registered nurses, physician assistants, and physicians. BMC cancer. 2014; 14:233–241. [PubMed: 24685149]
43. Wallace AE, MacKenzie TA, Weeks WB. Women's primary care providers and breast cancer screening: who's following the guidelines? Am J Obstet Gynecol. 2006; 194:744–748. [PubMed: 16522407]
44. Lewis BG, Halm EA, Marcus SM, et al. Preventive services use among women seen by gynecologists, general medical physicians, or both. Obstet Gynecol. 2008; 111:945–952. [PubMed: 18378755]
45. Abenhaim HA, Titus-Ernstoff L, Cramer DW. Ovarian cancer risk in relation to medical visits, pelvic examinations and type of health care provider. CMAJ. 2007; 176:941–947. [PubMed: 17389442]
46. Østbye T, Taylor DH Jr, Yancy WS Jr, et al. Associations between obesity and receipt of screening mammography, Papanicolaou tests, and influenza vaccination: results from the Health and Retirement Study (HRS) and the Asset and Health Dynamics Among the Oldest Old (AHEAD) Study. Am J Public Health. 2005; 95:1623. [PubMed: 16051935]
47. Saha, S., Freeman, M., Toure, J., et al. Racial and Ethnic Disparities in the VA Healthcare System: A Systematic Review VA Evidence-based Synthesis Program Reports. Washington (DC): Department of Veterans Affairs (US); 2007.
48. Quiñones, AR., O'Neil, M., Saha, S., et al. Interventions to Reduce Racial and Ethnic Disparities. 2011. VA-ESP Project #05-225

TABLE 1

Characteristics of Women Veterans by Provider Status

Variables	Assigned to Provider		P*
	DWHP (N = 22,561)	Non-DWHP (N = 14,567)	
Patient Demographics			
Age in years [mean (SD)]	47.4 (11.6)	48.6 (11.3)	< 0.0001
Age group [n (%)] (y)			
21–29	2078 (9.2)	1080 (7.4)	
30–39	3948 (17.5)	2261 (15.5)	
40–49	5380 (23.8)	3373 (23.2)	
50–59	7697 (34.1)	5282 (36.3)	
60–69	3458 (15.3)	2571 (17.6)	
Body mass index [mean (SD)]	30.4 (7.0)	30.7 (7.2)	0.0031
Body mass index [n (%)]			
Underweight/normal < 25	5091 (23.0)	3150 (22.0)	
Overweight 25–29.9	6256 (28.3)	4144 (29.0)	
Obese 30+	10,794 (48.8)	7018 (49.0)	
Race [n (%)]			
White	15,759 (69.8)	9716 (66.7)	< 0.0001
Nonwhite	6802 (30.2)	4851 (33.3)	
Ethnicity, Hispanic [n (%)]	1115 (5.0)	743 (5.2)	0.4187
Mental health diagnosis [n (%)]	16,271 (72.1)	10,478 (71.9)	0.6899

External Peer Review Data (2012).

*t test for continuous, χ^2 test for categorical measures.

DWHP indicates Designated Women's Health Provider.

TABLE 2

Characteristics of Providers Linked to Patient Data

Provider Characteristics	Provider Designation (N = 5012)		
	DWHP (n = 1575)	Non-DWHP (n = 3437)	*P**
Age [mean (SD)]	50.8 (9.0)	52.9 (9.5)	< 0.0001
Sex [n (%)]			< 0.0001
Female	1005 (78.4)	1328 (46.5)	
Male	277 (21.6)	1527 (53.5)	
Provider class [n (%)][w]			< 0.0001
Physician	998 (63.4)	2682 (78.0)	
Nurse practitioner	467 (29.6)	521 (15.2)	
Physician's assistant	110 (7.0)	234 (6.8)	
Proportion full-time [mean (SD)]	0.66 (0.37)	0.67 (0.36)	0.3138
Total patient panel [mean (SD)]	1237.7 (618.1)	1269 (637.8)	0.1022
Female	177.1 (213.6)	63.0 (68.0)	< 0.0001
Male	1046.1 (652.2)	1206.4 (614.9)	< 0.0001
% Female [median (IQR)]	7.8 (4.8–16.7)	4.8 (2.4–6.6)	< 0.0001≠
Scheduled clinic type [n (%)]			
Only in women's clinics	752 (47.8)	164 (4.8)	< 0.0001
Only in nonwomen's clinics	455 (28.9)	3201 (93.1)	< 0.0001
Both in women's and nonwomen's clinics	368 (23.4)	72 (2.1)	< 0.0001

External Peer Review Program (2012).

*t test for continuous, χ^2 for categorical measures.

†Providers who are in the recognized provider classes (PH, NP, PA) and had active privileges during the survey period (2012).

≠Wilcoxon rank-sum test for non-normally distributed measures.

DWHP indicates Designated Women's Health Provider; IQR, interquartile range.

TABLE 3

Unadjusted Female-specific measures by Provider Status

	Assigned to Provider				
	DWHP		Non-DWHP		
Female-specific Measures*	**n (%)**	**N**	**n (%)**	**N**	***P***
Cervical CA screening (y)					
21–64	14,872 (94.4)	15,762	8792 (91.9)	9566	< 0.0001
Breast CA screening (y)					
40–69	12,203 (86.3)	14,147	7742 (83.3)	9299	< 0.0001
40–49	4847 (82.5)	5872	2923 (80.2)	3645	0.0158
50–59	4819 (88.5)	5446	3120 (85.1)	3667	< 0.0001
60–69	2537 (89.7)	2828	1700 (85.5)	1988	< 0.0001

*Count (n) and percent completed of those eligible (N). Adjusted for survey sampling weight and clustering within region, station, and provider. Rao-Scott χ^2 test for categorical data.

DWHP indicates Designated Women's Health Provider.

TABLE 4

Factors Associated With Receipt of Cervical Cancer Screening in Women Veterans (N = 20,339)

Effects	Odds Ratio	Lower 95% CL	Upper 95% CL	*P*
Patient (age 21–64 y)				
Age group (y)				
30–39 vs. 21–29	0.838	0.634	1.107	0.2140
40–49 vs. 21–29	0.786	0.600	1.031	0.0819
50–59 vs. 21–29	0.598	0.461	0.775	0.0001
60–64 vs. 21–29	0.415	0.310	0.556	< 0.0001
BMI *				
Overweight vs. underweight/normal	1.234	1.044	1.458	0.0137
Obese vs. underweight/normal	1.090	0.934	1.273	0.2742
Race				
Nonwhite vs. white	1.163	1.003	1.350	0.0461
Ethnicity				
Hispanic vs. non-Hispanic	0.877	0.682	1.129	0.3093
Mental health flag				
Yes vs. no	0.789	0.682	0.913	0.0015
Provider				
Sex				
Female vs. male	1.430	1.207	1.694	< 0.0001
Class				
NP vs. PH	1.094	0.901	1.329	0.3655
PA vs. PH	1.040	0.769	1.405	0.7998
Designation				
DWHP vs. Non-DWHP	1.255	1.071	1.470	0.0050

Model adjusted for survey sampling weight and clustering within region, station, and provider. Additionally (covariate) adjusted for total provider panel size.

* Underweight/normal (BMI < 25), overweight (BMI 25–29.9), obese (BMI 30+).

BMI indicates body mass index; CL, confidence limit; DWHP, Designated Women's Health Provider; NP, nurse practitioner; PA, physician's assistant; PH, physician.

TABLE 5

Factors Associated With Receipt of Breast Cancer Screening in Women Veterans (N = 19,660)

Effects	Odds Ratio	Lower 95% CL	Upper 95% CL	*P*
Patient (age 40–69 y)				
Age group (y)				
50–59 vs. 40–49	1.593	1.438	1.765	< 0.0001
60–69 vs. 40–49	1.779	1.560	2.030	< 0.0001
BMI *				
Overweight vs. underweight/normal	1.209	1.069	1.368	0.0025
Obese vs. underweight/normal	1.336	1.192	1.497	< 0.0001
Race				
Nonwhite vs. white	1.229	1.109	1.361	< 0.0001
Ethnicity				
Hispanic vs. non-Hispanic	0.937	0.744	1.180	0.5801
Mental health flag				
Yes vs. no	0.795	0.716	0.884	< 0.0001
Provider				
Sex				
Female vs. male	1.210	1.073	1.365	0.0020
Class				
NP vs. PH	0.869	0.757	0.996	0.0442
PA vs. PH	1.111	0.897	1.374	0.3347
Designation				
DWHP vs. Non-DWHP	1.238	1.104	1.389	0.0003

Model adjusted for survey sampling weight and clustering within region, station, and provider. Additionally (covariate) adjusted for total provider panel size.

* Underweight/normal (BMI < 25), overweight (BMI 25–29.9), obese (BMI 30+).

BMI indicates body mass index; CL, confidence limit; DWHP, Designated Women's Health Provider; NP, nurse practitioner; PA, physician's assistant; PH, physician.