



Original article

Gender Differences in Smoking and Smoking Cessation Treatment: An Examination of the Organizational Features Related to Care

Melissa M. Farmer, PhD^{a,b,*}, Danielle E. Rose, PhD^a, Deborah Riopelle, MSPH^a, Andy B. Lanto, MA^a, Elizabeth M. Yano, PhD, MSPH^{a,b}

^aVA Health Services Research and Development Center of Excellence, Center for the Study of Healthcare Provider Behavior, VA Greater Los Angeles Healthcare System, Los Angeles, California

^bDepartment of Health Services, UCLA School of Public Health, Los Angeles, California

Article history: Received 1 December 2010; Received in revised form 18 April 2011; Accepted 20 April 2011

A B S T R A C T

Objectives: Veterans experience a particularly heavy burden with smoking rates higher than the general population, and the smoking prevalence for women Veterans has increased in recent years. We examined differences in smoking prevalence and treatment by gender for Veterans receiving at least some of their care at a VA facility, and examined the degree to which organizational factors may be associated with reductions in gender disparities in smoking cessation treatment.

Methods: We merged national organizational-level data focused on primary care (sites = 225) and women's health (sites = 195) with patient-level survey data ($n = 15,033$ smokers). Organizational measures focused on smoking cessation-specific structure and processes in primary care and women's health. Primary outcomes were patient-reported receipt of smoking cessation treatments—advised to quit, medication recommendation, and other treatment recommendation. We used multi-level, random-intercept logistic regression.

Results: In 2007, 29% of women and 23% of men were smokers. Overall, 83% of smokers reported they had been advised to quit, 62% recommended medications, and 60% recommended other treatments. Women were more likely to report being advised to quit (odds ratio, 1.33; 95% confidence interval, 1.07–1.64) but equally likely as men to have medications or other treatment recommended. Organizational factors did not eliminate the gender differences in being advised to quit.

Conclusion: Despite having equivalent or higher smoking cessation treatment rates, women Veterans were more likely to smoke than men. With the rapid growth of women entering VA care, the need for effective gender-focused and gender-sensitive smoking cessation care arrangements is critical for the future health of women who have served.

Published by Elsevier Inc.

Background

Smoking is the leading preventable cause of death and disease in the United States causing approximately 443,000 deaths each year (Centers for Disease Control and Prevention,

2010). Although the United States has experienced significant declines in smoking prevalence over the last 30 years, cigarette smoking continues to be widespread, and since 2005, the decline has actually stalled (Centers for Disease Control and Prevention, 2010). Unfortunately, Veterans experience a particularly heavy burden with smoking rates higher than the general population (27% vs. 21%), and recent data suggest that the smoking rate is actually increasing among active duty military personnel (Bastian & Sherman, 2010; Brown, 2010).

Although historically the smoking prevalence is higher for men than women in the general population (Centers for Disease Control and Prevention, 2010), the smoking rate among young women has been rising, causing the national gender gap favoring women to shrink. However, the smoking rates for women Veterans tell a different story. Over a decade ago, the prevalence

Funded by the Department of Veterans Affairs, Washington, DC (Project IIR 04-380) and a locally initiated project grant from the VA Health Services Research & Development Center of Excellence for the Study of Healthcare Provider Behavior, Sepulveda, CA (# LIP 65-127). Dr. Yano's time was covered by a VA HSR&D Research Career Scientist award (# RCS 05-195).

* Correspondence to: Melissa M. Farmer, PhD, HSR&D, Center for the Study of Healthcare Provider Behavior, VA Greater Los Angeles Healthcare System, 16111 Plummer Street (152) Sepulveda, CA 91343. Phone: 818-891-7711, ext 5475; fax: 818-895-5838.

E-mail address: Melissa.Farmer@va.gov (M.M. Farmer).

of smoking among women Veterans was significantly higher than nonveteran women and equal to that of Veteran men (Miller et al., 2001). More recent data from the Behavioral Risk Factor Surveillance System showed that smoking prevalence decreased between 2003 and 2007 for both Veterans and nonveterans, except for Veteran women who actually had a slight increase (Brown, 2010).

Women smokers have unique health effects associated with smoking. Cigarette smoking is the major cause of lung cancer—the leading cause of death ahead of breast cancer for women (American Cancer Society, 2010). Women who smoke may also be at higher risk for other cancers, such as bladder, pancreas, liver, colorectal and cervical cancer, as well as serious cardiovascular issues than women who do not smoke (U.S. Surgeon General, 2001). There are also numerous reproductive issues and pregnancy risks associated with women smoking (Salihu, Aliyu, Pierre-Louis, & Alexander, 2003).

Smoking cessation has one of the lowest treatment delivery rates of all preventive services (Coffield et al., 2001), and studies have shown that smoking women are less likely to initiate abstinence and more likely to relapse than men (Bohadana, Nilsson, Rasmussen, & Martinet, 2003; Piper et al., 2010; Ward, Klesges, Zbikowski, Bliss, & Garvey, 1997). Smoking cessation has been a national focus in the VA since the launch of the current performance measurement system in the mid-1990s. Consistent with those of other national organizations, the VA/Department of Defense guidelines for smoking cessation recommend all patients interested in quitting should get medications, counseling, and follow-up in the most intensive setting they are willing to attend (Sherman & Talcott, 2003). In a regional sample, women Veteran smokers were equally likely to report being advised to quit smoking or to be referred to a smoking cessation program, but less likely than men to be offered medications. At one year follow-up, women Veterans were less likely to have successfully quit smoking (Sherman, Fu, Joseph, Lanto, & Yano 2005).

Despite these early warning signs with respect to equitable smoking cessation care and outcomes, little is known about delivery of VA smoking cessation services for women Veterans nationally. With the rapidly growing population of women Veterans being discharged from the military and being seen in VA health care settings, ensuring the delivery of guideline-concordant smoking cessation care for women Veterans is a vital component of the VA's preventive care agenda. Furthermore, to provide support for the design of quality improvement

interventions, our need to understand the determinants of variations in smoking cessation care is immediate. Given that smoking cessation is one of the VA's biggest public health challenges, we examined differences in smoking prevalence and smoking cessation treatment, including brief counseling and recommendations for medications and/or other treatment by gender, and then examined the degree to which organizational factors—primary care smoking cessation-specific structures and processes and women's health structures—may be associated with reductions in gender disparities in smoking cessation treatment.

Methods

Conceptual Model

The conceptual model for this work was grounded in a clinically anchored version of the Donabedian model of structure–process–outcome (Donabedian, 1980, 1988; Rubenstein, Mittman, Yano, & Mulrow, 2000), wherein the structure of care includes a broad range of features that act upon but are outside of the direct provider–patient encounter (Figure 1). Based on this model, we examined the links between organizational structure and the processes of care for smoking cessation, while controlling for environmental factors (e.g., region).

Data Sources

To address organizational structure, we used two national VA organizational surveys: The Primary Care Module of the VA Clinical Practice Organizational Survey (CPOS), and the Senior Women's Health Clinician Module of the VA Survey of Women Veterans Health Programs and Practices (also called "Describing VA Health Services for Women Veterans" [DVAHS]). Both were administered in 2007 to the census of VA facilities meeting caseload and workload criteria. The Primary Care Module of CPOS was fielded among primary care directors at geographically distinct VA medical centers (VAMCs) and community-based outpatient clinics (CBOCs) serving 4,000 or more unique outpatients and delivering 20,000 or more outpatient visits in the year before survey administration (90% response rate; $n = 225$). The Senior Women's Health Clinician Module of DVAHS was fielded to senior women's health clinicians (i.e., identified by VA leadership at each facility as the women's health clinician most familiar with services at their location) also at geographically distinct VA facilities (VAMCs and CBOCs) serving 300 or more

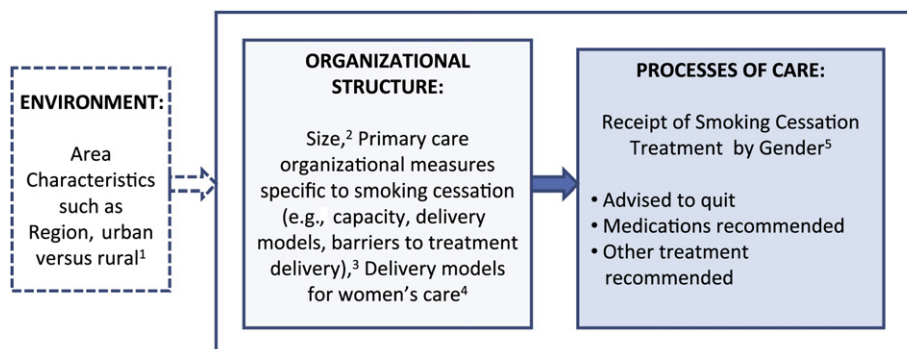


Figure 1. Conceptual model for receipt of smoking cessation treatment. Data sources include: ¹Area Resource File; ²VA National Patient Care Data; ³VA Clinical Practice Organizational Survey (CPOS), Primary Care Module 2007; ⁴VA Survey of Women Veterans Health Programs and Practices (DVAHS), Senior Women's Health Clinician Module 2007; and ⁵Survey of Healthcare Experiences of Patients (SHEP) 2007.

women Veterans in the year before survey administration (86% response rate; $n = 195$).

We also used site-level patient volume as a measure of facility size, constructed from patient utilization data for fiscal year 2007 (October 1, 2006, through September 30, 2007) from the VA National Patient Care Database, which is comprised of all VA patient encounters systemwide (Austin data). To adjust for environment, we examined area factors such as U.S. Census region (Northeast, South, West, Midwest) and large urban/rural location (Metro area 1 million or larger versus smaller locations) from the 2008 Area Resource File (Health Resources and Services Administration, 2008).

For smoking cessation processes of care, we obtained patient-level survey data from the VA Office of Quality and Performance's Survey of Healthcare Experiences of Patients (SHEP). SHEP is administered by mail to a random sample of Veterans with at least one visit to the VA clinic in the previous month. In fiscal year 2007, SHEP included 237,828 patients with a 55% response rate. Gender and patient age also came from SHEP.

Creation of the Analytic Sample

We created a hierarchical analytic dataset by merging the 2007 CPOS Primary Care Module, the 2007 DVAHS Senior Women's Health Clinician Module, Austin site-level volume, Area Resource File data, and the 2007 SHEP data. To examine smoking cessation treatment, we limited our sample to smokers identified in SHEP as patients who reported smoking every day or some days, or who were recent quitters (within the last year). Our final sample included 15,033 smokers (6% women) for the CPOS merge (the Primary Care Cohort) and 11,338 smokers for the DVAHS merge (the Women's Health Cohort; 6% women; Figure 2).

Measures

We examined a number of organizational factors covering both primary care and women's health delivery. For primary care (CPOS), measures specific to smoking cessation treatment included resource sufficiency—in the past year, how much of the time has service capacity been sufficient to meet patients' needs for smoking cessation treatment services (always, usually, sometimes, rarely or never)—and whether the care for diagnosed tobacco users is typically managed by the primary care provider (versus managed by the mental health specialist or referred to specialty clinic/program). Barriers to treatment included the average wait time for primary care patients to get access to specialty smoking cessation services (less than a week versus longer), and if there are restrictions on primary care providers' ability to prescribe medications (e.g., bupropion).

For women's health organizational factors, we examined whether sites had a primary care clinic specifically for the delivery of primary care services to women Veterans that was separate from general primary care clinics. At the sites with separate clinics, we examined the proportion of women Veterans who are assigned to the same-gender provider (all or almost all/90%–100% versus less). We also examined whether the site had a designated women's health provider in the outpatient mental health clinic to whom women Veterans were preferentially assigned.

We constructed three patient-level outcome measures based on patient-reported receipt of smoking cessation treatment including brief counseling and recommendations for medication

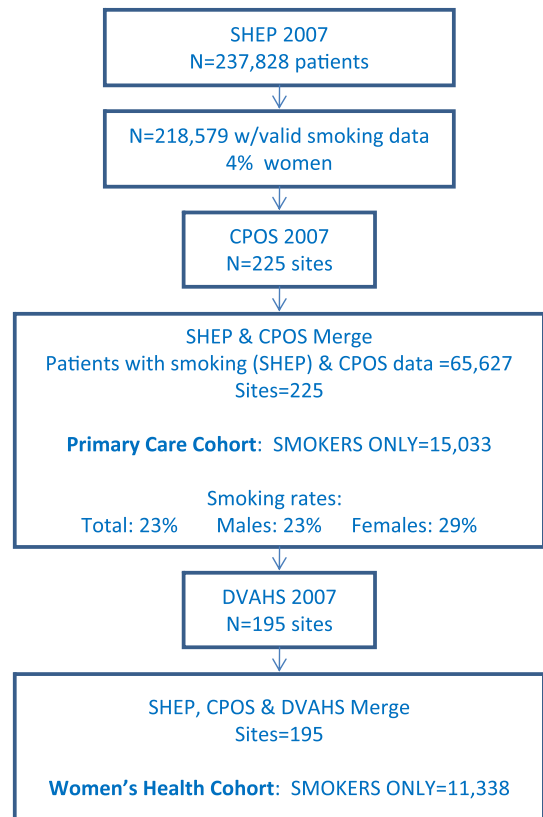


Figure 2. Flow chart of data merges for final analytic samples.

and/or other treatment from SHEP. In the survey, patients were asked on how many visits in the past 12 months: 1) Were you advised to quit smoking by a VA doctor or other VA health provider? 2) Was medication recommended or discussed to assist you with quitting smoking (e.g., nicotine gum, patch, nasal spray, inhaler, prescription medication)? and 3) Did your VA doctor or VA health provider recommend or discuss methods and strategies (other than medication) to assist you with quitting smoking? For each question, we constructed a dichotomous outcome indicator of receipt of treatment/recommendation at one or more visits (1 = yes, 0 = otherwise).

Analytic Strategy

We utilized multi-level model, random-intercept logistic regression to examine patient- and organizational-level predictors of smoking cessation treatment. To examine gender disparities in treatment, we ran a base model for each of the three outcome measures (advised to quit, medication recommended, other treatment recommended) indicating treatment at one or more visits, including gender, region, large urban/rural, and controlling for age and facility size to account for sampling. For models demonstrating a significant gender effect, we ran models additionally including each of the organizational factors to see how gender effects changed when accounting for organizational features. The Primary Care Cohort was used for models that included primary care organizational measures, and the Women's Health Cohort was used for models with women's health program measures (Figure 2).

Results

VA Facility Characteristics and Facility Variations in Smoking Cessation Treatment

Site-level characteristics are shown on Table 1. The average patient volume for the sites was over 25,000. Forty percent of sites were in the South, compared with 25% in the Midwest, 18% in the West, and 16% in the Northeast; 40% were in large urban areas. Only 19% of the VA sites reported capacity to meet patients' needs for smoking cessation treatment services was always sufficient in the last year. At 61% of the sites, the management of the patient's care for a diagnosed smoker/tobacco user was done mainly by the primary care provider. Overall, only 22% of sites reported a wait time of less than 1 week for smoking cessation services, and 29% reported site restrictions on primary care providers' abilities to prescribe smoking cessation medications such as bupropion.

In terms of women's health program characteristics, 41% of sites reported they had a women's health clinic for primary and gender-specific care, whereas an additional 29% reported having a women's clinic for annual gender-specific examinations. At those sites that reported having a clinic specifically for the delivery of primary care services to women, two-thirds reported that all or almost all of the women Veterans were assigned to female providers. Only 38% of all sites reported having a designated women's health provider in their

outpatient mental health clinic to whom women were preferentially assigned (Table 1).

Smoking Prevalence and Characteristics of Veterans Served by VA Facilities

In the analytic sample including all patients in 2007 ($n = 65,627$), 23% of patients were smokers. As shown in Table 2, smoking rates varied significantly by gender with 29% of women compared with 23% of men being smokers ($p < .001$). The mean age of smokers was 60, and women were younger on average, with a mean age of 50 (compared with 61 for men); 46% of women were age 50 or younger compared with only 12% of men. Other sample characteristics (data not shown) reveal that most of the sample was white (77%). Almost half (48%) of the smokers were married, and women were less likely to be married than men (35% vs. 48%). Women were more likely to have at least some college (71%) compared with men (48%). Women were more likely to be employed (37% for women versus 27% for men), whereas men were more likely to be retired than women (36% for men compared with 15% for women). For VA health services utilization, men and women both averaged a little more than two visits in the last 12 months.

Gender Differences in Smoking Cessation Treatment

In 2007, Table 2 shows VA smoking cessation treatment and recommendation rates by gender. Overall, 83% of smokers reported they had been advised to quit one or more times, 62% reported medications had been recommended, and 60% reported other treatments had been recommended one or more times. In the breakdown by gender, 87% of women reported they had been advised to quit one or more times compared with 83% of men ($p < .01$). There were no significant differences in medication or other treatment recommendations by gender. There was substantial variation across site with facility level rates ranging from 66% to 97% for advised to quit at one or more visits, 39% to 84% for medication recommendations, and 29% to 83% for other treatment recommendations (results not shown).

The multivariate results predicting receipt of smoking cessation treatment and recommendations controlling for age,

Table 1
Organizational Characteristics in 2007

VA Facilities Characteristics	Facility ($n = 225$)
Patient volume (mean number of patients)	25,359
Region	
Northeast	16%
Midwest	25%
South	40%
West	18%
Large urban (versus rural)	40%
Primary Care: Smoking Cessation Specific Organizational Measures	Facility ($n = 225$)
In past year, service capacity was always sufficient for smoking cessation treatment services (i.e., counseling, group sessions, pharmacotherapy).	19%
Care for diagnosed smoker/tobacco user is mainly managed by primary care provider (versus managed by mental health specialist or referred to specialty program).	61%
Average wait time for diagnosed smoker/tobacco user was less than one week for specialty smoking cessation services (e.g., pharmacotherapy, group counseling).	22%
Restrictions on primary care provider to prescribe smoking cessation medications (e.g., bupropion).	29%
VA Women Veterans Health Programs Characteristics	Facility ($n = 195$)
Site has a clinic specifically for the delivery of PC services to women Veterans separate from the general PC clinic.	
Yes, for primary and gender-specific care	41%
Yes, for annual gender-specific exams	29%
At sites with a clinic specifically for the delivery of primary care services to women ($n = 131$), all/almost all women Veterans are assigned to same gender providers in women's health clinic PC.	68%
Have a designated women's health providers in outpatient mental health clinic to whom women Veterans are preferentially assigned.	38%

Table 2
Patient Characteristics in 2007

All Patients From Primary Care Cohort	Total ($n = 65,627$)	Men ($n = 62,770$)	Women ($n = 2,857$)
Percent Smokers***	23%	23%	29%
Smokers Only	($n = 15,033$)	($n = 14,196$)	($n = 837$)
Mean age (SD)***	60 (10.66)	61 (10.32)	50 (11.81)
Age categories, yrs (%)***			
≤ 50	13%	12%	46%
51-64	58%	59%	45%
≥ 65	29%	30%	9%
Smoking cessation treatment and treatment recommendations (one or more times)			
Advised to quit smoking**	83%	83%	87%
Recommended medication for smoking cessation	62%	62%	63%
Recommended other treatment for smoking cessation	60%	60%	61%

Gender comparison using the chi-square or t -test.

** $p < .01$.

*** $p < .001$.

Table 3
Multi-Level Model Random-Intercept Logistic Regression to Examine the Predictors of Being Advised to Quit Smoking, Receipt of Medication Recommendation, and Other Treatment Recommendation

	Advised to Quit			Medications Recommended	Other Treatment Recommended
	Model 1 (n = 15,033) [‡]	Model 2 PC Factors (n = 15,033) [‡]	Model 3 WH Factors (n = 11,338) [‡]	Model 4 (n = 15,033) [‡]	Model 5 (n = 15,033) [‡]
Female	1.33** (1.07–1.64)	1.33* (1.07–1.65)	1.38** (1.08–1.77)	0.95 (0.81–1.10)	0.97 (0.84–1.13)
Region (reference is Northeast)					
Midwest	0.87 (0.72–1.03)	0.86 (0.72–1.03)	0.96 (0.77–1.18)	1.02 (0.87–1.21)	0.89 (0.77–1.04)
South	0.84* (0.72–0.99)	0.83* (0.70–0.98)	0.83 (0.68–1.02)	0.81** [‡] (0.69–0.94)	0.77** (0.67–0.89)
West	0.82* (0.67–0.98)	0.83 (0.67–1.0)	0.85 (0.69–1.05)	0.78** (0.67–0.95)	0.81** (0.69–0.95)
Primary care (PC) organizational measures					
Service capacity for smoking cessation treatment always sufficient	—	0.95 (0.90–1.01)	—	—	—
Care for diagnosed tobacco user is mainly managed by PC provider	—	1.07 (0.95–1.20)	—	—	—
Average wait time for specialty smoking cessation services	—	0.94 (0.87–1.02)	—	—	—
Restrictions on smoking cessation medications	—	1.00 (0.89–1.14)	—	—	—
Women's health organizational measures					
Separate clinic for delivery of PC services to women that is separate from general PC clinic (reference is no)	—	—	0.95 (0.80–1.12)	—	—
Yes, for PC and gender-specific care	—	—	0.92 (0.78–1.08)	—	—
Designated women's health providers in outpatient mental health clinics to whom women are preferentially assigned	—	—	0.98 (0.86–1.12)	—	—

Models control for age and number of patients at the site (volume); large urban/rural was not significant in any bivariate models and, therefore, was not included in the final models. Number of sites for CPOS = 225 and DVAHS = 195.

* $p < .05$.

[‡] Model 3 uses the Women's Health Cohort.

[‡] Models 1, 2, 4, and 5 use the Primary Care Cohort; the number varies slightly across models due to missing data.

^{||} Because of the large amount of missing data on the variable indicating the proportion of women assigned to a same gender provider, it was not included in the final model. However, the results were similar to the model presented.

** $p < .01$.

site volume, and region are shown in Table 3. In Model 1, women were more likely to be advised to quit (odds ratio, 1.33; 95% confidence interval, 1.07–1.64). There were no significant gender differences in medication or other treatment recommendations (shown in Table 3, Models 4 and 5).

To examine whether organizational factors either in primary care or women's health programs mitigated the gender disparities in being advised to quit, we added each organizational factor (listed in Table 1) to the model individually controlling for age and site volume. In each model (as illustrated in the final models shown on Table 3, Model 2, for primary care and Model 3 for women's health), the gender differences remained: Women smokers were more likely to be advised to quit than male smokers. As supplemental analyses (data not shown), we also ran models with individual primary care and women's health organizational factors for the sample of women only. None of the organizational factors were significant for advised to quit, medication recommended, or other treatment recommended at one or more visits. Because of the significant gender differences in age, we also tested for an interaction between age and gender for each smoking cessation model; none of the interactions were significant.

Discussion

We found that, despite having equivalent treatment recommendation rates and higher smoking cessation brief counseling rates, women Veterans receiving at least some of their care at the

VA were more likely to smoke than men. Further, although general primary care organizational factors (e.g., resource sufficiency and size) have been found to explain variations in processes of care in preventive measures (e.g., colorectal cancer screening; Soban & Yano, 2005) and/or chronic disease care (Jackson et al., 2005), we were surprised to find that none of the smoking cessation-specific organizational measures reflecting structures to improve care (e.g., primary care-based assessment/follow-up/management) were associated with improved treatment/recommendation rates or reductions in gender differences in care.

The conundrum of the lack of predictive primary care delivery factors surrounding women Veteran's health care quality is not entirely new. Studies have shown that women Veterans use VA care differently than men (Frayne et al., 2007) and perhaps the primary care organizational measures were not specific enough to the care that women Veterans experience. Building on comparable organizational factors focused on measuring how women's health care is organized, we therefore integrated unique DVAHS Senior Women's Health Clinician Module data to determine the extent to which features of women's health care delivery may have impacted treatment exposure. Despite testing an array of gender-focused delivery arrangements, we found that gender differences were persistent indicating that understanding women's health organizational factors did not shed light onto processes of care (e.g., smoking cessation treatment) for women Veterans.

Outside the VA, the smoking prevalence rate is consistently higher for men than women, yet there is only limited literature on gender disparities in treatment let alone their determinants. One study found that female smokers were more likely to have received a prescription for smoking cessation medication in the ambulatory setting (Croghan et al., 2009), yet we found no literature focusing on organizational factors that help ameliorate gender differences in smoking cessation efforts. Within the VA, our results indicate that care for women has improved: Treatment rates for women in 2007 were higher (advice) or equal to men (medication recommendations) compared with previous findings from 2000, which showed that women Veteran smokers were equally likely to report being advised to quit smoking, but less likely than men to be offered medications using baseline data from a group randomized trial across 18 southwestern VA primary care practices (Sherman et al., 2005). However, unlike the sample in 2000, women in our national sample were more likely to smoke than men in 2007.

Why women Veterans are not responding to these frequently provided treatment options is unclear. There is evidence that female smokers suffer greater nicotine withdrawal symptoms (such as more negative mood and cravings) and greater relief from symptoms after relapse than men (Xu et al., 2008), which our research was not able to address because our data sources lacked measures of nicotine dependence. There is also evidence of a higher level of overall mental health comorbidities among women Veterans who use the VA (Sambamoorthi, Bean-Mayberry, Findley, Yano, & Banerjee, 2010; Sambamoorthi, Shen, Findley, Frayne, & Banerjee, 2010), represented in part by high levels of posttraumatic stress disorder and military sexual trauma. Given there is evidence that the association between posttraumatic stress disorder and reports of relapse owing to withdrawal symptoms was substantially greater in women (Weinberger, Maciejewski, McKee, Reutenauer, & Mazure, 2009), an understanding of how gender moderates the impact of psychiatric diagnoses on abstinence is critical, especially for Veterans.

The setting where women receive their smoking cessation treatment may be a critical factor for success. Based on qualitative data from focus groups of women Veteran smokers, current VA smoking cessation interventions, such as group counseling, may run counter to their preferences for care (Katzburg, Farmer, Poza, & Sherman, 2008; Katzburg et al., 2009). Certain types of visits may be more amenable to effective delivery of smoking cessation for women. For example, there are serious contraindications of smoking while using birth control medications, so smoking cessation advice and prescribing oral contraceptives may be linked. With the serious risk of birth defects and pregnancy complications associated with smoking, prenatal visits could be where women are advised to quit smoking. With women Veterans' high levels of mental health comorbidities, mental health clinics may be the appropriate venue for women's smoking cessation services. In our sample, only 24 VA sites reported having mental health clinics specifically for women Veterans, and only 42% of those offered smoking cessation services within the clinic. We posit that exposing women Veterans to guideline-concordant recommendations of advice, medications, and referral to smoking cessation clinics will continue to fall short until their preferences and needs for treatment are better integrated into delivery options. Our findings here emphasize the need for future research on targeted interventions to help understand if gender-focused smoking cessation

services are effective in helping women Veteran smokers to quit successfully.

Although we were discouraged by our inability to identify organizational strategies associated with higher treatment and recommendation rates, the levels identified in VA settings were indeed encouraging. Overall, 83% of Veteran smokers had been advised to quit and about 60% reported medication or other treatment recommendations at least once. Outside the VA, treatment rates were much lower: In a national survey, 44% of smokers reported a quit attempt, and of those who attempted only 8% reported behavior treatment, 32% used medications, and 14% used more than one treatment (Shiffman, Brockwell, Pillitteri, & Gitchell, 2008). In the 2001 to 2004 National Ambulatory Medical Care Survey, only 19% of smokers received assistance and fewer than 2% received prescription pharmacotherapy (Ferketich, Khan, & Wewers, 2006).

Although the vast majority of the literature on gender disparities in quality of care currently focuses on describing their presence and their patient-level determinants of chronic conditions (Chou, Brown, et al., 2007; Chou, Scholle, et al., 2007; Correa-de-Araujo et al., 2006; Fremont, Correa-de-Araujo, & Hayes, 2007), we sought to empirically examine the extent to which differences in patient- and organizational-level characteristics might point to mutable factors that could contribute to high-quality smoking cessation treatment for women and men. The analytic complexities of examining organizational exposures are substantial. First, few health care organizations, health plans, or systems are big enough to afford sufficient power to examine such organizational influences on disparities in care. The VA health care system, in contrast, provides a large number of facilities to study. With almost 200 sites with both primary care and women's health organizational data, our power calculations demonstrated that we had ample power to detect meaningful differences in smoking cessation care. Second, it was difficult to directly test the impact of exposure to a women's clinic on differences between men and women, because men are unable to attend a women's clinic. We opted to first evaluate the influence of primary care organizational features on smoking cessation treatment and treatment recommendation rates for men and women and then the organizational factors related to women's health. Although men were not exposed to the women's services, it was hypothesized that men's experiences of care in a VA with gender-focused care arrangements may indeed differ. We also ran supplemental analyses that examined the organizational influences that women were exposed to (only women were in the models) and the results were similar to the full sample. The field would benefit from more methodological work in this arena, developing and applying alternate approaches for statistically evaluating the determinants of gender, racial-ethnic, and other disparities in care, in support of intervention design and development.

This project utilized a number of secondary data sources including patient self-report, organizational data, utilization data from Austin, and area factors from national data sources. Although the wealth of information across these data sources was an important strength of the study, reliance on secondary data always comes with limitations. Our patient self-report data, for example, like any survey data, are subject to recall and desirability bias (Jordan, Jinks, & Croft, 2006; Neugebauer & Ng, 1990). However, social desirability would lend itself to under-reporting smoking behavior, and we found significantly higher smoking rates for women Veterans. We also have no a priori reason to

believe women would over report receipt of treatment or differentially recall care events such as advice or recommendations for medications. Also, the data were cross-sectional, so it is difficult to interpret whether women were more likely to receive advice to quit due to their higher prevalence of smoking or if the higher levels of smoking indicate inadequate smoking cessation care. Additionally, measures for quit attempts and smoking abstinence were not available in SHEP, so our analyses only addressed treatments that have an evidence base for effectiveness in helping smokers to quit (Hughes, Stead, & Lancaster, 2007; Lancaster & Stead, 2005; Stead, Bergson, & Lancaster, 2008; Stead, Perera, Bullen, Mant, & Lancaster, 2008). In merging all the data sources, patients in SHEP from smaller CBOCs were not included in the final analytic sample. Therefore, our results reflect the smoking prevalence, brief counseling, and recommendations for medications and other treatment for patients seen at a national sample of the largest VA facilities. Finally, our data do not cover what is going on outside the VA. However, with the complete formulary coverage of smoking cessation medications for VA users, it is likely that the coverage within the VA is better than outside the VA.

Although the VA's performance in smoking cessation care outstrips that of many other health care organizations, the presence of persistent gender disparities in smoking prevalence and care is worrisome in a system that prides itself on being a model for health care reform (Jha, Perlin, Kizer, & Dudley, 2003; Oliver, 2007). Future research must be mindful of the challenges of higher mental health burden faced by many women Veterans as well as their different approaches to and preferences for care. With the rapid growth of women entering VA care and the projected smoking rates among women returning from Iraq and Afghanistan, the need for effective gender-focused and gender-sensitive smoking cessation care arrangements is critical for the future health of women who have served.

Acknowledgments

The authors acknowledge Martin Lee, PhD, for his statistical consultation, Ismelda Canelo and Britney Chow for their administrative support, and the reviewers for their comments. The views expressed in this article are those of the authors and do not necessarily reflect the position or policy of the Department of Veterans Affairs or the United States government.

References

- American Cancer Society. (2010). *Cancer facts & figures 2010*. Atlanta.
- Bastian, L. A., & Sherman, S. E. (2010). Effects of the wars on smoking among veterans. *Journal of General Internal Medicine*, 25, 102-103.
- Bohadana, A., Nilsson, F., Rasmussen, T., & Martinet, Y. (2003). Gender differences in quit rates following smoking cessation with combination nicotine therapy: Influence of baseline smoking behavior. *Nicotine & Tobacco Research*, 5, 111-116.
- Brown, D. W. (2010). Smoking prevalence among US veterans. *Journal of General Internal Medicine*, 25, 147-149.
- Centers for Disease Control and Prevention (CDC). (2010). Vital signs: Current cigarette smoking among adults aged ≥ 18 years—United States, 2009. *MMWR Morbidity and Mortality Weekly Report*, 59, 1135-1140.
- Chou, A. F., Brown, A. F., Jensen, R. E., Shih, S., Pawlson, G., & Scholle, S. H. (2007). Gender and racial disparities in the management of diabetes mellitus among Medicare patients. *Women's Health Issues*, 17, 150-161.
- Chou, A. F., Scholle, S. H., Weisman, C. S., Bierman, A. S., Correa-de-Araujo, R., & Mosca, L. (2007). Gender disparities in the quality of cardiovascular disease care in private managed care plans. *Women's Health Issues*, 17, 120-130.
- Coffield, A. B., Maciosek, M. V., McGinnis, J. M., Harris, J. R., Caldwell, M. B., Teutsch, S. M., et al. (2001). Priorities among recommended clinical preventive services. *American Journal of Preventive Medicine*, 21, 1-9.
- Correa-de-Araujo, R., Stevens, B., Moy, E., Nilasena, D., Chesley, F., & McDermott, K. (2006). Gender differences across racial and ethnic groups in the quality of care for acute myocardial infarction and heart failure associated with comorbidities. *Women's Health Issues*, 16, 44-55.
- Croghan, I. T., Ebbert, J. O., Hurt, R. D., Hays, J. T., Dale, L. C., Warner, N., et al. (2009). Gender differences among smokers receiving interventions for tobacco dependence in a medical setting. *Addictive Behaviors*, 34, 61-67.
- Donabedian, A. (1980). Basic approaches to assessment: Structure, process, and outcome. In A. Donabedian (Ed.), *The definition of quality and approaches to its assessment* (pp. 77-128). Ann Arbor, MI: Health Administration Press.
- Donabedian, A. (1988). The quality of care. How can it be assessed? *JAMA*, 260, 1743-1748.
- Ferketich, A. K., Khan, Y., & Wewers, M. E. (2006). Are physicians asking about tobacco use and assisting with cessation? Results from the 2001-2004 national ambulatory medical care survey (NAMCS). *Preventive Medicine*, 43, 472-476.
- Frayne, S. M., Yu, W., Yano, E. M., Ananth, L., Iqbal, S., Thraill, A., et al. (2007). Gender and use of care: Planning for tomorrow's Veterans Health Administration. *Journal of Womens Health (Larchmont)*, 16, 1188-1199.
- Fremont, A. M., Correa-de-Araujo, R., & Hayes, S. N. (2007). Gender disparities in managed care: It's time for action. *Women's Health Issues*, 17, 116-119.
- Health Resources and Services Administration. (2008). Area resource file (ARF). Hughes, J. R., Stead, L. F., & Lancaster, T. (2007). Antidepressants for smoking cessation. *Cochrane Database of Systematic Reviews* CD000031.
- Jackson, G. L., Yano, E. M., Edelman, D., Krein, S. L., Ibrahim, M. A., Carey, T. S., et al. (2005). Veterans Affairs primary care organizational characteristics associated with better diabetes control. *American Journal of Managed Care*, 11, 225-237.
- Jha, A. K., Perlin, J. B., Kizer, K. W., & Dudley, R. A. (2003). Effect of the transformation of the Veterans Affairs Health Care System on the quality of care. *New England Journal of Medicine*, 348, 2218-2227.
- Jordan, K., Jinks, C., & Croft, P. (2006). Health care utilization: Measurement using primary care records and patient recall both showed bias. *Journal of Clinical Epidemiology*, 59, 791-797.
- Katzburg, J. R., Farmer, M. M., Poza, I. V., & Sherman, S. E. (2008). Listen to the consumer: Designing a tailored smoking-cessation program for women. *Substance Use & Misuse*, 43, 1240-1259.
- Katzburg, J. R., Yano, E. M., Washington, D. L., Farmer, M. M., Yee, E. F., Fu, S., et al. (2009). Combining women's preferences and expert advice to design a tailored smoking cessation program. *Substance Use & Misuse*, 44, 2114-2137.
- Lancaster, T., & Stead, L. F. (2005). Individual behavioural counselling for smoking cessation. *Cochrane Database of Systematic Reviews* CD001292.
- Miller, D. R., Kalman, D., Ren, X. S., Lee, A. F., Niu, Z., & Kazia, L. E. (2001). *Health behaviors of veterans in the VHA: Tobacco use (1999 Large Health Survey of Enrollees)*. Washington, DC: U.S. Department of Veterans Affairs, Veterans Health Administration Office of Quality of Performance.
- Neugebauer, R., & Ng, S. (1990). Differential recall as a source of bias in epidemiologic research. *Journal of Clinical Epidemiology*, 43, 1337-1341.
- Oliver, A. (2007). The Veterans Health Administration: An American success story? *Milbank Quarterly*, 85, 5-35.
- Piper, M. E., Cook, J. W., Schlam, T. R., Jorenby, D. E., Smith, S. S., Bolt, D. M., et al. (2010). Gender, race, and education differences in abstinence rates among participants in two randomized smoking cessation trials. *Nicotine & Tobacco Research*, 12, 647-657.
- Rubenstein, L. V., Mittman, B. S., Yano, E. M., & Mulrow, C. D. (2000). From understanding health care provider behavior to improving health care: The QUERI framework for quality improvement. Quality Enhancement Research Initiative. *Medical Care*, 38(6 Suppl. 1), I129-I141.
- Salihu, H. M., Aliyu, M. H., Pierre-Louis, B. J., & Alexander, G. R. (2003). Levels of excess infant deaths attributable to maternal smoking during pregnancy in the United States. *Maternal and Child Health Journal*, 7, 219-227.
- Sambamoorthi, U., Bean-Mayberry, B., Findley, P. A., Yano, E. M., & Banerjee, R. (2010). Organization of care and diagnosed depression among women veterans. *American Journal of Managed Care*, 16, 657-665.
- Sambamoorthi, U., Shen, C., Findley, P., Frayne, S., & Banerjee, R. (2010). Depression treatment patterns among women veterans with cardiovascular conditions or diabetes. *World Psychiatry*, 9, 177-182.
- Sherman, S. E., Fu, S. S., Joseph, A. M., Lanto, A. B., & Yano, E. M. (2005). Gender differences in smoking cessation services received among veterans. *Women's Health Issues*, 15, 126-133.
- Sherman, S. E., & Talcott, W. C.-C. (2003). *Department of Defense/Veterans Health Administration clinical practice guideline on management of tobacco use*. Washington, DC: U.S. Department of Veterans Affairs.
- Shiffman, S., Brockwell, S. E., Pillitteri, J. L., & Gitchell, J. G. (2008). Use of smoking-cessation treatments in the United States. *American Journal of Preventive Medicine*, 34, 102-111.
- Soban, L. M., & Yano, E. M. (2005). The impact of primary care resources on prevention practices. *Journal of Ambulatory Care Management*, 28, 241-253.
- Stead, L. F., Bergson, G., & Lancaster, T. (2008). Physician advice for smoking cessation. *Cochrane Database of Systematic Reviews*, 2, CD000165.
- Stead, L. F., Perera, R., Bullen, C., Mant, D., & Lancaster, T. (2008). Nicotine replacement therapy for smoking cessation. *Cochrane Database of Systematic Reviews*, 1, CD000146.

- U.S. Surgeon General. (2001). *Women and smoking. The U.S. Surgeon General's report*. Washington, DC: U.S. Department of Health and Human Services.
- Ward, K. D., Klesges, R. C., Zbikowski, S. M., Bliss, R. E., & Garvey, A. J. (1997). Gender differences in the outcome of an unaided smoking cessation attempt. *Addictive Behaviors*, 22, 521–533.
- Weinberger, A. H., Maciejewski, P. K., McKee, S. A., Reutenauer, E. L., & Mazure, C. M. (2009). Gender differences in associations between lifetime alcohol, depression, panic disorder, and posttraumatic stress disorder and tobacco withdrawal. *American Journal of Addictions*, 18, 140–147.
- Xu, J., Azizian, A., Monterosso, J., Domier, C. P., Brody, A. L., Fong, T. W., et al. (2008). Gender effects on mood and cigarette craving during early abstinence and resumption of smoking. *Nicotine & Tobacco Research*, 10, 1653–1661.

Author Descriptions

Melissa M. Farmer, PhD, is an investigator at the VA Greater Los Angeles HSR&D Center of Excellence for the Study of Healthcare Provider Behavior. Her research focuses on organization influences on care, with a focus on smoking cessation and preventive care.

Danielle E. Rose, PhD, is a health research scientist at the VA Greater Los Angeles HSR&D Center of Excellence, where her research focuses on organizational influences on quality in primary care and women's health settings.

Deborah Riopelle, MSPH, is a project director at VA Greater Los Angeles HSR&D Center of Excellence with experience working on a variety of VA research studies. Her current area of work is in evaluation of VA emergency preparedness and response.

Andrew B. Lanto, MA, is a health statistician at the VA Greater Los Angeles HSR&D Center of Excellence with 30 years of statistical analysis experience programming primarily with SPSS and STATA data analysis packages.

Elizabeth M. Yano, PhD, MSPH, is Co-Director and Research Career Scientist at the VA Greater Los Angeles HSR&D Center of Excellence and Adjunct Professor of Health Services at the UCLA School of Public Health. Her work focuses on organizational influences on quality.