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STI diagnosis and HIV testing among OEF/OIF/OND Veterans

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Abstract

Importance—Patients with an STI diagnosis should be tested for HIV, regardless of previous HIV test results.

Objective—Estimate HIV testing rates among recent service Veterans with an STI diagnosis and variation in testing rates by patient characteristics.

Design, setting, and participants—The sample comprised 243,843 Veterans who initiated Veterans Health Administration (VHA) services within one year after military separation. Participants were followed for two years to determine STI diagnoses and HIV testing rates. We used relative risks regression to examine variation in testing rates.

Main outcomes and measures—We used VHA administrative data to identify STI diagnoses and HIV testing and results.

Results—Veterans with an STI diagnosis ($n=1,815$) had higher HIV testing rates than those without (34.9% vs. 7.3%, $p<0.0001$), but were not more likely to have a positive test result (1.1% vs. 1.4%, $p=0.53$). Among Veterans with an STI diagnosis, testing increased from 25% to 45% over the observation period; older age was associated with a lower rate of testing, while race and ethnicity, multiple deployments, PTSD, and substance abuse disorders were associated with a higher rate.

Conclusions and Relevance—Since VHA implemented routine HIV testing, overall rates of testing have increased. However, among Veterans at significant risk for HIV because of an STI diagnosis, only 45% had an HIV test in the most recent year of observation. Other patient

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characteristics such as alcohol and drug abuse were associated with being tested for HIV. Providers should be reminded that an STI is a sufficient reason to test for HIV.

Keywords

HIV; sexually transmitted infections; Veterans

Introduction

While the Centers for Disease Control and Prevention (CDC) recommends universal HIV testing for individuals aged 13–64 (1), nearly 200,000 Americans are unaware of their HIV infection. More frequent HIV testing for high risk individuals, such as those diagnosed with an STI, may help reduce that number as STIs can facilitate HIV transmission through direct, biological mechanisms. Over 20 million new sexually transmitted infections (STIs) occur each year in the US.(2–4) Between 2006 and 2011, rates increased 10% among men and women aged 20 to 39 years of age, and among young black men the rate of syphilis increased 134%.(5) However, HIV-testing among patients diagnosed with an STI is sub-optimal.(6)

Since 2001, over 1.5 million US Armed Forces personnel have deployed at least once in support of Operations Enduring Freedom, Iraqi Freedom, and New Dawn (OEF/OIF/OND), and over 1 million Veterans have returned from service. Data on HIV testing among Veterans are important. First, military populations have higher STIs rates compared to the civilian population, rates increase during times of armed conflict,(7–9) and STI risk behaviors may continue past the end of service.(10–12) Second, Veterans are younger and more likely to be racial and ethnic minorities,(13) groups disproportionately affected by both STIs and HIV.(2) Third, conditions which increase both STI and HIV risk, including substance abuse and post-traumatic stress disorder (PTSD), are prevalent among Veterans in Veterans Health Administration care (VHA).(14, 15)

CDC recommends HIV testing for individuals who are diagnosed with or suspected to have an STI.(16) Therefore, we sought to determine HIV testing rates among recently separated Veterans in VHA care diagnosed with an STI. We hypothesized that, among Veterans with an STI diagnosis, HIV testing would be associated with demographic, military service-related, and clinical characteristics, and that higher rates would be found in patients with additional HIV risk factors, including substance abuse diagnosis, race, and younger age.

Methods

Study Population

The study population comprised Veterans on the OEF/OIF/OND roster provided by the Defense Manpower Data Center—Contingency Tracking System Deployment File to the Women Veterans Cohort Study.(17) The roster contained information on 756,576 personnel who separated from the U.S. military between 09/11/2001 and 09/30/2013, and who enrolled for VHA services. We limited the sample to 244,195 Veterans who had at least one VHA primary care encounter (stop codes 310, 322, 323) between 01/01/2004 and 12/31/2010 that

occurred within one year after their military separation date. We applied these criteria because STI diagnoses typically occur in primary care, to allow for one year of observation to diagnose an STI, and an additional year after the STI diagnosis to allow time for HIV testing. We excluded Veterans diagnosed with HIV more than seven days prior to an STI diagnosis (n=6), and those who died within the first year of observation (n=346). The analytic sample included 243,843 Veterans. The study was approved by the Research and Development Committee at VA Connecticut Healthcare System (West Haven, CT) and the Human Investigation Committee at the Yale School of Medicine (New Haven, CT).

Data Sources

The roster includes data on sex, date of birth, race, last military rank (e.g. officer), branch (e.g. Army), and deployment dates. International Classification of Diseases, Ninth Revision, Clinical Modification (ICD9) codes for STI and comorbid conditions were ascertained from the VHA Corporate Data Warehouse. We searched for ICD9 codes used by the Armed Forces Surveillance Center report on STIs: chlamydia, gonorrhea, herpes simplex virus (HSV), and syphilis diagnostic codes, except for human papillomavirus (HPV), as many of these are non-venereal infections (Table 1). (18)

ICD9 comorbidity codes were mapped into validated groupings, such as major depressive disorder (MDD).(19) A Veteran was considered to have a comorbid condition if codes occurred on two or more outpatient or one or more inpatient visit(s).(20, 21) We examined high prevalence chronic conditions that were likely active at the time of the STI diagnosis, and that may be associated with risk for HIV. We then searched laboratory data for evidence of HIV testing and test results within one year after the STI among those with an STI. We counted tests conducted up to seven days before the STI diagnosis to account for reporting delays.

We validated the use of ICD9 codes to identify STI diagnoses in our cohort. Two clinicians (JW, CB) reviewed the clinical progress notes of 100 randomly selected patients (50 with an STI diagnosis and 50 without). JW is a nurse midwife and advanced practice nurse, and CB is a medical doctor. Among those with a diagnosis, the reviewers verified that the participant had the STI identified by ICD9 code. Among those without an STI code, reviewers verified that no STI diagnosis occurred within the observation period. Agreement between an ICD code based STI diagnosis and clinician review was kappa=0.80 (95% CI 0.69–0.92).(22)

Analysis

We used Poisson regression with a log link and robust variance estimates to calculate relative risks (RR) and 95% confidence intervals (95% CI). All variables were entered into the model as covariates. Analyses were performed using SAS 9.2.

Results

The mean age of the sample (N=243,843) was 31 years (range 18–69), 60% were White, and 88% were male. A majority had served in the Army (76%), and 46% had multiple deployments. Nearly 6% were diagnosed with major depressive disorder, 7% with alcohol

use disorder, 2% with drug use disorder, and 22% with PTSD. The median length of time between military separation and first VHA primary care encounter was 145 days.

In this sample, 1,815 (0.74%) Veterans had one or more STI diagnoses. Older Veterans were less likely to be diagnosed with an STI (RR=0.97 per year of age, 95% CI 0.96–0.97), while women (RR=2.94, 95% CI 2.64–3.26), Blacks (2.02, 95% CI 1.79–2.29) and Hispanics (1.22 95% CI 1.05–1.42) were more likely. Air Force (1.34, 95% CI 1.11–1.62), Marine Corps (1.16, 95% CI 1.00–1.35), and Navy (1.57, 95% CI 1.35–1.83) Veterans were significantly more likely to have a diagnosis compared to those who served in the Army, as were those with multiple deployments (1.15, 95% CI 1.04–1.26). A diagnosis of MDD (1.19, 95% CI 1.00–1.42), alcohol disorder (1.29, 95% CI 1.08–1.53), drug use disorder (1.60, 95% CI 1.24–2.07), and PTSD (1.30, 95% CI 1.16–1.46) were associated with significantly higher rates of diagnoses. (Table 2)

There were 18,264 HIV tests documented from 2004 through 2010. Overall, HIV testing rates increased from 4.7% in 2004 to 14.2% in 2010. Among Veterans with an STI diagnosis, HIV testing rates increased from 24.5% to 45.1% in the same period.

Veterans with an STI diagnosis were significantly more likely to have had an HIV test than those without (34.9% vs. 7.3%, $p<0.0001$). Among Veterans with an STI diagnosis, older age was associated with a lower rate of HIV testing (0.97, 95% CI 0.96–0.98), while Black race (1.33, 95% CI 1.14–1.55) and Hispanic ethnicity (1.44, 95% CI 1.21–1.72), Marine Corps service (1.18, 95% CI 1.02–1.37), multiple deployments (1.14, 95% CI 1.00–1.29), alcohol (1.21, 95% CI 1.01–1.46), drug use (1.42, 95% CI 1.12–1.79), and PTSD (1.15 95% CI, 1.00–1.32) were associated with higher rates of HIV testing.

While Veterans with an STI diagnosis had higher HIV testing rates than those without (34.9% vs. 7.3%, $p<0.0001$), they were not more likely to have a positive test result (1.1% vs. 1.4%, $p=0.53$).

Discussion

Our study demonstrates that recent Veterans with an STI diagnosis were significantly more likely to have had an HIV test than those without. However, less than half of these Veterans were tested for HIV. Even more concerning is the fact that HIV testing among those with an STI diagnosis varied by Veteran characteristics, some of which are associated with higher risk for HIV, such as substance use disorders. This suggests that having an STI alone was not sufficient to prompt HIV testing.

These results are best understood in the context of VHA policy on HIV testing. Prior to 2009, VHA focused on risk-based testing and written informed consent, in addition to pre and post-test counseling. In August of 2009, VHA updated its HIV testing policy to include testing all adults of any age at least once, and its informed consent policy to eliminate the need for pre- and post-test counseling and require only verbal consent.(23, 24) In conjunction with these policy changes, VHA developed and implemented an electronic reminder to both prompt and facilitate HIV testing.(25) Finally, VHA has had numerous successes expanding HIV testing beyond the primary care provider to include other points of

contact such as emergency department care (26), nurse initiated rapid testing (27) and mental health.(28) Our study covers the five years prior to this change and the two years post. Therefore, the very high rates of HIV seropositivity seen in our study likely reflect risk-based rather than universal testing.

In addition to universal testing, the VHA Directive 2009–036 specifically states that “(a)ll patients who are documented to be HIV negative and who have risk factors or clinical indications of HIV must be tested for HIV at least annually, provided they consent.” ((24)pg. 4) Risk factors listed include: injection drug use, being a sexual partner of an injection drug user, exchanging sex for money or drugs, being a sexual partner of someone who is infected with HIV, men who have sex with men, and heterosexuals who have had or whose sexual partners have had more than one sexual partner since their most recent HIV test.(24) It is possible that because an STI diagnosis was not included on this list that an STI diagnosis was not sufficient to trigger HIV testing. It is also possible that an HIV test was offered, but the patient refused. Rewording the Directive, and providing patient education about the importance of HIV testing may encourage more appropriate HIV testing.

Our study has a number of limitations. Unlike the armed services, VHA does not have an active STI surveillance program, and we are not able to assess the true rate of STIs in the Veteran population. Thus our results highlight rates of STI diagnoses and not rates of STIs. Furthermore, as the analysis was based on ICD-9 codes, there is a risk for misclassification. However, our validation of an STI diagnosis by chart review demonstrated a high level of agreement between expert assessment of the patient record and ICD-9 code. We were also unable to differentiate between incident and prevalent STI diagnoses for persons identified with chronic STI conditions such as HSV. Finally, cohort members were only assessed for one or two years, depending on their STI status. It is likely that a subset of patients with an STI diagnosis may have had another, or multiple other, STI diagnoses over the follow-up period. Nevertheless, the occurrence of a single STI clearly demonstrates risk for HIV and a need for testing. The variations in STI diagnosis rates by prior military service characteristics may reflect differences in availability and/or attention to comprehensive exams during deployment.

Strengths of the study include a large and diverse national sample, and the use of standardized EHR data using ICD-9-CM codes which were validated by chart reviews conducted by clinical experts. OEF/OIF/OND Veterans are more likely to enroll for VHA care than prior military cohorts, and the national integrated healthcare system and EHR allow for a fuller assessment than may be possible from more fractured care settings. In addition, most data on STIs and HIV in military personnel come from studies of new recruits or those on active duty, and not among recent Veterans.(29) Risk behaviors for STI and HIV may persist among recent Veterans returning to their communities; however routine surveillance is no longer performed.

Our work demonstrates that rates of HIV testing among recent Veterans with an STI diagnosis are suboptimal, highlighting the need for further research to explore barriers to testing. Rates of HIV testing in general, however, had increased over the course of the study,

particularly after 2009, suggesting that the VHA policy on universal testing may lead to better identification of and earlier entry into care for Veterans infected with HIV.

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Table 1

Diagnostic codes (ICD-9-CM) for sexually transmitted infections (STI)

Condition	Diagnostic code(s)
Chlamydia	099.41, 099.5
Gonorrhea	098.xx
Herpes simplex (HSV)	054.xx
Syphilis	090.xx, 091.xx, 092.xx, 093.xx, 094.xx, 095.xx, 096.xx, 097.xx

Table 2

Veteran demographic and clinical characteristics and results of relative rates (RR) regressions for STI and HIV testing

	N (%)	% with STI diagnosis	RR of STI diagnosis	RR of HIV-test among STI+
Patients: N	243,843	1,815	N=243,843	N=1,815
Age: mean (SD)	31.4 (9.6)	28.8 (8.3)	0.97 (0.96–0.97)	0.97 (0.96–0.98)
Sex				
Female	29,151 (12.0)	1.9	2.94 (2.64–3.26)	1.04 (0.91–1.20)
Male	214,689 (88.0)	0.6	ref	ref
Race/Ethnicity				
Black	28,880 (11.8)	1.4	2.02 (1.79–2.29)	1.33 (1.14–1.55)
Hispanic	26,864 (11.0)	0.8	1.22 (1.05–1.42)	1.44 (1.21–1.72)
Other	9,627 (3.9)	0.5	0.76 (0.58–1.01)	1.28 (0.88–1.87)
Unknown	33,153 (13.6)	0.8	1.27 (1.10–1.46)	1.06 (0.87–1.29)
White	145,319 (59.6)	0.6	ref	ref
Branch				
Air Force	14,781 (6.1)	0.8	1.34 (1.11–1.62)	0.89 (0.66–1.18)
Marine Corps	26,394 (10.8)	0.8	1.16 (1.00–1.35)*	1.15 (0.96–1.37)
Navy	17,556 (7.2)	1.1	1.57 (1.35–1.83)	0.88 (0.70–1.11)
Army	185,112 (75.9)	0.7	ref	ref
Multiple deployments				
No	131,872 (54.1)	0.7	ref	ref
Yes	111,971 (45.9)	0.8	1.15 (1.04–1.26)	1.14 (1.00–1.29)*
MDD				
No	230,329 (94.5)	0.7	ref	ref
Yes	13,514 (5.5)	1.2	1.19 (1.00–1.42)*	1.05 (0.85–1.28)
Alcohol use disorder				
No	226,114 (92.7)	0.7	ref	ref
Yes	17,729 (7.3)	1.1	1.29 (1.08–1.53)	1.21 (1.01–1.46)
Drug use disorder				
No	238,917 (98.0)	0.7	ref	ref
Yes	4,926 (2.0)	1.5	1.60 (1.24–2.07)	1.42 (1.12–1.79)
PTSD				
No	189,523 (77.7)	0.7	ref	ref
Yes	54,320 (22.3)	0.9	1.30 (1.16–1.46)	1.15 (1.00–1.32)*

* p<0.05