High-Risk Behavior and Sexually Transmitted Infections Among U.S. Active Duty Servicewomen and Veterans

Vinita Goyal, M.D., M.P.H.,¹ Kristin M. Mattocks, Ph.D., M.P.H.,² and Anne G. Sadler, Ph.D., R.N.³

Abstract

The number of women who are active duty service members or veterans of the U.S. military is increasing. Studies among young, unmarried, active duty servicewomen who are sexually active indicate a high prevalence of risky sexual behaviors, including inconsistent condom use, multiple sexual partners, and binge drinking, that lead to unintended and unsafe sex. These high-risk sexual practices likely contribute to chlamydia infection rates that are higher than the rates in the U.S. general population. Human papillomavirus (HPV) infection and cervical dysplasia may also be higher among young, active duty servicewomen. Little is known about the sexual practices and rates of sexually transmitted infections among older servicewomen and women veterans; however, women veterans with a history of sexual assault may be at high risk for HPV infection and cervical dysplasia. To address the reproductive health needs of military women, investigations into the prevalence of unsafe sexual behaviors and consequent infection among older servicewomen and women veterans are needed. Direct comparison of military and civilian women is needed to determine if servicewomen are a truly high-risk group. Additionally, subgroups of military women at greatest risk for these adverse reproductive health outcomes need to be identified.

Introduction

THE PROPORTION OF FEMALE active duty personnel who serve in the U.S. military is steadily increasing, from 2% in 1973 to approximately 15% currently.^{1–3} The population of female veterans is also rising. There are at present more than 1.8 million U.S. female veterans, comprising 8% of the total veteran population.^{4–6} By 2036, it is projected that the proportion of female veterans will reach 15% (Fig. 1).⁷

Compared to the general population of U.S. women, women in the military may be at higher risk for sexually transmitted infections (STIs) and human papillomavirus (HPV)-related diseases. Active duty women and female veterans tend to be young and unmarried and belong to racial and ethnic minority groups.^{3,11} Each of these demographic factors is associated with an increased risk of STIs and cervical dysplasia.^{12–16} Furthermore, studies of active duty servicewomen, primarily new recruits, reveal a high prevalence of unsafe sexual practices, including sporadic condom use, multiple sexual partners, and binge drinking, which compromises barrier contraceptive use.^{17–19} There are limited data on the risks to these women as they transition out of military service and join the veteran population.

The purpose of this article is to review the literature on high-risk sexual behaviors, rates of STIs, and the burden of HPV-related disease among active duty and veteran women.

Data on the U.S. general population are also presented; however, comparison between these populations is imperfect. We explored the literature via a PubMed search using terms including sexual behavior, unsafe sex, multiple sexual partners, condoms, chlamydia, gonorrhea, HIV, HPV, cervical dysplasia, cervical cancer screening, military, veterans, and women and also searched reference lists of relevant articles for additional data. Based on this review, recommendations for future research are provided to evaluate and potentially reduce the incidence of STIs among military women.

Active Duty Servicewomen

High-risk sexual behavior

Some groups of active duty servicewomen, particularly those who are unmarried, young, and new to military service, engage in high-risk sexual behavior. This is defined by the U.S. Preventive Services Task Force (USPSTF) as using condoms inconsistently, having multiple current partners, having a new partner, or having sex while under the influence of alcohol or drugs.²⁰ These sexual practices may place military women at increased risk for acquiring an STI.

Condom use. In Department of Defense (DOD) surveys assessing health behaviors of active duty military personnel, only 33% of sexually active unmarried women reported using

¹Department of Obstetrics and Gynecology, Women and Infants' Hospital, Providence, Rhode Island.

²Department of Quantitative Health Sciences, University of Massachusetts, Worcester, Massachusetts.

³Comprehensive Access & Delivery Research and Evaluation, Iowa City Veterans Affairs Health Care Center, Iowa City, Iowa.

- **Active Duty¹**: Enlisted personnel and officers providing full-time duty in the active military service of the United States (Army, Navy, Air Force, Coast Guard, and Marine Corps) and active duty status in the Reserves and the National Guard (other than for training).
- **New Recruits⁸**: Members of the civilian population who join military service for the first time.
- **Enlisted Rank⁸**: Member of a military rank below a commissioned or warrant officer.
- **Officer⁸**: Military personnel who hold a grade and office under a warrant or commission signed by military authority.
- **Deployed Personnel⁸**: Active duty personnel who are relocated to desired operational areas. Deployment encompasses all activities from origin or home station through destination specifically including intracontinental U.S., intertheater, and intratheater movement.
- **Reservist⁸**: Members of the Military Services who are not in active service but who are subject to call to active duty. The Reserve Component consists of the Army and Air National Guard and the Army, Navy, Marine Corps, Air Force, and Coast Guard Reserve.
- **Veterans¹**: Individuals who have served, but are not currently serving, on active duty in the U.S. Army, Navy, Air Force, Marine Corps, Coast Guard, National Guard, or Reserves or who served in the U.S. Merchant Marine during World War II.
- **TRICARE⁹**: Healthcare plan provided by DOD for active duty personnel, retirees, Reservists, and National Guard members called to active duty, and certain dependents.
- **Coverage for Veterans^{6,10}**: Veterans may seek care from a community physician using TRICARE (where accepted), private health insurance, Medicaid, or Medicare. Veterans who are honorably discharged active duty service personnel or eligible Reservists or National Guard members may also qualify for cost-free or subsidized healthcare services through the VA, based on the presence of a service-related medical condition (i.e., service connection) and/or income-based need at any time after discharge from the military. Operation Enduring Freedom (Afghanistan) and Operation Iraqi Freedom (OEF/OIF) veterans may receive healthcare services at the VA for 5 years after discharge regardless of income or service connection.

FIG. 1. Military service duty definitions and available healthcare coverage.

condoms during last intercourse in 2002, which increased marginally to 36% by 2005.^{17,21} Among both unmarried women and men who responded to the survey, reported condom use with last intercourse was higher for those <21 compared to 21–25 years old, those with lower educational levels, and service members with enlisted compared to officer rank. Those who reported a higher number of sexual partners in the past year were also more likely to report condom use at last intercourse but less likely to use condoms with each act of intercourse.¹⁷ In a smaller survey of 131 Army servicewomen, nearly 70% did not use condoms regularly, and <40% used condoms with their last self-reported casual sexual partner.²² This is comparable to women in the U.S. general population who endorsed high-risk sexual behavior, among whom only 34% reported condom use at last intercourse.²³ (Table 1A).

A qualitative study of women enlisted in the Navy revealed potential barriers to condom use while in the military. These women reported feeling stigmatized as promiscuous if they requested condoms and believed their male counterparts to be exempt from the same criticism.²⁴ They also reported not using condoms because if found this would be evidence of violation of the policy prohibiting sexual activity while deployed.²⁴

Multiple sexual partners. Although there are limited data on high-risk sexual practices among military women, some studies have reported a high prevalence of new or concurrent sexual partners. In a study of 1,095 male and female Army recruits, nearly 60% reported >1 sexual partner within the last year.¹⁸ Another study of 13,204 female Army recruits conducted between 1996 and 1997 found that in the prior 90 days, 27% of women had >1 partner, 31% had a new partner, and only 17% reported that her partner always wore condoms.²⁵ In the U.S. general population, risk factors for multiple new partners include black race, alcohol or drug use, and young age (≤13 years old) at first intercourse.²⁶ Given limited data in military populations, risk factors for multiple sexual partners

have not been identified; however, younger age may be associated with high-risk sexual practices among service-women. In a 1991 study of female Army personnel, adolescents were found to have a greater number of sexual partners, less reproductive health knowledge, and higher likelihood of not using any method of contraception compared to their older counterparts¹⁹ (Table 1B). In a study of 999 female veterans, the proportion who reported having a partner who had concurrent sexual partners increased from 30% before joining the military to 42% during military service.²⁷

Binge drinking. In the U.S. general population, 6%–7% of women per year reported binge drinking,²⁸ whereas in a survey of 1,095 Army recruits, 33% of female respondents reported binge drinking in the past month.¹⁸ Binge drinking has been associated with unsafe sexual practices and unwanted sexual activity among female military personnel. Female Army recruits who participated in binge drinking were less likely to report using effective methods of contraception during their last sexual encounter.¹⁸ A study of 1,841 female Marine Corps recruits revealed that 31% reported having sex under the influence of alcohol or drugs in the 3 months before recruit training.²⁹ In a qualitative study of Navy personnel, female respondents stated that servicewomen participated in binge drinking to fit in with a predominantly male crew; however, this left women vulnerable to nonconsensual or compromising sexual encounters²⁴ (Table 1C). When women veterans were asked about their previous sexual behaviors, 24% stated they had unintended sex after drinking alcohol or using drugs before joining the military, and 33% reported this occurrence during military service.²⁷

Sexually transmitted infections

Limited condom use and high-risk sexual encounters among some groups of active duty military personnel may

result in STI rates that are higher than in the general population. Indeed, rates of STIs are reported to be up to seven times higher in military than civilian populations.²² In particular, the rates of STIs in military recruits, young military personnel, and military ethnic minorities are above the national average.^{21,30,31} In a study of 1,841 female Marine Corps recruits who were screened for chlamydia, gonorrhea, and trichomoniasis upon entry to the military, 14% tested positive for an STI compared to 8% of similar aged women in the general population tested during the same time frame.²⁹ In studies in which asymptomatic military personnel were randomly screened for STIs, the prevalence of chlamydial infection was between 5% and 10% overall.^{25,32,33} This estimate is significantly higher than that in studies among women in the general population who were randomly screened, where chlamydia prevalence is between 2% and 5%.^{14,34} Chlamydia rates among servicewomen who seek care at STI clinics are comparatively higher than among those who are screened as part of routine protocol. A 2002 epidemiologic investigation of > 800 women who lived on or near a U.S. Army base and sought care at an on-base infectious disease screening clinic found that approximately 19% of servicewomen were infected with chlamydia and 3% had gonorrhea.³⁵ Another study at the same military base found the rate of chlamydial infection among female active duty soldiers to be 3–7-fold higher than that in the general population living within the same state over a 6-year period after standardizing for age and race/ethnicity.³⁶

Risk factors for chlamydial infection among female military personnel include younger age, black race, having > 1 sexual partner, having a new sexual partner, or having a partner who inconsistently used condoms in the last 90 days.²⁵ Additionally, women with lower military rank had higher odds of chlamydial infection compared to their higher ranking counterparts.³⁵ Gender is also a risk factor for STI infection. Among active duty personnel deployed to Iraq and Afghanistan, women were found to have higher rates of gonorrhea and chlamydia infection than their male counterparts.³⁷ Female gender, young age, and high-risk sexual practices have been shown to be risk factors for reinfection. A study of 11,771 active duty Army personnel found that women were more likely than men to be reinfected with chlamydia and confirmed that women in their early 20s were at highest risk for reinfection.³⁸ Compared to new recruits who tested negative for an STI upon entry in the military, those who tested positive were more likely to test positive again after returning from vacation during recruit training, and those aged 19–21 years who tested positive were more likely to report having a casual sex partner during vacation.³⁹

Data on the prevalence of other STIs, including syphilis or herpes simplex, among servicewomen is lacking. Overall, the rates of HIV infection within the military are declining but there is a slower decline among women compared to men.^{40–41} Furthermore, the incidence of HIV infection is higher for minority compared to white women in the military.^{40–42} Given the different years of evaluation and methods of calculation, it is difficult to compare HIV incidence among military personnel to that in the general population (Table 2).

Cervical dysplasia and human papillomavirus infection

In addition to chlamydia, the prevalence of cervical dysplasia may be higher among servicewomen compared to women in the general U.S. population. In a study examining

126,024 cervical cytology records of women obtaining care at U.S. Armed Forces medical facilities, 4% of active duty servicewomen had low-grade or high grade squamous intraepithelial lesions (SIL) or lesions consistent with carcinoma compared to 1% of wives who were military beneficiaries.⁴³ In a study evaluating 76,675 cervical cytology smears obtained from Army medical facilities, 2.5% demonstrated lesions more severe than atypical squamous cells of undetermined significance.⁴⁴ Combining active duty servicewomen with military beneficiaries not serving in the Armed Forces may have caused in this lower prevalence rate. However, a study conducted in 1993 also reported a 3% prevalence rate of low-grade or high grade SIL among female military recruits.⁴⁵ An older study conducted among 332 female cadets with an average age of 22 years demonstrated that 5% had cervical cytology results consistent with low-grade or high grade SIL.⁴⁶ Based on the evidence presented, the prevalence of low-grade or high-grade SIL among military women is between 2.5% and 5%. In comparison, a study conducted at a civilian health maintenance organization (HMO) between 1997 and 2002 revealed < 1% prevalence of low-grade or high-grade SIL.⁴⁷ Comparisons between the civilian and military populations are imperfect, given differences in study methods, years of ascertainment, and reporting of results. Better designed studies are needed to determine if cervical dysplasia rates are truly higher among military women compared to the general population, as these data would suggest (Table 3A).

Although data are limited, the prevalence of HPV infection may also be higher among women in the military compared to those in the general population. In studies among active duty servicewomen seeking care at an Army medical center STI screening clinic, prevalence of any HPV type ranged between 36% and 51%,^{48,49} which is far higher than in the general population of U.S. women (27%, 95% confidence interval [CI] 23%–31%), but similar to that found in U.S. women 20–24 years old (45%, (95% CI 36%–55%).⁵⁰ Comparisons of the prevalence of high-risk HPV types between military and civilian women are difficult, given the variation in types included within this category^{15, 48} (Table 3B).

Cervical cancer screening and HPV vaccination

Both the DOD and Department of Veterans Affairs (VA) recommend cervical cancer screening for sexually active women with a cervix.⁵¹ In 2007, the DOD expanded women's cancer screening from Papanicolaou testing to cervical cancer screening to ensure coverage of current screening mechanisms, including HPV typing, for TRICARE (the DOD healthcare plan) beneficiaries.⁵² Rates of cervical cancer screening among active duty servicewomen have increased over time from 78% of women receiving screening within 12 months of deployment in 2003 to 90% receiving screening in 2005.^{53,54} In a large survey of active duty personnel conducted by the DOD in 2005, 97% of military women reported receiving cervical cancer screening within the past 3 years.¹⁷ High rates of cervical cancer screening have also been reported among TRICARE Prime beneficiaries, of whom 92% received screening within the past 3 years.⁵⁵ This rate of cervical cancer screening was higher than among the general population of U.S. women.⁵⁵ (Table 4A).

In addition to enhanced cervical cancer screening, administration of the HPV vaccine to appropriate individuals may also

TABLE 1. ACTIVE DUTY SERVICEWOMEN: SUMMARY OF STUDIES ON HIGH-RISK SEXUAL BEHAVIOR

<i>Study</i>	<i>Study group</i>	<i>Demographic characteristics</i>	<i>Sample size</i>	<i>Outcome of interest</i>
A. Condom use DOD, 2002 ¹⁷	Unmarried military personnel who had ≥1 sexual partners in the past 12 months	Data for unmarried women unavailable	3,989	33.2% of unmarried female military personnel reported condom use at last intercourse 45.9% of personnel who reported ≥ 5 sexual partners in the past year reported condom use at last intercourse 66.3% of personnel who reported ≥ 5 sexual partners in the past year reported condom use at each time of intercourse compared to 70.2% who reported 2–4 sexual partners in the past year
DOD, 2005 ²¹	Unmarried military personnel who had ≥1 sexual partners in the past 12 months	Data for unmarried women unavailable	5,103	36.2% of unmarried female military personnel reported condom use at last intercourse 53.1% of personnel who reported ≥ 5 sexual partners in the past year reported condom use at last intercourse
von Sadowszky, 2008 ²²	Army servicewomen	Age: mean 30.5 Race/ethnicity: 52.7% white, 26.5% African American, 14.5% Hispanic Marital status: 44.3% with long-term partner Education: 40.5% some college, 31.3% college degree, 15.3% graduate degree Military rank: 80.2% enlisted	131	68.7% did not use condoms regularly 38.2% used condoms at last intercourse
B. Multiple sexual partners O'Rourke, 2008 ¹⁸	Army recruits	Gender: 54.1% male, 45.9% female Age: 37.3% < 20, 55.9% 21–24 Race/ethnicity: 23.5% black, 15.6% Hispanic, 54.2% Caucasian Marital status: 72% single Education: 57.9% high school, 32.6% > high school Military rank: 92.3% Private or Specialist 4th class	1,095	Almost 60% had intercourse with > 1 partner in the past year (exact figure not given)

(continued)

TABLE 1. (CONTINUED)

<i>Study</i>	<i>Study group</i>	<i>Demographic characteristics</i>	<i>Sample size</i>	<i>Outcome of interest</i>
Gaydos, 1998 ²⁵	Female Army recruits presenting for physical examination	Age: median 21 Race: 51.0% white, 35.9% black, 13.1% other	13,204	Sexual practices in previous 90 days: 26.7% of women had >1 partner 31.4% had a new partner 16.9% had partner who always wore condoms
Borsay-Trindle, 1991 ¹⁹	Female active duty Army personnel	Age: mean 21 Race/ethnicity: 50% white, 40% black, 6% Hispanic Marital status: 61% single Education: 30% some college Military service: 75% ≤ 2 years	112 (35 adolescents 17–19 years old, 40 postadolescents 20–23 years old, 37 adults 24–37 years old)	Reproductive health knowledge: 29% adolescents vs. 48% postadolescents correctly identified midmenstrual cycle as time they were most likely to conceive Contraceptive use: 63% adolescents vs. 45% postadolescents and adults reported no contraceptive use
C. Binge drinking O'Rourke, 2008 ¹⁸	Army recruits	Gender: 54.1% male, 45.9% female Age: 37.3% < 20, 55.9% 21–24 Race/ethnicity: 23.5% black, 15.6% Hispanic, 54.2% Caucasian Marital status: 72% single Education: 57.9% high school, 32.6% > high school Military rank: 92.3% Private or Specialist 4th class	1,095	Binge drinking: 48.8% males 33.2% females Association between binge drinking and use of highly effective methods of contraception: OR 0.74, 95% CI 0.57–0.97
Boyer, 2008 ²⁹	Sexually experienced female Marine Corps recruits	Age: mean 19.1 Race/ethnicity: 57.7% Caucasian, 20.1% Hispanic, 16.6% African American Marital status: 91.3% single Education: 73.2% high school/GED, 26.8% any college/vocational	1,841	31% reported sex under influence of alcohol or drugs in 3 months before to recruit training

CI, Confidence interval; DOD, Department of Defense; GED, general equivalency diploma; OR, odds ratio.

TABLE 2. ACTIVE DUTY SERVICEWOMEN: SUMMARY OF STUDIES ON SEXUALLY TRANSMITTED INFECTIONS

Study	Study Group	Demographic Characteristics	Sample size	Outcome of interest
Boyer, 2008 ²⁹	Sexually experienced female Marine Corps recruits screened for chlamydia, gonorrhea, and trichomonas in first 2 weeks of recruit training	Age: mean 19.1 Race/ethnicity: 57.7% Caucasian, 20.1% Hispanic, 16.6% African American Marital status: 91.3% single Education: 73.2% high school/GED, 26.8% any college/vocational	1,841	Positive test for at least one STI: 14.1% 11.5% chlamydia 2.4% gonorrhea 1.7% trichomonas Compared to 8% prevalence among adolescent and young women in National Survey of Family Growth and 2005 CDC statistics of 5.6% chlamydia and 0.9% gonorrhea among women 15–24 years old
Gaydos, 1998 ²⁵	Female Army recruits presenting for physical examination	Age: median 21 Race: 51.0% white, 35.9% black, 13.1% other	13,204	Chlamydia infection: 9.2% prevalence OR for prevalence of infection: Age ≤25: 3.0, 95% CI 2.3–4.0 Black race (compared to white): 3.0, 95% CI 2.7–3.5 More than 1 sexual partner in past 90 days: 1.9, 95% CI 1.7–2.1 New sex partner in past 90 days: 1.7, 95% CI 1.5–1.9 Partner who inconsistently used condoms in past 90 days: 1.2, 95% CI 1.0–1.4 Chlamydia infection: 1,307 cases per 100,000 person-years
Jordan, 2011 ³¹	Cases reported to Defense Medical Surveillance System to which the Air Force, Army, Marine Corps, and Navy report	Data presented separately for each military branch Gender: 6.2%–19.6% female Age: 28.3%–48.0% 20–24 Race/ethnicity: 64.4%–77.1% white, 10.3%–20.2% black Marital status: 45.4%–60.3% married, 33.0%–51.1% single	301,237,703	
Thomas, 2001 ³²	Navy-enlisted women	Age: mean 26.5 Race: 62.3% white, 29.1% African American Marital status: 56.2% never married, 28.5% married, 15.3% separated, divorced, widowed	299	Chlamydia infection: 4.7% prevalence

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TABLE 2. (CONTINUED)

<i>Study</i>	<i>Study Group</i>	<i>Demographic Characteristics</i>	<i>Sample size</i>	<i>Outcome of interest</i>
Brodine, 1998 ³³	Shore-based female Navy personnel	Education: 51.1% high school, 42.3% some college, 4.2% college degree Age: mean 27.2 Race/ethnicity: 65.6% white, 8.4% Hispanic, 16.8% African American Marital status: 39.7% single/divorced, 60.3% married Education: 55.6% post-high school	150	Chlamydia infection: 6.9% prevalence
Zenilman, 2002 ³⁵	Active duty personnel receiving care at a U.S. Army medical center STI clinic	Data for entire study population unavailable	2860 tested for chlamydia (2038 males, 822 females), 2854 tested for gonorrhea (2039 males, 815 females)	Chlamydia prevalence 15.6% 19.1% females 14.1% males Enlist (E1-E4) rank compared to officers: RR 3.1, 95% CI 0.7-19 Gonorrhea prevalence 7.4% 3.3% females 8.8% males
Sena, 2000 ³⁶	Active duty personnel receiving care at a U.S. Army medical center STI clinic compared to CDC and North Carolina data	Gender: 89.3% male, 10.7% female Age: 4.5% 15-19, 34% 20-24, 25.3% 25-29, 17.6% 30-34, 17.7% ≥ 35 Race/ethnicity: 62.2% white, non-Hispanic, 23.8% black, 5.5% Hispanic	42,160	Gonorrhea incidence in women: 3,034 cases/100,000 person-years active duty Chlamydia incidence in women: 4,342 cases/100,000 person-years active duty adjusted incidence of chlamydia in 1996: 2388 cases/100,000 person-years in female active duty soldiers 343 cases/100,000 person-years for North Carolina 373 cases/100,000 person-years for the United States

(continued)

TABLE 2. (CONTINUED)

<i>Study</i>	<i>Study Group</i>	<i>Demographic Characteristics</i>	<i>Sample size</i>	<i>Outcome of interest</i>
Aldous, 2011 ³⁷	Military personnel serving in Iraq or Afghanistan	Data for entire study population unavailable	Not reported	Chlamydia infection Afghanistan: 60.5 cases/100,000 female personnel 14.7 cases/100,000 male personnel Iraq: 770.9 cases/100,000 female personnel 192.6 cases/100,000 male personnel Gonorrhea infection: Afghanistan: 13.4 cases/100,000 female personnel 1.2 cases/100,000 male personnel Iraq: 37.9 cases/100,000 female personnel 15.5 cases/100,000 male personnel Repeat chlamydial infection: 7.5% incidence 63.4% female vs. 36.6% male, RR 1.72, 95% CI 1.50–1.98 15.2% <20, 63.4% 20–24, 16.6% 25–29, 4.1% 30–34, 0.7% 35 +
Barnett, 2001 ³⁸	Active duty Army personnel with repeat positive chlamydia tests reported to Defense Medical Surveillance System	Data for repeat chlamydia infection presented per 1000 person-years Gender: 65.8% female, 38.2% male Age: 44.3% <20, 61.9% in 20–24, 44.4% in 25–29, 32.2% in 30–34 Race: 56.8% black, 44% white Marital status: 41.6% married, 58.0% single	11,771	
Hwang, 2007 ³⁹	Women enrolled in Marine Corps recruit training	Age: 57% 17–18, 35% 19–21, 10% 22 + Race/ethnicity: 16% African American, 55% white, 21% Latina Marital status: 93% single Education: 75% high school/GED	1,712	At baseline 10% chlamydia 2% gonorrhea 1% trichomonas After vacation 5% chlamydia 1% gonorrhea 1% trichomonas OR for STI positive after vacation: STI positive at baseline: 3.74, 95% CI 2.10–6.65 OR for casual sex partner during vacation among 19–21 year olds: STI positive at baseline: 2.48, 95% CI 1.12–5.50

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TABLE 2. (CONTINUED)

<i>Study</i>	<i>Study Group</i>	<i>Demographic Characteristics</i>	<i>Sample size</i>	<i>Outcome of interest</i>
Bautista, 2006 ⁴⁰	Review of medical records of white and African American active duty Army personnel 1986–2003	Data for entire study population unavailable	1,500,000	Incident HIV infections: 1,280 0.15 cases/1000 person-years, 95% CI 0.14–0.16 7% in women White personnel: Overall: 0.07 cases/1000 person-years, 95% CI 0.07–0.08 Male: 0.08 cases/1000 person-years, 95% CI 0.07–0.09 Female: 0.03 cases/1000 person-years, 95% CI 0.02–0.05 Significantly smaller decline in incidence in women than men between 1986 and 2003: –8.8% vs. –9.2% ($p < 0.05$) African American personnel: 0.34 cases/1000 person-years, 95% CI 0.32–0.36 Male: 0.39 cases/1000 person-years, 95% CI 0.37–0.42 Female: 0.13 cases/1000 person-years, 95% CI 0.10–0.16 Significantly smaller decline in incidence in women than men between 1986 and 2003: –4.0% vs. –6.3% ($p < 0.001$)
Bautista, 2006 ⁴¹	Review of medical records of all white and African American applicants to all branches of the military, 1985–2003	Gender: 82% male Age: 53% ≤19 Race: 79% white	5,699,590	HIV positive: 4,065 Overall: 0.72 cases/1000 persons White personnel: 0.31 cases/1000 persons Male: 0.34 cases/1000 persons Female: 0.14 cases/1000 persons After 1992 greater decline for men than women African American personnel: 2.27 cases/1000 persons Male: 2.63 cases/1000 persons Female: 1.22 cases/1000 persons HIV prevalence in Africa American compared to white overall: OR 9.2, 95% CI 7.6–11.0 HIV prevalence in African American compared to white women OR 8.3, 95% CI 6.6–10.4
Renzullo, 2001 ⁴²	Review of medical records of active duty Army personnel between 1985 and 1999	Data for entire study population unavailable	2,004,903	Incidence rate: Men: 0.18 cases/1000 persons, 95% CI 0.17–0.19 Women: 0.08 cases/1000 persons, 95% CI 0.06–0.10 White women: 0.03 cases/1000 persons, 95% CI 0.02–0.05 Black women: 0.14 cases/1000 persons, 95% CI 0.11–0.18

CDC, Centers for Disease Control and Prevention.

TABLE 3. ACTIVE DUTY SERVICEWOMEN: SUMMARY OF STUDIES ON CERVICAL DYSPLASIA AND HUMAN PAPILLOMAVIRUS INFECTION

<i>Study</i>	<i>Study Group</i>	<i>Demographic characteristics</i>	<i>Sample size</i>	<i>Outcome of interest</i>
A. Cervical dysplasia				
Ollayos, 2002 ⁴³	Review of records at the Armed Forces Cytocenter, a primary Pap test screening facility	Data for entire study population unavailable	126,024 records	Pap test results of low-grade SIL, high-grade SIL, or carcinoma: 3.66% in active duty 1.37% dependent wives Among active duty: 7.77% 15–19, 6.25% 20–24, 2.99% 25–29, 1.62% 30–34, 1.08% 35–39
Stany, 2006 ⁴⁴	Review of records within Department of Army medical facilities computer database	Data for entire study population unavailable	550,000	Pap test results of low-grade SIL or high-grade SIL: 2.5% prevalence
Ollayos, 1995 ⁴⁵	Review of records for women presenting for training at Navy Recruit Training Center	Data for entire study population unavailable	8,029	High-grade SIL: 0.3% prevalence Low-grade SIL: 2.5% prevalence
Stafford, 1996 ⁴⁶	College women cadets presenting for military summer camp training	Age: mean 21.9 Race/ethnicity: 70% white, 16% black, 4% Hispanic, 4% Asian, 6% other	332	Pap test results of low-grade SIL or high-grade SIL: 5.42% prevalence
B. HPV infection				
Shah, 2001 ⁴⁸	Female active duty personnel receiving care at a U.S. Army medical center STI clinic	Age: median 24	189	Any HPV: 47.3%–50.9% prevalence High-risk HPV (16,18,31,45): 12.1%–13.9% prevalence Intermediate-risk HPV (33,35,39,51,52,56,58,59,68): 15.8–17.6% prevalence Any HPV: 33.2%–38.5% prevalence
Rompalo, 2001 ⁴⁹	Female active duty personnel receiving care at a U.S. Army medical center STI clinic	Age: median 24 Race/ethnicity: 59.8% African American, 32.5% white Marital status: 54.8% never married, 26.5% married, 18.8% divorced/separated/widowed	768	

SIL, squamous epithelial lesion.

TABLE 4. ACTIVE DUTY SERVICEWOMEN: SUMMARY OF STUDIES ON CERVICAL CANCER SCREENING AND HUMAN PAPILLOMAVIRUS VACCINATION

<i>Study</i>	<i>Study Group</i>	<i>Demographic characteristics</i>	<i>Sample size</i>	<i>Outcome of interest</i>
A. Cervical cancer screening Thomson, 2006 ⁵³	Female soldiers deployed for Operation Iraqi Freedom	Data unavailable	251	Self-reported cervical cancer screening: 78.5% received screening within 12 months of deployment 56.2% received screening within 6 months of deployment
Nielsen, 2009 ⁵⁴	Female soldiers deployed for Operation Iraqi Freedom	Data unavailable	397	Self-reported cervical cancer screening: 90.0 % received screening within 12 months of deployment 73.1% received screening within 6 months of deployment While deployed: 16% required repeat cervical cytology screening test 7.5% required colposcopic examination 3.4% required excisional procedure
DOD, 2005 ¹⁷	Female military personnel with intact uterine cervix	Data for women with intact uterine cervix unavailable	3,720	Self-reported Pap test in past 3 years: 97.0%
Brown, 2009 ⁵⁵	TRICARE Prime beneficiaries 65 years old compared to U.S. general population	TRICARE beneficiary data standardized to U.S. population by gender and age	Not reported	Pap test in past 3 years: TRICARE beneficiaries: 91.9%, 95% CI 91.8–92.0% Exact data not reported for U.S. population
B. HPV vaccination Shen-Gunther, 2011 ⁵⁷	Records of all recipients of the quadrivalent HPV vaccine at a U.S. Naval medical center	Age: mean 19, 42%, 8–17, 55%, 18–26, 35% 27–50	5,088 females	Completion of the 3-dose series among those who received first vaccination ($n = 5,088$): Active duty: 233/1424 (16%) Dependent daughters: 1265/2924 (43%) Dependent spouses: 157/740 (21%)

minimize the burden of HPV-related diseases among those in the military. The HPV vaccine is a TRICARE covered benefit,⁵⁶ yet a 2011 study conducted at a Naval medical center found that only 16% of active duty women completed the three-vaccination series compared to 43% of dependent daughters and 21% of dependent spouses.⁵⁷ Some active duty women may have deployed or relocated and completed the vaccination series at other facilities, yet it is still likely that the vaccination rate could be improved. Further studies on the rate of HPV vaccination among active duty servicewomen are needed (Table 4B).

Women Veterans

In comparison to active duty servicewomen, little is known about the sexual risk-taking behaviors among female veterans. The prevalence of high-risk behaviors, including having multiple concurrent sexual partners and unintended sex after substance use, appears to decrease after women leave military service.²⁷ Even with a reduction in these behaviors, however, female veterans may still be at risk. In a survey of 999 female veterans, 28% reported that their sexual partner had concurrent partners, and 17% reported having unintended sex after drinking alcohol or using drugs²⁷ (Table 5). It is unknown if these high-risk sexual practices translate into high rates of STIs among women veterans.

There is a paucity of literature on the prevalence of cervical dysplasia and HPV infection within the military veteran population, but evidence suggests that the burden of these genital tract diseases are greater among these women compared to U.S. women on the whole. In a study evaluating the relationship between sexual assault and cervical dysplasia conducted among female veterans who were enrolled in VA care, 16% of women had one or more abnormal Pap tests within the past 5 years.²⁷ Among those with an abnormal screening test, 48% were low-grade or high-grade SIL or carcinoma *in situ*.²⁷ Victims of lifetime sexual assault were more likely than women without this history to have an abnormal Pap test.²⁷ Furthermore, women who reported military sexual assault were also more likely to self-report infection with HPV compared to those who did not experience sexual assault while in the military²⁷ (Table 5).

Regarding cervical cancer screening, evaluation of 144 VA medical centers revealed an average national screening rate of 90% among women veterans.⁵⁸ Screening rates were higher in clinics with a greater proportion of female patients and when quality improvement programs were implemented⁵⁸ (Table 5). Despite VA recommendations for routine cervical cancer screening, a qualitative study of female veterans found that although most women received cervical cancer screening at the VA, some were not aware that Pap tests were performed at VA medical centers.⁵⁹ It is unknown if female veterans who are eligible for HPV vaccination receive this service.

Conclusions

Several studies among groups of U.S. military women suggest that this population may be at high risk for STIs and HPV-related disease. This review of the available literature reveals gaps that should be investigated as part of efforts to improve the reproductive health of U.S. military women. Most data on high-risk behaviors and STIs in military women comes from studies of new recruits or those who are early in their military careers. It is unknown if the military environ-

ment leads to high-risk sexual practices or if those who join the military are more likely to engage in high-risk behaviors because of demographic factors that are independent of their military status. Furthermore, there are limited data on the prevalence of high-risk sexual practices that can cause STIs and cervical dysplasia in older servicewomen and veterans. Research investigating the true risk factors for STIs and cervical dysplasia among military women are needed.

Detection of chlamydia may be higher among servicewomen compared to the general population because military policy dictates that all female recruits, not just those seeking screening, be tested,⁶⁰ but direct comparison of STI rates between military and civilian women who seek screening are unavailable. Although routine STI screening occurs for female military recruits, Reserve and National Guard members who can seek care outside of military treatment facilities may also be at high risk but may not be screened. Female veterans may also have similar risk factors for STI acquisition, but prevalence of infection and rates of screening are unknown in this population. Evaluation of STI prevalence in active duty servicewomen, Reserve and National Guard members, and female veterans compared to civilian women are needed to determine if servicewomen are a truly high-risk group that could benefit from targeted interventions.

Sexual assault during military service may place servicewomen at risk for STIs, including HPV infection, and cervical dysplasia, but further research evaluating these relationships is necessary. The American College of Obstetricians and Gynecologists recommends immediate availability of prophylaxis against STIs for victims of sexual assault.⁶¹ But servicewomen who are victims of sexual assault are unlikely to report trauma. In a study of women veterans, only 26% who were raped during military service reported the assault to a military official, and 31% sought medical attention.⁶² Among those who seek care, it is unknown how many get screened, test positive, or receive prophylactic medications for STIs. Only one study has evaluated the relationship between military sexual trauma and cervical dysplasia.²⁷ Cervical cancer screening programs targeted to victims of military sexual assault may be warranted, but this association needs to be evaluated in a variety of veteran populations.

Cervical cancer screening rates are high among both active duty and veteran women. However, the available literature suggests that rates of cervical dysplasia may be higher for military women compared to those in the general population. Costs associated with evaluation and treatment of abnormal Pap tests may be averted with greater implementation of the HPV vaccine in eligible military women. Although the HPV vaccination is covered by TRICARE and available on the VA formulary,^{56, 63} limited data show that few military women use this service. Additionally, among those who receive HPV vaccination, it is unknown how many go on to develop cervical dysplasia, given that not all high-risk HPV types are covered in the vaccine.⁶⁴ Greater collaboration between DOD and VA medical facilities will allow for a unique opportunity to follow vaccinated women over time to assess disease outcomes.

The population of active duty and veteran women is increasing. These women may seek healthcare services from a variety of sources, including military facilities, VA medical centers, and civilian physicians. Thus, all healthcare providers need to understand the reproductive health issues of this population. Active duty servicewomen may be at higher risk for STIs, including HPV-related diseases, than civilian women.

TABLE 5. VETERAN WOMEN: SUMMARY OF STUDIES

<i>Study</i>	<i>Study group</i>	<i>Demographic characteristics</i>	<i>Sample size</i>	<i>Outcome of interest</i>
Sadler, 2011 ²⁷	Women ≤51 years old enrolled at Iowa City or Des Moines VA medical centers or clinics	Age: mean 38.3 Race/ethnicity: 80% white, non-Hispanic Marital status: 22.7% single, 44.1% married, 33.1% divorced Education: 15.2% high school/GED, 56.3% some college/technical training, 28.5% completed college or more Military rank: 94.8% enlisted	999	Multiple sexual partners Partner with concurrent sexual partners: 30% before military service 42% during military service 28% after military service Binge drinking Unintended sex at least once after alcohol or drug use: 24% before military service 33% during military service 17% after military service Cervical dysplasia Self-reported Pap test results confirmed by medical record abstraction: 97% had Pap test within past 5 years 57% self-reported at least one abnormal Pap test in her lifetime 13% abnormal Pap test in past year 17% had abnormal Pap test identified by VA chart review Low-grade SIL: 32% High-grade SIL: 12% Carcinoma <i>in situ</i> : 5% Odds of abnormal Pap test among women with history of sexual assault compared to women with no assault: OR 1.64, 95% CI 1.25–2.14 Self-reported HPV history: 21% at least one sexual assault during military service, 13% no sexual assault during military service, 12% no sexual assault ever ($p < 0.002$) Cervical cancer screening 90% average screening rate, range 60%–100% Higher screening rates associated with higher rewards and recognition scores for staff efforts to improve service quality, greater commitment to quality improvement, performance goals linked to quality, large vs. small academic sites, and sites with large female veteran caseloads
Goldzweig, 2004 ⁵⁸	Survey of VA medical center primary care directors and staff	N/A	144 VA medical centers	

Female veterans may share the same risk factors for these diseases as active duty servicewomen, yet little is known about the prevalence of STIs among female veterans. To adequately address the healthcare needs of this growing population, further research into their unique reproductive health issues is necessary.

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Disclosure Statement

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References

1. U.S. Census Bureau. Veterans: Definitions and Concepts. U.S. Census Bureau, 2010. Available at www.census.gov/hhes/veterans/about/definitions.html Accessed July 14, 2011.
2. Bean-Mayberry B, Huang C, Batuman F, et al. Systematic review of women veterans health research 2004–2008. Department of Veterans Affairs, 2010. Available at www.hsrd.research.va.gov/publications/esp/womens-health.pdf Accessed March 31, 2011.
3. Holder K. Post 9/11 women veterans. Proceedings of the Annual Meeting of the Population Association of America, April 15–17, 2010, Dallas, TX: Housing and Household Economic Statistics Division, U.S. Census Bureau, 2010.
4. Washington DL, Sun S, Canning M. Creating a sampling frame for population-based veteran research: Representativeness and overlap of VA and Department of Defense databases. *J Rehabil Res Dev* 2010;47:763–771.
5. Yano EM, Hayes P, Wright S, et al. Integration of women veterans into VA quality improvement research efforts: What researchers need to know. *J Gen Intern Med* 2010;25 (Suppl 1):56–61.
6. VA. Department of Veterans Affairs Health Care Overview. Department of Veterans Affairs, 2009 Available at www.va.gov/healtheligibility/library/pubs/healthcareoverview/#PriorityGroups Accessed June 27, 2011.
7. Veteran Population Projections Model (VetPop). Projected female veteran population 17 years and older: 2000 to 2036. Department of Veterans Affairs, 2007. Available at www.va.gov/vetdata/docs/quickfacts/Population-slideshow.pdf Accessed June 24, 2011.
8. Department of Defense. Dictionary of military terms. Department of Defense, 2010. Available at www.dtic.mil/doctrine/dod_dictionary/ Accessed July 14, 2011.
9. Military Advantage. TRICARE prime overview, 2011. Available at www.military.com/benefits/tricare/tricare-prime/tricare-prime-overview Accessed July 14, 2011.
10. Seal KH. Prepared statement of Karen H. Seal, M.D., M.P.H., Department of Medicine and Psychiatry, San Francisco Department of Veterans Affairs Medical Center, Veterans Health Administration, U.S. Department of Veterans Affairs. House Committee on Veterans Affairs, 2011. Available at veterans.house.gov/prepared-statement/prepared-statement-karen-h-seal-md-mph-department-medicine-and-psychiatry-san Accessed July 14, 2011.
11. Department of Defense. FY 2007 population representation in the military services: Department of Defense, 2007. Available at prhome.defense.gov/mpp/ACCESSION%20POLICY/PopRep2007/download/ExecSum2007.pdf Accessed March 31, 2011.
12. Eggleston E, Rogers SM, Turner CF, et al. *Chlamydia trachomatis* infection among 15- to 35-year-olds in Baltimore, MD. *Sex Transm Dis* 2011;38:743–749.
13. Navarro C, Jolly A, Nair R, Chen Y. Risk factors for genital chlamydial infection. *Can J Infect Dis* 2002;13:195–207.
14. Datta SD, Sternberg M, Johnson RE, et al. Gonorrhea and chlamydia in the United States among persons 14 to 39 years of age, 1999 to 2002. *Ann Intern Med* 2007;147:89–96.
15. Datta SD, Koutsky LA, Ratelle S, et al. Human papillomavirus infection and cervical cytology in women screened for cervical cancer in the United States, 2003–2005. *Ann Intern Med* 2008;148:493–500.
16. Kahn JA, Lan D, Kahn RS. Sociodemographic factors associated with high-risk human papillomavirus infection. *Obstet Gynecol* 2007;110:87–95.
17. RTI International. Department of Defense survey of health related behaviors among active duty military personnel. RTI International, 2006. Available at www.ha.osd.mil/special_reports/2005_Health_Behaviors_Survey_1-07.pdf Accessed June 27, 2011.
18. O'Rourke K, Richman A, Roddy M, Custer M. Does pregnancy/paternity intention predict contraception use? A study among U.S. soldiers who have completed initial entry training. *J Fam Plann Reprod Health Care* 2008;34:165–168.
19. Borsay-Trindle LA, Pass CM, Gilzean SM. Unplanned pregnancy among active-duty Army females as a readiness issue. *Mil Med* 1991;156:82–86.
20. Meyers D, Wolff T, Gregory K, et al. USPSTF recommendations for STI screening. *Am Fam Physician* 2008;77:819–824.
21. Klein DA, Adelman WP. Adolescent pregnancy in the U.S. military: What we know and what we need to know. *Mil Med* 2008;173:658–665.
22. von Sadvoszky V, Ryan-Wenger N, Germann S, Evans M, Fortney C. Army women's reasons for condom use and nonuse. *Womens Health Issues* 2008;18:174–180.
23. Anderson JE, Mosher WD, Chandra A. Measuring HIV risk in the U.S. population aged 15–44: Results from Cycle 6 of the National Survey of Family Growth. *Adv Data* 2006:1–27.
24. Duke MR, Ames GM. Challenges of contraceptive use and pregnancy prevention among women in the U.S. Navy. *Qual Health Res* 2008;18:244–253.
25. Gaydos CA, Howell MR, Pare B, et al. *Chlamydia trachomatis* infections in female military recruits. *N Engl J Med* 1998; 339:739–744.
26. Santelli JS, Brener ND, Lowry R, Bhatt A, Zabin LS. Multiple sexual partners among U.S. adolescents and young adults. *Fam Plann Perspect* 1998;30:271–275.
27. Sadler AG, Mengeling MA, Syrop CH, Torner JC, Booth BM. Military service, life span sexual assault exposures, and cervical cytologic abnormalities. *J Womens Health* 2011;20:1693–1701.
28. Naimi TS, Brewer RD, Mokdad A, Denny C, Serdula MK, Marks JS. Binge drinking among US adults. *JAMA* 2003; 289:70–75.
29. Boyer CB, Pollack LM, Becnel J, Shafer MA. Relationships among sociodemographic markers, behavioral risk, and sexually transmitted infections in U. S. female Marine Corps recruits. *Mil Med* 2008;173:1078–1084.
30. Shafer MA, Boyer CB, Pollack LM, Moncada J, Chang YJ, Schachter J. Acquisition of *Chlamydia trachomatis* by young

- women during their first year of military service. *Sex Transm Dis* 2008;35:255–259.
31. Jordan NN, Lee SE, Nowak G, Johns NM, Gaydos JC. *Chlamydia trachomatis* reported among U.S. active duty service members, 2000–2008. *Mil Med* 2011;176:312–319.
 32. Thomas AG, Brodine SK, Shaffer R, et al. Chlamydial infection and unplanned pregnancy in women with ready access to health care. *Obstet Gynecol* 2001;98:1117–1123.
 33. Brodine SK, Shafer MA, Shaffer RA, et al. Asymptomatic sexually transmitted disease prevalence in four military populations: Application of DNA amplification assays for *Chlamydia* and gonorrhea screening. *J Infect Dis* 1998;178:1202–1204.
 34. Miller WC, Ford CA, Morris M, et al. Prevalence of chlamydial and gonococcal infections among young adults in the United States. *JAMA* 2004;291:2229–2236.
 35. Zenilman JM, Glass G, Shields T, Jenkins PR, Gaydos JC, McKee KT, Jr. Geographic epidemiology of gonorrhoea and chlamydia on a large military installation: Application of a GIS system. *Sex Transm Infect* 2002;78:40–44.
 36. Sena AC, Miller WC, Hoffman IF, et al. Trends of gonorrhea and chlamydial infection during 1985–1996 among active-duty soldiers at a United States Army installation. *Clin Infect Dis* 2000;30:742–748.
 37. Aldous WK, Robertson JL, Robinson BJ, et al. Rates of gonorrhea and *Chlamydia* in U.S. military personnel deployed to Iraq and Afghanistan (2004–2009). *Mil Med* 2011;176:705–710.
 38. Barnett SD, Brundage JF. Incidence of recurrent diagnoses of *Chlamydia trachomatis* genital infections among male and female soldiers of the US Army. *Sex Transm Infect* 2001;77:33–36.
 39. Hwang LY, Shafer MA, Pollack LM, Chang YJ, Boyer CB. Sexual behaviors after universal screening of sexually transmitted infections in healthy young women. *Obstet Gynecol* 2007;109:105–113.
 40. Bautista CT, Sateran WB, Singer DE, Carr JK, Birx DL, Sanchez JL. Trends in HIV prevalence among white and African-American civilian applicants for United States Military Service, 1985 to 2003. *J Acquir Immune Defic Syndr* 2006;42:68–74.
 41. Bautista CT, Sateran WB, Sanchez JL, et al. HIV incidence trends among white and African-American active duty United States Army personnel (1986–2003). *J Acquir Immune Defic Syndr* 2006;43:351–355.
 42. Renzullo PO, Sateran WB, Garner RP, Milazzo MJ, Birx DL, McNeil JG. HIV-1 seroconversion in United States Army active duty personnel, 1985–1999. *AIDS* 2001;15:1569–1574.
 43. Ollayos CW, Peterson M. Relative risks for squamous intraepithelial lesions detected by the Papanicolaou test among Air Force and Army beneficiaries of the Military Health Care System. *Mil Med* 2002;167:719–722.
 44. Stany MP, Bidus MA, Reed EJ, et al. The prevalence of HR-HPV DNA in ASC-US Pap smears: A military population study. *Gynecol Oncol* 2006;101:82–85.
 45. Ollayos CW, Swogger KA. Abnormal cervical smears in the military recruit population. *Mil Med* 1995;160:577–578.
 46. Stafford EM, Stewart RS, Jr., Teague GR, et al. Detection of human papillomavirus in cervical biopsies of summer camp ROTC cadets with abnormal Papanicolaou smears. *J Pediatr Adolesc Gynecol* 1996;9:119–124.
 47. Insinga RP, Glass AG, Rush BB. Diagnoses and outcomes in cervical cancer screening: A population-based study. *Am J Obstet Gynecol* 2004;191:105–113.
 48. Shah KV, Daniel RW, Tennant MK, et al. Diagnosis of human papillomavirus infection by dry vaginal swabs in military women. *Sex Transm Infect* 2001;77:260–264.
 49. Rompalo AM, Gaydos CA, Shah N, et al. Evaluation of use of a single intravaginal swab to detect multiple sexually transmitted infections in active-duty military women. *Clin Infect Dis* 2001;33:1455–1461.
 50. Dunne EF, Unger ER, Sternberg M, et al. Prevalence of HPV infection among females in the United States. *JAMA* 2007;297:813–819.
 51. VA. Cervical cancer screening. Department of Veterans Affairs, 2009. Available at www.hiv.va.gov/provider/manual-primary-care/cancer-screening.asp#S5X Accessed August 30, 2011.
 52. Department of Defense TRICARE: Changes included in the National Defense Authorization Act for fiscal year 2007: Improvements to descriptions of cancer screening for women. Final rule. *Fed Regist* 2010;75:47460–47461.
 53. Thomson BA, Nielsen PE. Women's health care in Operation Iraqi Freedom: A survey of camps with echelon I or II facilities. *Mil Med* 2006;171:216–219.
 54. Nielsen PE, Murphy CS, Schulz J, et al. Female soldiers' gynecologic healthcare in Operation Iraqi Freedom: A survey of camps with echelon three facilities. *Mil Med* 2009;174:1172–1176.
 55. Brown DS, Kurlantzick VG, McCall NT, Williams TV, Gantt CJ, Granger E. Use of six clinical preventive services in TRICARE Prime compared to insured, managed care, and all U.S. populations and *Healthy People 2010*. *Prev Med* 2009;48:389–391.
 56. TRICARE Management Activity. TRICARE benefit covers HPV vaccine, 2007. Available at www.tricare.mil/press-room/news.aspx?fid=266 Accessed August 30, 2011.
 57. Shen-Gunther J, Shank JJ, Ta V. Gardasil HPV vaccination: Surveillance of vaccine usage and adherence in a military population. *Gynecol Oncol* 2011;123:272–277.
 58. Goldzweig CL, Parkerton PH, Washington DL, Lanto AB, Yano EM. Primary care practice and facility quality orientation: Influence on breast and cervical cancer screening rates. *Am J Manag Care* 2004;10:265–272.
 59. Mattocks KM, Nikolajski C, Haskell S, et al. Women veterans' reproductive health preferences and experiences: A focus group analysis. *Womens Health Issues* 2011;21:124–129.
 60. Diniega B. *Chlamydia* screening of female recruits: Department of Defense, 2007 (vol 2011).
 61. Kuehn BM. Group advises clinicians to routinely screen women for sexual assault history. *JAMA* 2011;306:1072.
 62. Sadler AG, Booth BM, Cook BL, Doebbeling BN. Factors associated with women's risk of rape in the military environment. *Am J Ind Med* 2003;43:262–273.
 63. VA. Formulary decisions: Pharmacy benefits management-medical advisory panel, 2007. Department of Veterans Affairs, 2007. Available at www.pbm.va.gov/ezminutes/EzMinutes%20April-June%2007.pdf Accessed September 26, 2011.
 64. American College of Obstetricians and Gynecologists. Practice bulletin No. 109: Cervical cytology screening. *Obstet Gynecol* 2009;114:1409–1420.

Address correspondence to:

Vinita Goyal, M.D., M.P.H.

Department of Obstetrics and Gynecology

Women and Infants' Hospital

101 Dudley Street

Providence, RI 02905

E-mail: vgoyal@wihri.org